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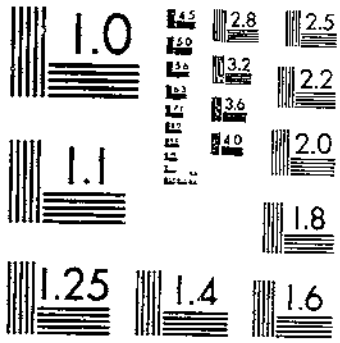
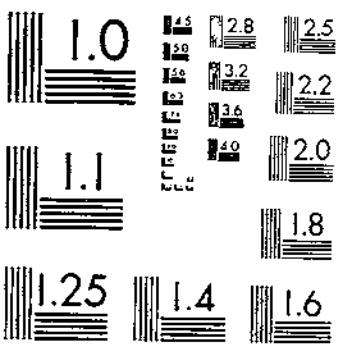


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



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UNITED STATES DEPARTMENT OF AGRICULTURE
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IRRIGATION DISTRICTS,[1] THEIR ORGANIZATION, OPERATION AND FINANCING

By WELLS A. HUTCHINS

Irrigation Economist, Division of Agricultural Engineering, Bureau of Public Roads

CONTENTS

[1] This bulletin supersedes Department Bulletin 1177, Irrigation District Operation and Finance, published in 1923 and presenting information as of Dec. 31, 1921. It brings the information on irrigation districts for the 17 Western States down to Dec. 31, 1928, except where specific reference is made otherwise. The bulletin was prepared under the direction of W. W. McLaughlin, associate chief, division of agricultural engineering, Bureau of Public Roads. The field work was done by Paul A. Ewing, Guy Ervin, and the author. Most of the data concerning California districts were obtained under the direction of Frank Adams, irrigation economist, University of California, under a cooperative agreement between the California State Department of Public Works, University of California, and the U. S. Department of Agriculture and were published in 1929 (2).[2] Valuable information has been furnished by State engineers or corresponding officials of the other States, by officers of individual districts, and by engineers, attorneys, bond dealers, and others actively connected with irrigation district affairs.

[2] Italic numbers in parentheses refer to Literature Cited, p. 92.

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INTRODUCTION

The unfavorable agricultural conditions that have prevailed since the publication of Department Bulletin 1177 have affected many irrigation districts adversely and have led to less favorable showings for certain groups than in 1921. Other groups, on the contrary, have maintained their 1921 standing. While developments of recent years have shown a large number of districts to be unfeasible according to present-day standards, the usefulness of the district as an operating organization or as a means of effecting development for which a real need exists, has not been impaired.

SCOPE OF BULLETIN

The data in this bulletin, with exceptions noted below, refer only to districts organized under the Wright Act of California, as amended and reenacted, and to the irrigation-district statutes of the other 16 Western States based upon the Wright Act.

Montana has irrigation districts of two classes governed by separate statutes. The older class is independent of the Montana Irrigation Commission; the other is under its jurisdiction. There is no other distinction, and until 1929 districts of the first class could elect to join the second. Both groups are included herein.

Texas has several kinds of districts concerned with irrigation, the most important being water-improvement districts and water-control and improvement districts. The laws governing water-control and improvement districts go far beyond the scope and purpose of the original irrigation district law. Nearly all such districts formed to the present time, however, are primarily irrigation projects, and a number of water-improvement districts have assumed the status of water control and improvement districts without altering their main purposes. The present situation is such that a separation of these groups in this bulletin would be impracticable.

Several other States have districts concerned with irrigation, in addition to irrigation districts, their status being less closely interwoven with that of the original irrigation districts than in the Montana and Texas cases cited. Their activities are referred to under Irrigation District Development (p. 70), but data concerning them are not otherwise included.

DEFINITION AND ATTRIBUTES OF THE IRRIGATION DISTRICT

The irrigation district may be defined as a public or quasi municipal corporation organized under State laws for the purpose of providing a water supply for the irrigation of lands embraced within its boundaries, empowered to issue bonds, and deriving its revenue primarily from assessments levied upon the land.

The fundamental attributes of an irrigation district are:

It is a public corporation, a political subdivision of a State with defined geographical boundaries. It is created under authority of the State legislature through designated public officials or courts at the instance and with the consent of a designated fraction of the

landowners or of the citizens, as the case may be, of the particular territory involved. Being public and political, the formation of a district is not dependent upon the consent of all persons concerned, but may be brought about against the wishes of the minority. In this respect the district differs fundamentally from the voluntary mutual company and the commercial irrigation company.[3]

It is a cooperative undertaking, a self-governing institution, managed and operated by the landowners or citizens within the district. Supervision by State officials is provided for to the extent of seeing that the laws are enforced, and in most States is extended in greater or less degree over organization, plans and estimates prior to bond issues, and construction of works.

It may issue bonds for the construction or acquisition of irrigation works, which bonds are payable from the proceeds of assessments levied upon the land.

Hence, it has the taxing power. Each assessment becomes a lien upon the land. While the ultimate source of revenue, therefore, is the assessment, an additional source frequently provided for is the toll charged for water. Other revenue may in some cases be obtained from the sale or rental of water or power to lands or persons outside the district.

Finally, the purpose of the irrigation district is to obtain a water supply and to distribute the water for the irrigation of lands within the district. Additional authority is granted irrigation districts, almost without exception, to provide for drainage. In some States districts may also develop electric power. These additional powers, however, are subsidiary and are intended to make more effective the principal function of the organization, which is to provide irrigation water.

For a full discussion of the legal nature of the irrigation district, see (*9*).

PRESENT STATUS OF THE IRRIGATION-DISTRICT MOVEMENT

The location of active irrigation districts is shown in the map of the 17 Western States which have irrigation-district laws. (Fig. 1.) The cumulative chart (fig. 2) shows the growth of the district movement through the 42 years of district activities extending from 1887 through 1928, and the proportion of districts now active. Table 1 gives the number of districts formed in each State each year, arranged in the order in which the several irrigation-district acts were passed.

[3] The constitutionality of the irrigation district law was upheld by the United States Supreme Court in the case of Fallbrook Irrigation District v. Bradley, 164 U. S. 112, decided Nov. 16, 1896.

FIGURE 1.—Location of all active irrigation districts in the United States, December 31, 1928. Inactive districts, even though legally alive, are not included

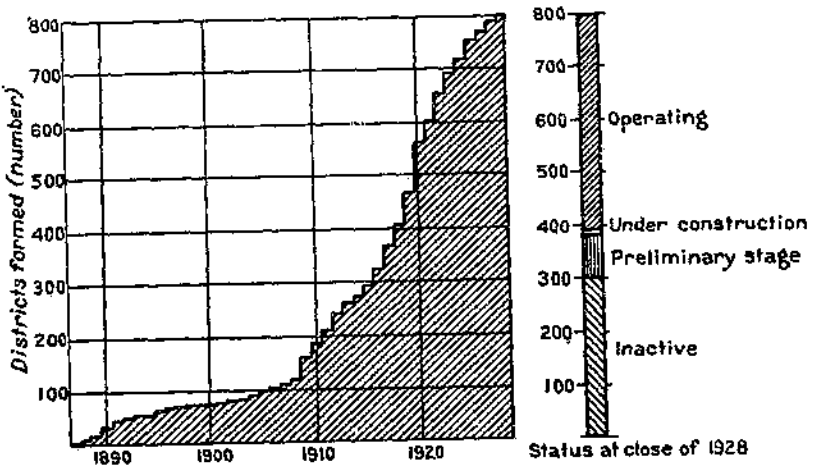

FIGURE 2.—Cumulative chart showing total number of irrigation districts formed to the end of each year, 1887 to 1928, inclusive, and status of districts at the close of 1928

TABLE 1.—*Irrigation districts formed in 17 Western States to December 31, 1928, by years*

Year	California	Washington	Kansas	Nevada	Oregon	Idaho	Nebraska	Colorado	Texas	Wyoming	Montana	New Mexico	Utah	Arizona	Oklahoma	South Dakota	North Dakota	Total
1887	[1] 4																	4
1888	7																	7
1889	6																	6
1890	11	[1] 4																15
1891	13	2	(1)	(1)														15
1892	3	1																4
1893	4																	4
1895	1				(1)	(1)	[1] 2											10
1896							3											3
1897							2											2
1898							4											4
1900						1												1
1901						1	1	[1] 1										3
1902						2		1										3
1903								3										3
1904					1	3	1	4										9
1905					2	1	1	2	(1)									6
1906					1	2	2	3		(1)	[1] 2							8
1907						1		3		1								6
1908						1		5		1								7
1909	2					4	1	19		2	6	11	16					41
1910					2	3		18		1	2	2	2					29
1911	2	2			1	1	1	9	1	3	1	1	1					23
1912		5			4	8	4	5				1	1	[1] 2				30
1913	2	2			2	4	2	2	2		3			1				20
1914	1	6		1		2			3		1							14
1915	5	7			1	5	1		1						(1)			20
1916	8	9			7	2			1		2							29
1917	7	14			10	4			3		1	1	3		1	(1)	(1)	44
1918	8	8		1	8	4	3		1		3	1		2			1	40
1919	11	11		1	14	4	2		3		12			2				60
1920	18	16		1	12	12	2		4	1	22		3	2			1	94
1921	14	3			2	3		1	2	2	6		5	2				40
1922	9	7			6	7	1	1	2	1	6		1	9				50
1923	8	6			1	11			2	2	1	1		5		1		38
1924	7	7				2			6	2	1			3				27
1925	9	3			3	6	1	1	5	2	1	1		2				34
1926	3	2		1		2	2		2	1	1			2				16
1927	5	3			1				4	3				2				18
1928		2			1		1	1	7	1				1				14
Total	168	120	5	5	79	96	44	79	48	22	71	8	22	35	1	1	2	801

[1] Irrigation district act passed.

The origin and growth of the district movement are discussed under Irrigation District Development (p. 70). In certain sections this movement is less important now than it was 10 years ago. For example, few of the districts formed or projected in Utah during and immediately following the World War are now active, and there the mutual company remains the outstanding form of community-irrigation organization. In some other States, on the contrary, the district movement has assumed really remarkable proportions. On the whole the wider market for district bonds as compared with that for securities of other irrigation enterprises has resulted during much of the present century in a rather consistent trend to the district from other forms of organization, such as the commercial company and the mutual company, for the purpose of financing more and more costly extensions and improvements. This trend, coupled with proposals for new development, has given the district an increasingly important place in western irrigation affairs. This is true as to number of organizations, area covered, and capital invested.

AREAS

Table 2 gives the areas of all districts in each State at the end of 1928, classified by activity status, and the areas to which the districts delivered water in 1928.

TABLE 2.—*Areas in irrigation districts organized to December 31, 1928* [1]

State	Active districts								Approximate areas to which districts delivered water in 1928
	Operating		Under construction		Preliminary stage		Total		
	Number	Irrigable areas	Number	Irrigable areas	Number	Irrigable areas	Number	Irrigable areas	
		Acres		*Acres*		*Acres*		*Acres*	*Acres*
Arizona	15	196,069			11	379,585	26	575,654	110,200
California	73	2,582,316	3	44,116	17	479,488	93	3,105,920	[2] 1,467,500
Colorado	27	537,380			1	23,511	28	560,891	[3] 322,000
Idaho	59	1,201,036	1	85,837	4	147,378	64	1,434,301	[4] 619,500
Montana	32	216,284	1	5,076	9	501,142	42	722,502	142,000
Nebraska	33	429,267	1	5,500			34	434,767	362,100
Nevada	2	260,000			2	89,743	4	349,743	137,000
New Mexico	4	38,372	1	8,373	1	83,000	6	129,745	14,500
North Dakota					1	20,321	1	20,321	
Oregon	46	323,797			6	233,635	46	557,432	190,400
South Dakota					1	81,500	1	81,500	
Texas	25	619,950	3	34,268	16	771,394	44	1,416,612	369,200
Utah	7	82,494			1	8,000	8	90,494	47,800
Washington	78	234,416			9	323,266	87	557,682	149,700
Wyoming	12	195,836			3	77,698	15	273,534	128,600
Total	407	6,908,277	10	183,170	82	3,219,651	499	10,311,098	4,060,600

State	Inactive districts									
	Legally alive		Illegally organized		Consolidated with other districts		Dissolved		Total	
	Number	Areas	Number	Areas	Number	Areas	Number	Areas	Number	Areas
		Acres		*Acres*		*Acres*		*Acres*		*Acres*
Arizona	8	87,276					1	33,000	9	120,276
California	38	702,334	7	595,550	5	20,869	25	972,497	75	2,300,250
Colorado	16	324,733	3	46,440			32	883,135	51	1,254,308
Idaho	27	287,079	1	1,279	3	25,340	1	31,000	32	344,698
Montana	23	192,259					6	63,527	29	255,786
Nebraska	4	33,800	1	9,250			5	87,100	10	130,150
Nevada	1	2,500							1	2,500
New Mexico	2	26,400							2	26,400
North Dakota	1	7,501							1	7,501
Oklahoma	1	2,500							1	2,500
Oregon	22	611,720			1	3,000	10	575,600	33	1,190,320
Texas	1	14,000	1	171,280	1	7,600	1	35,000	4	227,880
Utah	12	203,892	1	10,495			1	30,000	14	249,387
Washington	29	1,160,323			2	6,500	2	17,730	33	1,184,553
Wyoming	6	201,240					1	6,804	7	208,044
Total	191	3,962,557	14	834,294	12	72,309	85	2,735,393	302	7,604,553

[1] This table does not include local improvement districts, but does include the 2 irrigation lateral districts in Idaho as they are organized as independent irrigation districts.

[2] Exclusive of 191,446 acres in Mexico irrigated by Imperial irrigation district.

[3] Exclusive of 51,340 acres irrigated in 3 districts, each owning minority stock in Farmers' Reservoir & Irrigation Co., the company delivering the water.

[4] Exclusive of 380,000 acres irrigated with water stored by American Falls Reservoir district and delivered through other enterprises.

The areas shown for active districts are the irrigable areas, upon which operation and financial requirements are based. These areas are almost invariably less and frequently much less than gross areas

within district boundaries. It was not always possible to determine irrigable areas with precision, but the figures reported are in general the best obtainable. For inactive districts the areas shown in Table 2 are the irrigable areas where available and otherwise the gross areas. Many of the projects now inactive were never carried to the point of determining irrigable areas.

Districts shown in Table 2 as operating districts are only those which are operating their own irrigation systems. Districts classed as in preliminary stage are not operating systems nor doing construction work, but are maintaining active organizations; if organized some years ago, they have at present reasonable expectations that plans for beginning construction or taking over existing works will mature. Districts on Federal reclamation projects which have not yet assumed actual operation of the irrigation systems are placed in this class.

Areas to which districts delivered water in 1928 are not necessarily the total areas irrigated within irrigation districts. This column purports to show only the performance of the districts themselves with their own operated systems. It does not include areas within districts irrigated from systems operated by other agencies, such as the Bureau of Reclamation, and therefore shows no areas for North Dakota and South Dakota where the active districts are still in this status. Nor does the column include areas irrigated solely from private pumping plants or other means of original diversion not controlled by the district. Areas irrigated from individual pumping plants within the few irrigation districts which have been formed solely to provide power for such plants are, however, included.

SIZES OF OPERATING DISTRICTS

The range in size of operating irrigation districts within each State is given in Table 3.

TABLE 3.—*Range in size of districts by States*

States	Largest	Smallest	Average	States	Largest	Smallest	Average
	Acres	*Acres*	*Acres*		*Acres*	*Acres*	*Acres*
Arizona	40,936	640	13,071	New Mexico	15,000	3,972	9,593
California	557,000	288	35,374	Oregon	46,849	296	8,005
Colorado	82,300	600	19,903	Texas	59,000	2,800	24,438
Idaho	388,634	135	20,357	Utah	37,200	4,880	11,785
Montana	32,500	936	6,759	Washington	38,000	35	3,005
Nebraska	116,000	830	13,608	Wyoming	45,000	2,310	16,320
Nevada	160,000	100,000	130,000				

[1] This is an irrigation lateral district. The smallest original district in Idaho contains 120 acres.

The wide range in size of districts in some States is apparent from these figures. California has eight operating irrigation districts containing more than 100,000 acres each, the largest being Imperial irrigation district. American Falls Reservoir district is the largest operating district in Idaho and the second largest in the United States. The two smallest, each containing 35 acres, are Artesian irrigation district, Washington, and Middle Weiser lateral irrigation district, Idaho. Washington is distinctive in its large number of small irrigation districts, 39 of the 78 operating districts in that State containing less than 1,000 acres each.

Texas has two districts exceeding 100,000 acres in the preliminary stage, and Arizona, California, Montana, Oregon, and Washington have one each. Districts now inactive, with gross areas exceeding 100,000 acres, have been formed in California, Colorado, Oregon, Texas, and Washington.

REASONS FOR SUCCESS OR FAILURE

ELEMENTS OF ECONOMIC FEASIBILITY

The successful irrigation districts are those in which, in addition to securing and distributing water effectively, annual income is derived from the soil year after year in amounts sufficient to pay interest and maintenance and operation charges promptly and to retire the principal of the bonds at maturity. If such conditions obtain, the project is said to be economically feasible. The experience of irrigation districts has shown that economic feasibility depends upon (1) productivity of soil; (2) sufficiency and stability of water supply; (3) soundness of construction and adequacy of service of irrigation and drainage works; (4) settlement of the land by farmers of character, ability, and means; (5) availability and capacity of markets; (6) reasonableness of capital and operating charges; and (7) allowance for a wide margin of safety, or permissible cost, above the charge determined upon as reasonable, which the lands must be able to bear if the project is to be considered feasible.

The sixth and seventh elements together depend directly upon the five preceding ones and become the final measure of economic feasibility. Changes in the physical and economic conditions involved in the other elements necessarily affect the annual charges in greater or less degree, either by way of increasing or decreasing the absolute costs or by changing the relative capacity of district lands to bear the fixed costs. Hence, a given annual charge may be reasonable at one time under a certain combination of conditions yet may prove unreasonably high at another time under entirely different conditions. There is no formula by which economic feasibility may be unalterably determined. Nevertheless, soil, agronomic, and engineering determinations may be carried to a satisfactory degree of refinement, and the need for a proposed development may be judged on the basis of physical and economic conditions and trends evident at the time the project charges are under consideration, with a wide margin of safety to allow for unfavorable changes not then foreseen. Experience of the 10 years following the World War shows all too clearly the necessity for laying more stress upon this seventh fundamental.

Types of agriculture may and do change. It appears that certain new districts capitalized on the basis of high-value crops would have been better off if their financing had been based altogether upon the probable returns from lower-value crops of proven adaptability. That done, the prospective ultimate establishment of a type of agriculture promising greater profits would tend to a sounder development and thereby enhance the security for the district's bonds.

CAUSES OF FAILURE

Past causes of failure of irrigation districts may be reduced to the following general classes:

OPPOSITION OF LARGE AND INFLUENTIAL LANDOWNERS

Some of the earliest districts met disaster or at least years of obstruction because of the inclusion of too much land belonging to persons opposed to district organization. This cause of failure, while still to be reckoned with, is not so pronounced as it was some years ago.

INCLUSION OF UNPRODUCTIVE LANDS

Inclusion of large areas of land incapable of bearing their share of the burden of taxation has resulted in considerable trouble. It is the area that is actually irrigable and capable of producing satisfactory crops that in the last analysis is responsible for the district debts. This is true from the standpoint of bondholders in any event, and also from the standpoint of assessment payers in the large number of States which provide for general liability of all lands for payment of obligations. So-called "shoestring" and "spotted" development, resulting in disproportionate maintenance and operating expenses, has likewise been unfavorable to success.

Before public lands were made liable to inclusion within irrigation districts, some districts which had placed too great dependence upon the voluntary incorporation of such areas found themselves embarrassed by the lack of revenue therefrom.

INADEQUACY OF WATER SUPPLY

Inclusion of more land than could be adequately irrigated with the available water supply has been a fruitful source of trouble to districts. Remedying such a situation necessarily involves a higher acreage cost than anticipated, either by securing additional supplies of water for the entire area or by eliminating portions of the district and concentrating all the water and all the cost on the remaining portions. In some cases this has not been fatal, but the wide margin allowed in other cases between the early productive value of the land and the cost of the irrigation system has been sufficient to cause failure.

EXPLOITATION

A condition frequently found in irrigation districts promoted for profit has been the unduly large difference between the actual cost of construction and the price the settlers had to pay. For example, a system costing, say $50 per acre, has sometimes been sold to or built for the settlers for $75 per acre, the difference of $25 per acre, or one-third of the bond issue, constituting promotion profits. Legislative attempts to prevent overcapitalization by providing that bonds should not be disposed of for less than 90 or 95, or even par, did not hinder promoters from placing excessive valuations upon the works and trading them for district bonds at what purported to be a legal figure. The difficulty with such an overcapitalized district was that the additional charge of $25 per acre sometimes represented the difference between success and failure.

ENGINEERING DIFFICULTIES

Unwise location of irrigation works, faulty design and construction, poor choice of materials, disaster to irrigation works, and

unduly heavy maintenance and operation charges have been responsible for some of the troubles of irrigation districts.

SLOW RATE OF SETTLEMENT OF LAND

Settlement of sufficient land to provide revenue for district requirements is vital to the success of any irrigation district. Irrigation enterprises of all types are dependent for eventual success upon the same thing; but the method of financing an irrigation district through the disposal of bonds makes the rapid settlement of land especially important, for the district is dependent upon its own efforts for money to operate the system and must in addition provide for interest payments on bonds. Capitalization of interest on the bond issue eases but does not wholly relieve the situation. It is essential that the districts become self-supporting quickly. Coupled with such necessity is the need for having the right kind of settlers from the standpoints of integrity, industry, adaptability, and financial resources. Lack of adequate land occupation by capable and well-equipped settlers or of a workable colonization plan has been a source of trouble in a number of districts and has prevented the financing of others.

OTHER CONDITIONS CONTRIBUTING TO UNREASONABLY HIGH ANNUAL CHARGES

Conditions listed in the foregoing paragraphs have resulted in adding to the charges which district lands would otherwise be called upon to pay. Other contributory causes of expense have been aggravation of drainage difficulties, internal dissensions, graft, and poor management. Probably the main cause of trouble since the late war has been the general agricultural situation. This had the dual effect of reducing the demand for farm products upon which annual charges had been based and, by interfering with anticipated settlement of land, of rendering the charges even more burdensome to projects capitalized on a war basis. A most vicious circumstance has been, in some cases, a weakening of the morale of assessment payers and a consequent growth of the idea of avoiding payment of obligations. A feeling actually prevailed in some quarters that district creditors should share with landowners the burden of post-war deflation. Irrespective of the justice of such an attitude, the results are unfortunate from every standpoint.

The fact that irrigation districts have been organized and financed under conditions conducive to failure has been due in no small degree to overoptimism of landowners, manipulations of promoters interested only in their own profits, connivance of certain bond houses, absence or insufficiency of official restraint, failure on the part of investors to discriminate between speculative and nonspeculative bonds, and failure on the part of those in charge of the district financing to allow sufficient margin for contingencies.

WHERE THE DISTRICT HAS SUCCEEDED

Some district enterprises in which the security for the bonded indebtedness remained to be created have attained success because they have combined the features necessary to rapid development of the land and production of income. But the proportion of districts of this type that have proved successful from all standpoints is small in

comparison with the proportion of successful districts in which at least a fair amount of the security existed at the time of organization. Supplemental development of itself does not insure adequacy of the security, as is evident from the numerous cases in which districts formed to take over and extend existing systems have added impossible burdens to lands already in a fair state of cultivation. Nor is the value of the lands at any particular time a safe measure of the security, in as much as land values change and their earning capacity varies with the demand for farm products to which they are adapted. While construction of entirely new irrigation works does not necessarily imply a speculative district enterprise, yet the status of districts formed for the several classes of irrigation development, as shown in Table 4, page 14, indicates clearly that districts formed primarily for supplemental development have more generally attained their ends. Furthermore, as shown in Table 5, page 15, the class of districts formed for extensions, betterments, and other supplemental purposes has provided relatively many more cases of perfect records in payment of bond obligations than have the groups organized for new construction. Supplemental development implies some prior development through which values have been created and irrigation works constructed and put into operation, together with a certain amount of income already accruing from irrigation. As the irrigation district is dependent upon revenue, it has followed that conditions making possible immediate and adequate revenue have gone far toward insuring financial success. Supplemental development naturally has more often embraced such conditions.

As a general rule, therefore, the successful districts have been those formed for purchase and operation by the landowners of constructed systems which were "going concerns," for extension of existing systems to cover adjacent unirrigated lands where the cost of extension has not been so far out of proportion to the original cost as to cast an unduly heavy burden on the entire project, for improvement of existing systems, for providing needed additional amounts of water for already irrigated lands, for contracting with the United States on Federal reclamation projects for payment of construction and operation costs and for eventual operation, and for building new irrigation systems in sections already productive under dry-farming methods where development of irrigated farms has followed rapidly or where the cost of irrigation has been kept within the earning capacity of tracts partly irrigated and partly dry farmed. In any event, the irrigation districts that have kept up their payments of interest and principal have been those older districts with low capital and operating charges and those more recent ones that have had substantial reserves to tide them over the postwar depression.

THE OUTLOOK FOR DISTRICT SUCCESS

Irrigation-district history records several cycles with stages somewhat as follows: (1) Limited financing of sound projects, (2) good records of districts in meeting obligations, (3) building up of an active bond market, (4) expansion of development, both sound and unsound, (5) defaults, and (6) tightening or collapse of the bond market.

Each cycle has left its failures and defaults, but at the same time has resulted in an increasing proportion of bonds in good standing. Each series of district failures adds to the sum total of experience in the possibilities and limitations of district organization and financing; something is learned each time that had not been previously stressed. Probably the most important lesson of the postwar failures is the need for more extensive determinations of economic feasibility, and particularly for the inclusion in the cost figures of a decidedly larger safety factor than has heretofore been thought necessary.

A cycle has recently been completed, and district development is in a state of depression. If past experience may be relied upon as a guide, development will be resumed when the financial situation again becomes favorable.

The going concerns which are paying their debts indicate clearly that the district is a proven institution for irrigation purposes. On the other hand, the failures of the past decade show with equal clarity that economic feasibility has not been sufficiently stressed. The reserve or margin of safety implied by economic feasibility must be large indeed if districts are to succeed in the face of agricultural depressions. If the margin is small the districts deficient in this reserve simply can not pay their way, and the public or private investors are inevitably called upon to assume part of the cost of development.

The purchaser of a bond with net yield of 6 per cent should obviously not be expected to share the cost of developing the project. He is an investor; not a speculator. When his investment is definitely in default, the wiser course is to make prompt adjustment, but experience now indicates that such defaults are in large measure avoidable. The desirability of a public subsidy for such situations is a controversial matter and has no place in the present discussion. The point is that if district development is to continue without asking the bond investors to share the cost, deficiencies in this vital margin of security would seem to leave no alternative other than public subsidies.

PURPOSE OF FORMATION

The original purpose of the irrigation district was the construction of irrigation works. Although the Wright Act gave the alternative power of purchasing irrigation systems, nevertheless it was the need for new development that resulted during the first few years in the formation of districts predominantly for the construction of new works. In fact, 41 of the 55 districts organized in California and Washington during the first seven years of the district era were formed for entirely new development and 3 others for principally new development.

As time went on the district organization was employed for other purposes, such as the acquisition of existing irrigation works by landowners who were dissatisfied with the management or who thought that they might operate the system more economically themselves. It was also employed for the extension of existing systems to include adjacent unirrigated areas; the improvement of existing

systems; or the development of additional supplies of water needed for late summer irrigation by communities already served with a partial supply, a condition which often arises in sections undergoing transition to more intensive development. All of these purposes presuppose a certain amount of development prior to the district formation.

All irrigation districts organized to the end of 1928 have been classed, according to the purpose of their formation, (1) entirely new development, (2) principally new development, and (3) principally supplemental development or acquisition of existing irrigation works. The first class includes not only projects for reclaiming 100 per cent raw land, but also those in which some earlier private development may have existed, though of little or no consequence in the proposed plans. The second class is intended to cover districts on the border line between new and supplemental development; for example, those with plans for purchasing and extending systems already constructed, the cost of existing works and area served being a minor or incidental factor in the entire program. All other districts are in the third class.

In general, irrigation districts with the larger proportions of improved land at the time of organization, and consequently with the smaller increases in capital irrigation charges per acre resulting from district activities, have had the better prospects of succeeding. Exceptions have been districts intended for absolutely new con-

FIGURE 3.—Rates of formation of irrigation districts by 7-year periods, 1887 to 1928, classified according to type of proposed development and status at the end of 1928

struction that have been formed on the fringes of proven and rapidly growing communities, or in sections where high land values had already been established independently of irrigation and where the districts were not essential to the success of the communities, or where circumstances were otherwise favorable to speedy success. On the other hand, some districts organized primarily to take over existing works have faced uphill tasks because of the insufficient settlement of land, shortage of water, inclusion of too much additional unirrigated land, or other causes. The success of a district in most cases, however, has been dependent upon the relation of its development to the times when its obligations fell due. The advantage, therefore, has been with districts formed principally for supplemental purposes.

Table 4 gives the number and status of all irrigation districts formed to date in each of 17 Western States, segregated according to the three main classes of development. Attention is called particularly to the percentages of totals given in the last line of the table, which indicate a more favorable situation generally in the second class of districts than in the first class, and a decidedly more favorable situation in the third group formed principally for supplemental purposes. Figure 3 shows the respective rates of formation of the three classes by 7-year periods.

TABLE 4.—*Number and status on December 31, 1928, of irrigation districts in 17 Western States classified according to purpose of formation*

State	Number of districts whose purpose of formation was—															All districts				
	Entirely new development					Principally new development					Principally supplemental development or acquisition of existing works									
	Operating	Under construction	Preliminary stage	Inactive	Total	Operating	Under construction	Preliminary stage	Inactive	Total	Operating	Under construction	Preliminary stage	Inactive	Total	Operating	Under construction	Preliminary stage	Inactive	Total
Arizona	6	----	5	7	18	1	----	1	1	3	8	----	5	1	14	15	----	11	9	35
California	17	3	2	46	68	12	----	5	12	29	44	----	10	17	71	73	3	17	75	168
Colorado	8	----	----	33	41	4	----	1	6	11	15	----	----	12	27	27	----	1	51	79
Idaho	5	----	2	19	26	4	----	1	3	8	50	1	1	10	62	59	1	4	32	96
Kansas	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Montana	4	1	4	20	29	1	----	----	----	1	27	----	5	9	41	32	1	9	29	71
Nebraska	6	1	----	7	14	1	----	----	----	1	26	----	----	3	29	33	1	----	10	44
Nevada	----	----	----	----	----	----	----	----	----	----	2	----	2	1	5	2	----	2	1	5
New Mexico	----	----	----	2	2	1	----	----	----	1	3	1	1	----	5	4	1	1	2	8
North Dakota	----	----	----	----	----	----	----	----	----	----	----	----	1	1	2	----	----	1	1	2
Oklahoma	----	----	----	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	1	1
Oregon	14	----	3	16	33	4	----	----	7	11	22	----	3	10	35	40	----	6	33	79
South Dakota	----	----	----	----	----	----	----	----	----	----	----	----	1	----	1	----	----	1	----	1
Texas	3	3	11	2	19	4	----	1	----	5	18	----	4	2	24	25	3	16	4	48
Utah	1	----	----	6	7	1	----	1	3	5	5	----	----	5	10	7	----	1	14	22
Washington	22	----	2	22	46	4	----	----	3	7	52	----	7	8	67	78	----	9	33	120
Wyoming	1	----	1	3	5	----	----	----	2	2	11	----	2	2	15	12	----	3	7	22
Total	87	8	30	184	309	37	----	10	37	84	283	2	42	81	408	411	10	82	302	801
Per cent of total	28	3	10	59	100	44	----	12	44	100	69	1	10	20	100	51	1	10	38	100

Table 5 carries the analysis a step farther by giving the group records of bond payments of districts which actually constructed or acquired irrigation systems with the proceeds of bond sales and thereafter actually became engaged in operation of such systems. Some such districts are no longer in operation although included

in the table. On the other hand, numerous districts that sold bonds but never operated systems constructed or acquired with the proceeds of the bonds are not included. Nor are operating districts without bonded indebtedness included. The purpose of the table is to bring out whatever relation existed between purposes of formation and records of bond payments. This may best be shown by comparing the records of all those districts that fully accomplished, through bond issues, their purposes of organizing and that were afforded the opportunity of making bond payments under fully operating conditions. The last line of Table 5 indicates that about half of such districts formed for new and for principally new development, and about three-fourths formed for principally supplemental development, have maintained perfect records in meeting bond obligations. This showing appears consistent with the situation shown in Table 4.

TABLE 5.—*Record of bond payments to December 31, 1928, of all those irrigation districts in 17 Western States which were then operating or had once operated systems constructed or acquired with proceeds of bond sales, classified according to purpose of formation*

State	Number of districts whose purpose of formation was—									All districts operating or that once operated systems financed from sale of bonds		
	Entirely new development			Principally new development			Principally supplemental development or acquisition of existing works					
	Record of bond payments		Total	Record of bond payments		Total	Record of bond payments		Total	Record of bond payments		Total
	Perfect	Not perfect		Perfect	Not perfect		Perfect	Not perfect		Perfect	Not perfect	
Arizona	6		6				4	1	5	10	1	11
California	12	18	30	11	3	14	36	7	43	[1] 59	28	87
Colorado		12	12		7	7	12	7	19	12	26	38
Idaho	2	5	7	2	2	4	26	15	41	30	22	52
Kansas												
Montana	1	5	6	1		1	15	11	26	17	16	33
Nebraska	6	2	8	1		1	18	3	21	25	5	30
Nevada							1		1	1		1
New Mexico				1		1	2	2	4	3	2	5
North Dakota												
Oklahoma												
Oregon	6	7	13	1	3	4	8	7	15	15	17	32
South Dakota												
Texas	4		4	3	1	4	15	2	17	22	3	25
Utah	1	1	2		1	1	1	3	4	2	5	7
Washington	18	2	20	2	3	5	34	9	43	54	14	68
Wyoming		1	1	1		1	7		7	8	1	9
Total	56	53	109	23	20	43	179	67	246	[1] 258	140	398
Per cent of total	51	49	100	53	47	100	73	27	100	65	35	100

[1] This number is reduced to 52 as of July 1, 1930.

THE ELECTORATE

The qualifications required of voters at irrigation-district elections vary widely in the several States. The California rule has always been that such qualifications shall be those prescribed by the general election laws of the State. Early experience in California indicated,

however, that great harm might be done through the voting of bonds by persons who might be called upon to shoulder none of the burden of paying off the indebtedness—in other words, by electors who owned no land—with the result that in the revision of the Wright Act in 1897 provision was made for presentation of a petition signed by a majority of the landowners, representing a majority in value of the lands, before the directors could call a bond election. The petition is no longer required in California—although a majority, instead of a two-thirds vote, is sufficient to authorize bonds if such petition has been presented—and the directors must call an election if petitioned. Furthermore, it is now optional that the petition be signed by 500 persons, either resident electors or holders of title, representing at least 20 per cent of the value of the lands; for in very large and populous districts it was found that the majority provision involved so much time and expense that the business of the district was seriously hampered. This means, of course, that bonds may be authorized despite the opposition of predominant landholding interests, which actually occurred in at least one large district. The Kansas law requires a petition by three-fifths of the landowners who are qualified electors before a bond election may be called. The present Idaho law imposes the qualifications of the general election laws and residence in the district upon district electors; it also provides that no person who is not a holder of land in the district may vote on questions of incurring indebtedness, and that no person not a resident owner of lands within the district and subject to assessment, or the wife or husband of such owner, may vote at bond elections.

The other 14 Western States impose property qualifications in one form or another upon all district electors. These various requirements, in addition to ownership or possession of land or of some stated acreage of land within the district, in a number of cases include residence in the district or at least in the State, and in several instances also include general election qualifications or citizenship. Corporations, executors, administrators, and guardians are sometimes allowed to vote. Voting according to acreage is provided in Colorado, Montana, and Wyoming, and with certain limitations in New Mexico, and according to acre-feet of water allotted to the land of the elector in Utah. Oregon formerly permitted a vote for each acre of land but in 1917 limited each person to one vote. Colorado's experience was just the reverse, the new law of 1921 authorizing voting according to acreage. For two years Nevada had in effect a system of voting according to dollars of assessment of benefit but in 1919 changed to one vote per elector.

Almost all of the States, therefore, limit the right to create indebtedness to those persons whose lands are to become responsible for it, but only a few States recognize the vital interest of landowners living outside the State. Some difference of opinion exists as to the wisdom of allowing voting according to acreage owned. On the one side it is argued that an irrigation district is a business corporation rather than a governing municipality and that its affairs should accordingly be conducted along similar lines, recognizing the right of the majority in interest to control. On the other hand, proponents of the plan of limiting individuals to one vote contend

that the small landowners are as vitally interested in the district as are the large holders, and that the plan of giving a vote to each acre puts control of district affairs in the hands of a few large landowners.

The really important feature, however, is the very general recognition given to the interest of the landowner in the creation of district indebtedness. The irrigation district has but one end in view—the development of a community through the irrigation of its agricultural land. All persons in the community are interested in its development, but those persons whose lands are to be made to pay for the entire irrigation development are necessarily most deeply concerned.

MANAGEMENT

The management of an irrigation district is vested in a board of directors or commissioners, who must usually be landowners and electors in the district. The directors are elected in whole or in part every year or two years and, except for the collection and custody of funds by county officials or by elected district officials, are solely responsible for the conduct of district affairs. They may appoint and discharge at will all officers and employees of the district except those whose election is provided for by statute. In California, where the handling of funds is in the hands of the district, the assessor, collector, and treasurer are elected officials. In Idaho, on the contrary, the assessor, whose duties are performed by the secretary, and the treasurer are appointed by the directors. Again, in Texas the assessor-collector may be appointed by the directors or elected at their option. In all of the States directors have the responsibility either of levying assessments or of initiating proceedings therefor, as well as of authorizing expenditures.

The number of directors depends in some measure upon the size of the district. Some States authorize only a specified number, usually three; others allow some latitude either to the original petitioners or to the electors after organization in determining the number of directors. The highest number allowed in any State is nine. Owing to the wide range in size of irrigation districts, some latitude in the size of the managing board is manifestly desirable, for a large board of directors renders the management of a very small district unwieldy and cumbersome, whereas a small board may not afford adequate representation in a large district of divergent needs and conditions. The usual practice is to lay out the district into divisions as nearly equal in areas as practicable and to choose one director from each division. Division into equal areas has been departed from in certain cases in which population and assessed valuations suggested a more practicable basis of division.

The powers of the board of directors are usually set forth in considerable detail in the statutes. In the execution of their policies the directors are given extensive authority to appoint employees on the scale desired. Owing to the nature of an irrigation district, which requires construction of works at certain times and maintenance and operation of the system at all times, the services of an engineer are always needed, highly trained services a great deal of the time, and practical experience always. So it has come about that the district

engineer is frequently the principal executive officer as well. Some large districts have found it advantageous to employ a general manager of executive ability, and usually of engineering training and experience, who is placed in charge of all phases of the district's operation and is subject only to formulation of general policies by the board of directors. The Texas statute specifically encourages the appointment of a manager.

Certain phases of management inherent in the district form of organization have been criticized from time to time; for example, placing the disposal of large sums of money in the hands of directors inexperienced in large financial transactions, and selection of directors from political considerations. These problems, however, are incident to the conduct of any self-governing institution, and so long as the irrigation district remains self-governing its efficiency will depend upon the choice of directors who are able to combine business ability with public spirit and who are broadgauged enough to leave the administration of details to trained employees necessarily better qualified than they to perform such duties.

The district is essentially a farmer organization. The farmers collectively own the irrigation system, are the direct beneficiaries of its operation, and pay the costs. Directors selected from among themselves have the point of view of the farmer and are sensitive to local trends of thought, which is a valuable feature. The two other most important interests are those of the public and of the bondholders. The several statutes providing for State supervision are designed to afford the public more or less protection against the consequences of unwise development but in many cases have not proven adequate. There is no way at present in which bondholders may intervene prior to default. Beneficial results have been noted in certain cases in which district directors have voluntarily counseled with representatives of bondholders on major questions of policy affecting the district's welfare. In this connection the New Mexico district law now authorizes district boards to contract with purchasers of bonds or with the bond brokers that so long as any of the bonds remain outstanding the owners of two-thirds of the principal amount may select one director of the district. Such director is not required to have other qualifications and has the same powers and duties as other directors but serves without compensation.

The actual character of the management varies greatly in different districts. In probably the greater number of operating districts it is but a reflection of the progressive spirit of the farmers composing the electorate. The problems faced in some cases have been exceedingly complicated. On the whole, judging from the results attained, and with due allowance for differences in character of organization and financial problems, irrigation-district management does not suffer by comparison with management of privately-owned irrigation enterprises.[4]

[4] An unprecedented move in the field of irrigation-district management was attempted several years ago by a California district with valuable power resources. This district contracted with a private corporation formed for that purpose to turn over to the corporation for 99 years complete control and management of all irrigation and power works and rights, and all business of the district so far as the directors could delegate such work, subject to reasonable rules and regulations to be established by the directors. The corporation was to pay all operating costs and the principal and interest of bonds issued up to a prescribed maximum, and was to retain all income above a prescribed annual amount. The corporation was not able to finance the undertaking, however, and the arrangement was not carried out.

HANDLING OF FINANCES

The irrigation district secures revenue for the construction or acquisition of irrigation works, for their annual maintenance and operation, and for all general purposes primarily by means of assessments levied upon the land. Each assessment becomes a lien upon the land when levied, and its collection may be enforced by delinquent tax sale or in some cases by a suit at law. Other and secondary methods of raising revenue are through tolls charged for the actual use of water, the sale or rental of water to lands outside the district, and the sale of electric power generated by the district.

In order to spread over a series of years the burden of paying for the irrigation works, the district may borrow money through the issuance of bonds, or may contract with the United States for the construction or acquisition of an irrigation system. The interest and principal of the bonds and the installments due the United States are payable from the proceeds of annual assessments. Current expenses are taken care of, pending the collection of assessments, by the issuance of warrants and in some States by negotiable notes.

FINANCIAL OFFICERS

Although the irrigation district is responsible for its financial condition, the services of county officials are utilized to greater or less extent in most of the States for levying and collecting assessments and disbursing district funds. California provides complete district machinery for handling financial matters and makes the district entirely independent of the county so long as the district continues to levy assessments to pay its debts, failing which the county is obliged to step in. An amendment to the Idaho law in 1923 authorized the directors of any irrigation district, if concurred in unanimously by the county commissioners, to provide for collection of district assessments by county officers instead of by district officers. Five irrigation districts in Idaho have adopted the provisions of this amendment. The Texas law governing water control and improvement districts permits the directors the option of employing their own assessor and collector or of certifying the tax levy to county officers for collection. In New Mexico, districts formed to cooperate with the United States may take over all duties relating to levying and collecting district taxes.

In several States, of which Arizona is typical, the district directors determine the amount of money necessary to be raised and the areas subject to assessment, but the county supervisors or commissioners levy the assessment after the county assessor has made up the roll, and the county treasurer collects the taxes at the same time and in the same manner as collections of general taxes are made. The county treasurer of the county in which the office of the district is located is ex officio district treasurer.

In the other States these fiscal duties are divided, the usual procedure being that the district directors levy the assessment and certify the assessment roll to the county assessor or county clerk, as the case may be, for addition to the county roll, the county treasurer making collections in the usual way and transmitting the receipts to the district treasurer or ex officio treasurer. In several of these States the county treasurer of the county in which the district was

originally organized is charged with the duty of paying the interest and principal of bonds, while collections on account of assessments for general purposes are turned over to the district treasurer to be disbursed by him.

There is no fundamental distinction, therefore, between district and county handling of funds in so far as the usual responsibility of the district directors is concerned. Whether the directors actually levy the assessment or not, it is nevertheless their duty at least to initiate proceedings looking to procuring revenue through the proper channels and to authorize expenditures. The difference is that some States have put the existing county financial machinery at the disposal of the irrigation district.

The statement is sometimes made that separation of district taxing machinery from that of the county is objectionable to bondholders, in that district tax officials are more subject to local influences and have less prestige in the eyes of the taxpayers than have county officials. The validity of such an objection is necessarily difficult to estimate, but consideration of tax delinquencies and the reasons therefor, sale of bonds, and integrity of bonds of irrigation districts in California, Idaho, and Texas, as compared with those in other States, fails to support the objection.

ACCOUNTING

For the purpose of accounting, each statute prescribes certain funds, the most usual series consisting of the bond fund, including money received from the collection of assessments for payment of interest and principal of bonds; the construction fund, money received from the sale of bonds or from collection of construction assessments, to be used for construction of works; the general fund, revenue for the payment of current expenses; and the United States contract fund, money received for making payments due under Federal contracts. Several States prescribe a single fund, called the bond and United States contract fund, for money received on account of payments due on bonds or on Federal contracts. Other names are sometimes given to funds for substantially the above purposes, and additional funds are often provided. The reason for having definite funds is to insure the use of money for the purpose for which it was obtained. Statutory provision sometimes exists for transferring money from one fund to another.

ASSESSMENTS

The words "tax" and "assessment" are often used indiscriminately to denote the charge levied by an irrigation district against land. However, court decisions involving the nature of this charge usually distinguish clearly between tax and assessment and in most cases have held the district charge to be an assessment. This distinction is important in that assessments for local improvements, which the district charges are usually held to be, are not subject to constitutional provisions that taxation shall be equal and uniform.

The assessment becomes a lien upon the land when levied, or on a date fixed by statute. Assessments are levied annually at the times prescribed by the respective statutes, in order to raise money for paying the interest and principal of bonds, or to provide a

sinking fund for retirement of the bonds when due. They are levied also for payments due the United States, and for other obligations of the district as well as for maintenance and operation and all general purposes. The amount that may be raised annually for maintenance and general expenses is sometimes limited by statute. Special assessments must usually be authorized by vote of the electors. Some of the statutes provide for levying a greater amount than needed—usually 15 per cent—to cover anticipated delinquencies. In some States assessments are made payable in two annual installments.

Several States authorize the receipt of bonds or coupons in satisfaction of the bond-fund levy for years in which such obligations fall due, and in some cases the receipt of warrants in payment of general-fund levies. This authority has proved valuable in consummating several complicated financial reorganizations. A provision that the assessment lien for the payment of bonds or for payments due on contract with the United States shall be a preferred lien to that for bonds subsequently issued appears in a number of the statutes. Arizona, on the contrary, expressly declares that no bonds shall have priority of lien over that of any other bonds.

METHODS OF ASSESSMENT

While all irrigable lands within an irrigation district are liable to assessment and in some cases nonirrigable lands as well, there are several methods of determining the amounts to be assessed against the respective tracts. One particular method is customarily in use in each State, though it is sometimes provided that districts contracting with the United States may levy assessments pursuant to the terms of such contract, and alternative methods are provided for in some States.

AD VALOREM METHOD

The original Wright Act of California provided that all real property in the district, including improvements, should be assessed for irrigation-district purposes at its full cash value. In 1909, however, the legislature exempted improvements from taxation in all districts thereafter organized and provided that existing districts might come within the new provision by vote of a majority of the resident title holders. Most of the operating districts in which assessments were being levied proceeded to take advantage of this plan. Nebraska and Oklahoma follow the present California plan. Kansas provides that a tax shall be levied upon all real estate dependent upon the works for irrigation. Texas originally provided for ad valorem assessments only but has recently authorized a choice as between ad valorem or benefit plans, or in certain cases a combination of those for districts conforming to section 59 of article 16 of the State constitution. The ad valorem tax applies to both real and personal property. California permits assessments to be apportioned according to benefits in case of payments to be made to the United States.

Some of the California and Nebraska districts have made an approach to assessment according to the full cash value of the land, but the valuations arrived at are in most cases not proportionate to the market values, and seldom do they follow the county valuations for purposes of general taxation. That is, although

higher valuations are sometimes placed upon lands close to cities and towns and along important highways, nevertheless nominal valuations are customarily assigned to lands lying above the ditch system or impregnated with alkali. Thus to this extent the benefit method of appraisement is followed.

An analysis of assessed valuations per acre for 82 active California districts shows that in 31 cases the valuation was uniform upon all irrigable lands and that in 11 of these the valuation was $100 per acre. Where variations from a uniform assessment were made the tendency was to make the difference appreciable. Thus, of the 49 cases for which both high and low, other than nominal, valuations are reported, only 9 cases show the low valuation to be 75 per cent or more of the high, while 34 cases show it 50 per cent or less; and in 24 cases, or practically half of the total, the ratio is 32 per cent or less. In the most extreme instance the high valuation was $200 per acre, the low $5, and the usual, $120. Some districts have only 2 or 3 classifications, while others have 8 or 10.

UNIFORM RATE PER ACRE

In Arizona, Colorado, Montana, New Mexico, and Oregon all lands within an irrigation district are required to be valued for district assessment purposes at the same rate per acre or are subject to assessment in a uniform amount per acre, the effect being the same in either case. Several States permit exceptions to this rule, principally as follows:

In Oregon, reclamation of the lands may be by units and the assessments apportioned accordingly, provided the State engineer approves such plan. This procedure has not been reported as having been put into effect in any Oregon district. Another exception to the Oregon rule, put into operation in several cases, permits assessments, except for operation, maintenance, and drainage, against any tract which has an appurtenant water right not yet acquired by the district, to be in the same proportion to a full assessment as the additional water right to be supplied by the district bears to a full water right. These preexisting water rights have complicated matters considerably in several attempted cases of financial reorganization in that State, and in at least one case the granting of credits to holders of such rights is thought to have been a contributing cause of failure in that it relieved the lands best able to pay and actually, though not ostensibly, increased the burden upon the poorer lands. In addition to the above exceptions, the Oregon Legislature at the last two sessions has provided that under certain circumstances districts may adopt the benefit method of assessment.

In Montana, in case of pumping to different elevations, maintenance, operation, and pumping assessments may be levied at a different rate for each elevation. This authority is reported to have been exercised in few if any cases.

In New Mexico, in case of districts formed to cooperate with the United States, assessments may be made by units if the lands have been so divided by the Secretary of the Interior and shall take account of exemptions and credits under contracts with the United States.

ACCORDING TO BENEFITS

Assessments are apportioned according to the benefits received in Idaho, Nevada, North Dakota, South Dakota, Washington, and Wyoming, and benefit assessments are optional under certain circumstances in California, Oregon, and Texas, as previously referred to. The plan followed in Idaho, Nevada, and Wyoming involves a single apportionment of benefits after a bond issue has been authorized, which apportionment is subject to confirmation by the court and which as finally confirmed is the basis of all future assessment to pay the principal and interest of the bonds or assessments levied in lieu of bonds. Wyoming has an assessment of benefits and an assessment for construction, the former being a list of the benefits estimated to accrue to each tract from the proposed construction work and the latter the real assessment for the actual cost of construction which is proportioned according to the benefits and may equal but may not exceed the amount of benefits. In Washington, North Dakota, and South Dakota, apportionments of benefits are made annually.

The application of the benefit principle in the many operating irrigation districts in Idaho and Washington results in a surprisingly large number of uniform assessments per acre. This is because it has often been assumed that all irrigable land within a district is equally benefited and that nonirrigable land receives no benefit, with the result that all of the cost has been assessed at a uniform rate per acre against the irrigable land. In other districts it has been decided that all district land, whether irrigable or lying above the canal system, is benefited either directly or because of the enhanced value of the community as a whole, in which cases the construction cost has been apportioned against irrigable and unirrigable lands in the ratio of, say, 10 to 1. Sometimes, but in relatively few cases, several grades of irrigable or of nonirrigable land have been established and different benefits assigned. In other instances in which districts took over existing systems embracing tracts upon which only partial water-right payments had been made, the unpaid amounts were added to a flat rate per acre in determining the amount of benefits to assess against such tracts. In at least one instance of drainage construction by an irrigation district two classes of benefits were assessed—one amount against lands directly benefited and the other against lands indirectly benefited. In still another instance benefits were based upon the relative costs of three different pumping lifts. Adjustments for preexisting partial water rights and seepage conditions have also been made by this method.

ACCORDING TO WATER ALLOTMENT

In Utah, prior to district formation a determination is made by the State engineer of the maximum amounts of water which may be beneficially used upon each 40-acre tract, or smaller tracts if in separate ownership, in the proposed district. This allotment, as finally revised after organization and after the amount of water available has been determined, is the basis of all assessments and tolls. In actually making such allotment existing water rights are listed, soil and subsoil classified, the depth to ground water is measured, and the water deficiency ascertained.

COMPARISON OF METHODS OF ASSESSMENT

Irrigation-district assessments have one purpose—to secure money from the lands improved by irrigation to repay the cost of improvement, usually in installments. A method of assessment is essentially a scale by which to determine the degree in which the several tracts are improved, or benefited, as against each other. It is important to note that this scale is independent of the question of ultimate liability of any tract for all or for only a portion of the district obligations. Thus, in the event of blanket liability, delinquencies are added to the following year's levy and spread upon the entire district in accordance with the original scale. The main differences in character of the scale center about the possibility of changing the relative amounts of assessed benefits in case physical or economic conditions should subsequently alter the relative productive powers of the several tracts and therefore alter the value of the irrigation improvement to them.

A certain amount of flexibility in determining the proper amounts to be assessed against district lands is obtainable by either the ad valorem or the benefit method. Theoretically the ad valorem method might seem to require a rigid application, yet in actual practice the district assessors have frequently departed widely from a strict interpretation of the law, even to the extent in some cases of valuing all farm lands in the district year after year at the same rate per acre. The ad valorem principle does not readily lend itself, however, even under a liberal interpretation, to the organization into an irrigation district of a community in which varying degrees and values of water rights already exist, unless the district is prepared to purchase such rights, as was done in case of Merced irrigation district; nor is it adapted to a community composed of distinct units requiring radically different construction costs.

The theory of assessing the cost of a local improvement, such as irrigation, according to the full cash value of the land, if carried out rigorously, might readily prove inequitable inasmuch as all factors contributing to the full cash value of a tract do not necessarily contribute in the same degree to its increased value resulting from irrigation. The satisfactory operation of these ad valorem laws in connection with irrigation-district assessments has been due in no small measure to the refusal of so many assessors to follow them out to the letter; in other words, to the practices built up in applying the laws rather than to the strict requirements of the laws themselves. A further contributing factor has doubtless been the fact that inequities involved in the higher valuations have not been sufficiently harmful to result in changing the plan. Few, if any, of the districts in lower Rio Grande Valley, Tex., have adopted the benefit method of assessment in preference to the ad valorem plan, the latter having been tried there in numerous districts and found satisfactory.

Assessment according to benefits is designed to take care of varying local needs and conditions arising from the installation of irrigation systems. Greater adaptability in determining benefits is of course possible where the apportionment is made annually, or where a reapportionment is permitted in particular cases in subsequent years, than where the allotment of benefits is made only once for all time. A permanent assessment of benefits assumes that the ratio

of the value of water to the several tracts assessed will remain unchanged throughout the life of the bonds. This assumption, of course, is not supported by experience. The Washington plan of assessing benefits annually appears to be the more logical and equitable and offers a means of adjusting the district charges to meet changing conditions. Furthermore, where bonds are considered a general liability against all lands in the district, as they are in Washington and many other States, the security of bondholders can not be impaired by altering the relative burdens to be placed upon the several tracts by a given assessment. In practice the proportion of charges once established for a district usually remains the same year after year, but the valuable feature is that it does not need to remain the same. A readjustment of benefits recently made in Columbia irrigation district is stated to be working out satisfactorily and to have brought few, if any protests, in spite of the fact that the relative burdens on some lands were necessarily increased.

The two opposite views on assessment are represented, respectively, by the methods of assessing at the same rate per acre and according to acre-feet of water allotted, neither of which methods would seem to allow of deviation from the fixed rule. The one view is that the irrigation district is a unit in its community of interest involving equal benefits to all lands, with the result that each acre should bear a share of the burden equal to that of every other acre. The other idea is that the quantity of water received from the district is the measure of interest each tract has in the district, and that a tract receiving 4 acre-feet per acre is benefited twice as much as one entitled to 2 acre-feet per acre. Several States, as previously noted, permit modifications of the uniform rate plan. The Utah plan of assessing according to water allotments has been in force since 1917 only and has been tried out in but few cases. In reality it is an extreme application of the rigid benefit rule, and involving as it does the exact quantity of water to be supplied to each tract by the district improvement, necessarily requires careful, scientific handling. Administration of the rule has proved unsatisfactory in three of the five operating districts that have tried it, due mainly to weaknesses in the original allotments.

To summarize, the flat-rate assessment and the rigid-benefit assessment permit no deviation from the original allotment and therefore are not susceptible of adjustment should such prove desirable. The ad valorem and the annual benefit assessments are both adjustable in any year. The two latter plans in practice are not far apart in their aims, owing to the rather widespread interpretation of full cash value as the value or benefit resulting from irrigation. The tendency of so many assessors to regard irrigation improvements as of equal benefit to all lands is evidenced by the large number of districts operating under the ad valorem and benefit plans in which assessments are spread uniformly.

OPERATION COSTS

The basis for securing revenue for operating purposes is frequently different from that upon which construction charges are apportioned. While all irrigable (and sometimes nonirrigable) lands in an irrigation district are made liable for the cost of building or acquiring the irrigation system, nevertheless a sentiment sometimes prevails that

lands not using water should not be required to bear so large a proportion of the cost of maintaining and operating the system as lands to which water is actually delivered. In some States this distinction may be made in the annual assessment for general expenses, and in others it is made possible only through the imposition of tolls.

The ad valorem method in Texas does not apply to assessments for maintenance and operation purposes. For such purposes, one-third to two-thirds of the estimated expense for each year is charged at a uniform rate per acre to all land capable of being irrigated, and the balance to all persons actually applying for water. In the exercise of statutory authority, some of the Texas districts take promissory notes in advance from applicants for water and hypothecate these notes in order to secure money for operating expenses.

Where assessments in Idaho districts are levied for maintenance and operation purposes, they are required to be in proportion to the benefits received from the maintenance and operation of the district works rather than proportionate to the construction cost. This makes it possible to charge general expenses in whole or in part to lands using water in any year. Idaho has a further provision that in cases where works were constructed by the United States under the reclamation act, operation and maintenance assessments shall be levied according to the number of acre-feet delivered during the preceding season, with a minimum charge upon each irrigable acre for not less than 1 acre-foot.

New Mexico provides that in districts formed to contract with the United States, the portion of operation and maintenance costs to be collected by tax shall be not less than one-fourth nor more than two-thirds of the total.

TOLLS

Most of the States give district directors the discretion of either fixing rates of toll for water or levying assessments, or of employing both methods to defray the costs of organization and current expenses. Tolls are used by a large number of California districts, and to a lesser extent in some of the other States. They are sometimes made payable in advance of water delivery, but this is not always practicable owing to the fact that money for the payment of tolls is often available only upon the sale of crops on which that particular water was used. The power to require payment in advance, however, has been valuable in cases of pending financial reorganizations where assessments were not being paid and money to operate the system would not have been available otherwise. In such cases advance payments have assisted materially in keeping the systems functioning. In one Idaho district the quantity of water used during the season is the basis of charge for water master's and ditch riders' salaries and for repairing occasional breaks on the canal system, and the area of land irrigable is the basis of assessments for maintenance and all general expenses. Some of the statutes provide that unpaid tolls may be added to the annual assessment.

BONDS

The outstanding feature that distinguished the early Wright Act districts from those authorized by the early Utah laws was the

power to issue bonds. That the bonding privilege has been the outstanding inducement toward the formation of districts is indicated by the fact that 86 per cent of all districts now in operation or undergoing construction have voted bonds and 83 per cent have sold all or portions of their bond issues.

The bond of an irrigation district contains a promise to pay a definite sum on a definite date, with attached interest coupons payable annually or semiannually, usually the latter.

In addition to the usual type of bonds issued for construction purposes or for the acquisition of irrigation works, certain States provide for bonds of special character. Idaho authorizes districts to issue secondary bonds to pay interest on the main bond issue for any portion of the first five years after construction has been completed. Texas authorizes districts under certain circumstances to issue preliminary bonds to pay the costs of organization and preliminary investigations, and to issue interim bonds secured by a deposit of bonds from the main issue to pay, in case of emergency, for engineering and legal work and for the purchase of lands for right of ways and reservoir sites.

In all States except Montana and Wyoming bonds must be authorized by vote of the district electors, prior to issue. In Montana, however, a petition signed by holders of title to land must first be filed with the district commissioners. In Wyoming, after the assessment for construction has been confirmed by the court, the district commissioners without further authorization may issue bonds not exceeding the amount of the assessment. An investigation by the State engineer or other official or group of officials as to the feasibility of proposed plans upon which bond issues are to be based is a prerequisite in a number of States.

VALIDATION

So vital is the question of the legality of district bonds that the California Legislature early provided a means whereby the directors of a district could bring a special action in court to determine and confirm the validity of proceedings leading up to and including the bond issue. This feature has been adopted by the other States with the sole exception of Kansas. Some of the States make the bringing of such action mandatory. An advantage of this measure lies in determining the legality of bonds prior to their sale and before such legality can be called into question against the interest of purchasers. Of course it is possible to issue bonds properly and then dispose of them illegally. The purchaser, however, may stipulate in the contract of sale that the actual sale be similarly confirmed, or the assessment payer may bring action to safeguard his interests, in some States under the validation act itself. The various statutes also provide that proceedings in connection with assessments, contracts, exclusion of lands, and other acts may be tested in the same way.

Certain bond issues in large amounts sold during the first few years of irrigation-district operations in California, and 20 years later in Colorado, were subsequently declared null and void by the courts. Confirmation proceedings are now common, however. In this connection it is noteworthy that no bonds sold since 1913 have yet been declared illegal, and that of $185,000,000 in bonds outstand-

ing, less than $750,000 are now involved in unfriendly litigation over their validity.

INTEREST

Most of the statutes prescribe that irrigation-district bonds shall bear interest at a rate not exceeding 6 per cent per annum; three, however, provide that the interest rate shall be 6 per cent, and several laws fix the limit at 7 per cent. In most States interest must be paid semiannually, usually on January 1, and July 1.

In order to give irrigation districts an opportunity to get on a paying basis before interest shall fall due, it is provided in the majority of the States that the first one to five years' interest may be included in the amount of the bond issue. In Idaho this is provided for by the issuance of secondary bonds.

DENOMINATIONS

Although several of the State statutes contain no provision as to denomination of bonds, most of them fix maximum and minimum limitations. The minimum wherever provided is $100 and the maximum either $500 or $1,000. Several States require the amounts to be multiples of $100.

Denominations are determined in individual cases by the probable class of investors. Some districts, for exceptional reasons, have adopted 8 or 10 denominations ranging from $100 to $500, but the usual practice, because of greater convenience and consequent less expense of handling, is to limit issues to 1 to 3 denominations. Large investors prefer the larger denominations as a matter of convenience, whereas small investors can be reached only with the smaller bonds. In States which permit of $1,000 bonds these are frequently combined with $100 and $500 bonds. Where $500 is the maximum, it has been the general practice to use that figure for most of the bonds issued, with often a small percentage of the issue in $100 denominations in order to attract the small investor or to comply with statutory requirements for retiring certain percentages each year.

MATURITIES

Irrigation-district bonds have nearly all been of the serial type, a certain percentage of the issue maturing each year. In some States it is legally possible to have the entire bond issue fall due at one time; but, particularly in districts only partly settled, the advantage of spreading the principal payments over a series of years has resulted in the use of serial maturities in most cases. Some statutes provide that certain percentages of the issue shall be made to fall due in a specified number of years; for example, 5 per cent at the end of the eleventh year from date of issue, increasing to 16 per cent at the end of the twentieth or last year of the series. However, the varying conditions in different districts have caused most of the State laws to allow the electors or the supervising State officials more or less option in fixing dates of maturity, and even where certain definite series and percentages are prescribed in the statute, other maturities are usually made optional. Entirely different conditions obtain, for example, in a comparatively new and only partly settled district—which usually has the burden of a considerable discount added to its capitalization—from those found in a com-

munity sufficiently developed to command a ready market for its bonds and capable of discharging its indebtedness within a short term of years. The one district is benefitted in having its principal payments deferred until the income from the land becomes sufficient to take care of them, while the other reaps the advantages of having to pay less for its loan and of eliminating the unhealthy effect of postponing payments unduly.

Most of the States provide maximum periods within which bonds must mature. This period is usually either 20 or 40 years, although statutes in two States provide 30 years and one, 50 years. Wyoming imposes no statutory limitation except that bonds shall run not longer than one year after the last installment of the assessment for construction, such installments being fixed by the court.

Oregon and Idaho provide for amortization; that is, for the combined sum of principal and interest payments to be approximately equal each year during the life of the issue. Such bonds may run not less than 5 nor more than 50 years in Oregon and 40 years or less in Idaho. The amortization plan is optional in Idaho, and in Oregon has been so construed by the attorney general. Experience points to the desirability of an optional amortization plan. A project, for example, that is well established and without prospect of large increase in earning capacity has little to gain by arranging its heaviest payments 10 or 20 years hence. On the other hand, the amortization plan is not adapted to the capacity of an unseasoned project, where the expectation is that years of growth will make possible larger annual payments than the project can carry originally.

Payment of the principal of individual bonds in installments is allowed in some States and forbidden in others. Several issues have been on this basis, but the practice has never gained favor because of the complicated payments involved and the pronounced unmarketability of such bonds. Certain statutes providing for the payment of percentages in given years state that such provisions "shall not be construed to require any single bond to fall due in partial payments."

The statutes are not uniform in their use of the words "issue" and "series" in connection with bonds. Some define an issue as the whole amount of bonds authorized at any election and a series as the part of an issue maturing in any year, while others call a series the amount authorized at an election and an issue the portion of a series sold at a specific time. In most States, however, "series" is used in connection with maturities, and "issue," whether specifically defined in the statute or not, commonly refers to a single bond authorization.

DISPOSAL OF BONDS

Bonds may usually not be sold without a prior advertisement for bids, although in several States the advertising may be dispensed with if par can be secured for the bonds at private sale. The statutory provisions with reference to private sale and to exchange of bonds for construction or for completed works differ in the several States, some of the laws allowing the directors considerable latitude and others imposing restrictions. In several States such matters as the use of bonds for construction purposes, disposal of bonds at private sale, disposal at less than a certain percentage of par, etc., are subject to approval by the State bond commission. Limits as

to the price at which bonds may be sold or otherwise disposed of range from par down to 85, although a few States have no minimum price limitation or else provide that bonds may not be sold for less than amounts fixed by the State commission.

The difficulty of attempting to establish, by legislation, bond yields which will stand the test of a fluctuating market has appeared in the operation of irrigation districts generally and has caused several States to make their statutory provisions on this point more liberal. In California, for example, the Wright Act provided that bonds should bear 6 per cent interest and should not be sold below 90. This feature was amended in 1897 to provide for 5 per cent interest and no sales at less than par, and was again amended in 1913 to make the interest rate not to exceed 6 per cent and to remove the minimum selling price limitation. A single rate of interest fixed by statute has proved to be detrimental to some districts at times when they could otherwise have secured a lower rate, for to secure the equivalent of a lower interest rate the districts would have had to ask for larger premiums than many bond buyers would be willing to offer. Neither excessive premiums nor excessive discounts are attractive to bond investors. Restrictions against trading bonds at less than par were circumvented in many cases during the speculative eras by setting excessive valuations upon irrigation works and then exchanging such works for district bonds ostensibly at par. The nearest approach to a solution of these problems, without at the same time injuring legitimate development, appears to lie in making more liberal the statutory requirements governing selling prices and interest rates and in safeguarding the security so far as practicable by State investigations and reports. Statutory price fixing has not been altogether successful.

REFUNDING BONDS

Many of the States authorize bonds to be refunded. Funding issues in some States may similarly be exchanged for outstanding interest, warrants, or notes, or sold to take up such indebtedness.

While the refunding privilege has been used in the financial reorganization of districts in several States in order to take up overdue bonds and interest at a discount, nevertheless the fact of refunding does not by any means imply insolvency on the part of a district. As a matter of sound business policy certain districts have refunded maturing bonds, which they could well have paid in full, because of prevailing market conditions which would have required the farmers to mortgage their farms at higher rates of interest or to call in loans bearing higher rates than the district bonds were carrying, in order to provide the district with funds to take up such bonds. Certain funding issues of this type have sold at a premium, whereas the original issues which they were designed to take up had sold below par, the higher price of the funding bonds being due to the increase in the security resulting from the district's development. On the other hand, sound districts faced by the necessity of refunding during the present depressed condition of the bond market may be required to take discounts quite out of proportion to their records in meeting obligations.

SECURITY FOR BOND ISSUES

The security behind the bonds of an irrigation district lies in the district's power and duty to levy annual assessments upon all the lands benefited in order to obtain funds for paying the interest and principal as due. In case of neglect or refusal of district or county officials to levy assessments, bondholders may compel such levy by mandamus proceedings.

The bonds ordinarily are not a lien upon the irrigation works or other property of the district. The Washington statute alone provides that in addition to the usual provisions for payment of bonds from revenue derived from annual assessments, such bonds shall become a lien upon all water rights, works, and other property of the district, enforceable in a civil action as in case of foreclosure of a mortgage.

EXTENT OF LANDOWNER'S RESPONSIBILITY FOR PAYMENT OF BONDS

The landowner's responsibility for the bonds extends to the entire issue in some cases and to a proportionate part in others. This matter is discussed in another publication of this department (7). Briefly, some of the State statutes provide that a cumulative levy shall be made each year to include delinquencies in payment of assessments levied in previous years, so that every landowner is ultimately liable for the delinquencies of all other landowners. His liability in such case is known as blanket or general liability. Other statutes are silent upon this point, but most of the State supreme courts that have had the question before them have decided in favor of blanket liability. The Colorado Supreme Court is an outstanding exception in holding that the landowner's obligation for bond assessments is individual, and that once having paid an assessment his land can not be reassessed because of the failure of others to pay.[5]

Blanket liability is intended to protect creditors in case of delinquencies and has a definite value where delinquencies are not heavy. In severe cases of default, however, blanket liability defeats its ends in eventually making it impossible for even the best lands to continue paying assessments.

The laws of Arizona, Colorado, and Utah, and an alternative law in Oregon, provide that under certain circumstances a landowner may release his land from liability for assessments for payment of bond principal and interest by paying in advance of maturity his proportionate part of the outstanding bonded indebtedness. Some of the landowners in Holbrook irrigation district, Colorado, have done this by buying and turning in to the county treasurer the requisite face value of bonds or by paying the equivalent amount in cash. Thereafter, in the language of the statute, "such lands shall be free and clear from any and all liens, levies, and assessments of such bonded indebtedness for which such payment was made." The Arizona statute has a proviso that in event of default at maturity such lands may be taxed to meet the deficiency. Montana provides for

[5] In the recent case of Board of Commissioners of Adams County et al. v. Heath et al., 87 Colo. 204, 286 Pac. 107, the court held further that the legislative provision that the rate of levy be increased 15 per cent to cover delinquencies does not apply to the bond and interest levy, but is limited to levies for "maintenance, operating, current, and other expenses." This decision involved the earlier irrigation district law of Colorado, that is, the law under which districts were organized prior to 1921.

release from the bond-assessment lien only at the hearing for determination of irrigable areas in connection with proposed bond issues, at which time a landowner's proportionate liability may be discharged in cash. This involves a fundamental distinction from releases from the lien for outstanding bonds.

PROCEDURE IN CASE OF DEFAULT

Remedies of creditors of defaulting irrigation districts, as of other taxing districts, differ markedly from those of creditors of private corporations. Instead of immediate foreclosure and sale of the irrigation system the creditors (except in Washington) have access to delinquent lands only, and then only upon expiration of the period of redemption, which is usually one to three years after the delinquency. If no purchasers appear at the sale, the lands are struck off to the county or the district, as the case may be; hence unless the creditors elect to buy the lands at tax sale, a further period ensues before their final liquidation for their benefit. In several States amendments have been proposed from time to time to shorten the periods of redemption of delinquent assessments. Some of these have passed, while others have been opposed successfully on the ground of undue hardship to the farmer.

A period of redemption that serves to prevent a marginal district from going to default is of course desirable. In case of a project unsoundly financed, however, it is of little help. Wholesale ejectment of farmers from a project capitalized beyond its ability to pay and that is known to be heavily in default would merely compromise the project's future, for experience has shown that newcomers are repelled from an enterprise in financial straits. Projects that have defaulted definitely from deep-seated physical or economic causes have been made successful only by reorganization on a sound basis, and seldom if ever by the simple expedient of selling out delinquent lands.

The Washington law authorizes a form of voluntary receivership in connection with the dissolution of insolvent districts, designed primarily for winding up the affairs of defunct enterprises. The plan is being followed successfully in one case and is proposed in another. An extralegal receivership is being used, with the consent of the interested parties, in the case of one operating district, in order to administer affairs efficiently until a plan of reorganization can be consummated. Oregon allows bondholders to take possession of the irrigation works of a defaulting district and operate them until the default is cured, but no case is reported in which this has been done.

The Washington statute making bonds a lien upon the works of irrigation districts was passed in 1895.[6] Foreclosure has been sug-

[6] So far as could be ascertained, the constitutionality of this section has not been passed on by the Supreme Court of Washington. The recent case of State ex rel. Wells *v.* Hartung et al., 150 Wash. 590, 274 Pac. 181, did not directly involve this section, but was a proceeding by the State to compel the directors of a district to make an additional assessment levy. In the opinion, however, the court made the following comment: "The provision of the statute for a lien upon the water rights and other property of the district for the benefit of the bondholders is only by way of precaution and for further security, and was not intended in any wise to take the place of assessments required by the statutes. The foreclosure of such a lien, in the place of the enforcement of such assessments as required by law, would defeat the very purpose of the irrigation law as to that district by taking away all the means of functioning as an irrigation district and distributor of water. In the event that all the lands within the district pass out of private ownership and be in the ownership of the county or the district, or both, then of course that provision may be enforced."

gested in connection with several reorganizations, but in no reported case have proceedings been consummated. The statute does not specify the relations of creditors and water users after the foreclosure. Plans in one case have involved formation of a public utility company to deliver water to users entitled to receive it at rates presumably fixed by the State department of public works. Amendments to district laws providing for such lien foreclosure have been suggested in other States as a means of improving the security of bondholders. Where bondholders may have such authority, a matter for consideration before actually making over a district system into a public-utility system is the past performance of commercial or public-utility irrigation companies, and especially their poor earnings (*8*). In other words, in view of the circumstances in a given case and the unfavorable financial history of commercial irrigation companies in general, does ownership of the system promise the bondholders greater remuneration than direct settlements with the landowners? Advantages of the power to foreclose would consist in inducing landowners to pay in possible cases of deliberate but unnecessary default and in realizing upon valuable marketable property, such as power rights, possessed by a district.

FINANCIAL REORGANIZATIONS

While some district projects have possessed so little merit as to result in complete abandonment, most of those unable to meet obligations in full have been sufficiently worthy to give promise of eventual success if relieved of part of their burdens. The bondholders under such circumstances, realizing that to pursue their legal remedies would merely result in forcing the settlers off the lands, have agreed in certain cases to write off a portion of the debt in order to assure ultimate payment of the balance. In most instances the district organization was retained; in several it was dissolved and the systems were transferred to mutual irrigation companies. A few projects have passed through several financial reorganizations before becoming definitely stabilized, while others have developed rapidly into sound enterprises, success depending partly upon the thoroughness of the first adjustment and partly upon subsequent economic changes. This subject is discussed in detail in a circular of this department (*7*).

CHARACTER OF IRRIGATION-DISTRICT BONDS

Bonds of irrigation districts may be divided into two general classes, speculative and nonspeculative, on the basis of the character of the enterprises issuing them. A district that includes lands valuable enough without irrigation to furnish adequate security for its obligations, and that is sufficiently developed to insure revenue for making all payments promptly, may issue bonds which are truly an income-producing investment. On the other hand, a project which has no security to offer beyond that to be created with the proceeds of its bonds, whether honestly conceived or otherwise, is essentially a speculative undertaking. Bonds issued by districts of these two classes have borne approximately the same rates of interest and have carried nothing on their face to indicate the extent of the security. Furthermore, in the periods of indiscriminate buy-

ing of irrigation securities, bonds of speculative districts often retailed, at prices comparable with those of sound bonds, to purchasers whose intent was to invest rather than to speculate. It was the failure to discriminate between these types of security that permitted so many questionable undertakings to be financed during those periods.

THE BOND MARKET

The market for irrigation-district bonds during the 44 years of district history has undergone extreme fluctuations and on the whole has been much more sensitive to district failures than to district successes. The earliest districts after considerable effort found an outlet for their securities in this country and in foreign markets. The failures of the early nineties, however, made the disposal of bonds on any great scale practically impossible for some years. Nevertheless, bonds continued to be sold in small quantities, mainly to local buyers, until the revival of interest in irrigation development during the first decade of this century caused a ready sale of irrigation securities in the Chicago and eastern markets upon the recovery from the financial depression of 1907. Then came the second series of district failures, coupled with the failure of a Chicago house which had been financing Carey Act and district enterprises, the net result of which was a second collapse of the market. Most districts that failed during that period were highly speculative enterprises that had little chance to succeed even under the most favorable circumstances; but the credit of all districts was impaired. The more conservative development of the next few years, financed locally in several Western States, tended to restore credit and led to an unprecedented market during the period extending from the close of the war through 1925. During the three following years, 1926 to 1928, sales of irrigation-district bonds aggregated some $23,500,000, which exceeded the total sold during any 3-year period prior to 1920 but was much below the post-war performance. In 1928 the sales totaled $5,000,000.

Bonds of districts in a number of States were sold in the West during and after the war, principally in California. Western markets were unable to absorb all the large issues that followed, and efforts to sell more extensively in the Middle West and East proved successful for the first time in years.

The market for irrigation-district bonds at present is poor. In company with the market for bonds of most types, municipals and industrials included, it declined heavily several years ago when investors turned their attention primarily to common stocks. The class of bond and character of individual security were not controlling; fixed-income bonds as a whole gave way to stocks with anticipated rises in market quotations. The collapse of the stock market during the fall of 1929 aroused expectations of improvement in the bond market. The measurable improvement in the general bond market noted during the winter of 1929–30 did not, according to reports, extend at that time to irrigation-district bonds.

The demand for irrigation-district bonds has doubtless been adversely affected by defaults of certain districts financed and built during the war boom, at the peak of prices, with insufficient reserve to withstand the protracted agricultural depression that followed.

The weight of this influence is difficult to estimate, in view of the decline in other bonds. That it did not have the sweeping effect of the failures of 1912 and 1913 is indicated by the fact that large sales of district bonds were made after information regarding the more recent defaults became generally known. The two situations are not strictly comparable, for in 1914 one-third or less of all district bonds sold were in good standing, while now the fraction is more than two-thirds.

Quotations of bonds of California districts during the winter of 1929-30, compiled in San Francisco and Los Angeles, with few exceptions were below par—some far below. Some marked variations in prices bid were out of harmony with actual differences between the districts involved. Some of these variations are rather surprising, in view of the large amount of authentic information concerning individual districts that has been made available to the public in recent years.

Irrigation-district bonds, which are sometimes referred to as "municipals," bear higher interest rates and sell to net higher yields than do the true municipals, even in favorable markets. Very few irrigation districts have sold bonds to yield the investor less than 5 per cent, and not many others to yield less than 5½ per cent. Municipal bonds as a class are much more numerous, older, and more seasoned than district bonds and are less affected by individual cases of default. Likewise the element of hazard, which enters in greater or less degree into agricultural and reclamation undertakings, has proved less pronounced in the case of municipalities. These factors necessitate a greater amount of advertising for district bonds, the cost of which, together with the greater expenses of handling, selling risk, etc., makes the margin between the price dealers pay for the bonds and the price at which they sell them to the ultimate investors usually greater than that for good municipal bonds. The effect of this situation is that a given town or school district may secure cheaper money than the irrigation district to which it owes its existence.

Measures taken to strengthen State supervision over district activities, and particularly to provide for State certification of bonds, undoubtedly gave great impetus to the sale of bonds. The State's certificate made the issue more attractive to the average purchaser and was consequently an important selling point. As noted under State Supervision (p. 47), however, this feature is less important in the sale of bonds from some States than it was 10 years ago. Another measure to improve the marketability of bonds was statutory authority in some States to eliminate the word "irrigation" from the official designations of irrigation districts and to substitute some equivalent term such as "water conservation," "water conservancy," or "water improvement." Some statutory amendments permitted and others required the new terms to be used. These changes were designed to afford districts an opportunity to prove the merits of their bond issues without having to encounter the initial handicap attaching in some places to the term "irrigation." Exemption of irrigation-district bonds from Federal taxation has also been an important selling point. In some States district bonds are free from State taxation as well.

TABLE 6.—*Irrigation-district bonds sold in 17 Western States to December 31, 1928, by years*[1] [000 omitted]

Year	California	Washington	Kansas	Nevada	Oregon	Idaho	Nebraska	Colorado	Texas	Wyoming	Montana	New Mexico	Utah	Arizona	Oklahoma	South Dakota	North Dakota	Total for each year
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1887	(2)																	
1888	860																	860
1889	180																	180
1890	1,570	(2)																1,570
1891	2,100		(2)	(2)														2,100
1892	2,060																	2,060
1893	900	220																1,120
1894	160	20																180
1895	100				(2)	(2)	(2)											100
1896							80											80
1897							160											160
1898							60											60
1899							30											30
1900						60	110	(2)										170
1901							20											20
1902	630					90	40											760
1903	20					340		300										660
1904						170	10	590										770
1905	80					430		180	(2)									700
1906	10				60	160	100	1,070										1,400
1907	20				40	280		850		(2)	(2)							1,180
1908	(2)					450		1,030		540								2,030
1909	210					110		6,990		150		(2)	(2)					7,460
1910	740	100				410	20	5,220			70							6,550
1911	250				70	350	250	6,400		100	340		120					7,880
1912	2,570	60			280	1,180	170	1,400		120	300	410	90	(2)				6,590
1913	2,200	310			(2)	50	2,700	1,090			80		230					6,670
1914	1,550	1,030			180	1,100	100	90	140		10		10					4,200
1915	3,490	800			120	190	40	80	2,550	40	320				(2)			7,650
1916	3,300	760			20	90	10	70			140					(2)	(2)	4,400
1917	4,660	530			950	180		10	500		10							6,850
1918	1,960	910			1,320	120	80		330		30							4,750
1919	2,570	940			1,340	390	20		530		380		1,050					7,210
1920	9,020	910			1,660	380	140		620		490	20	600	60				13,890
1921	9,700	300		410	1,780	40			5,840		120		460					18,650
1922	14,070	860		20	1,940	1,790	100	20	1,040	(2)	1,280			220				21,350
1923	7,030	1,170		280	850	690	400	100	3,840		1,000			100				15,450
1924	15,830	790		80	970	1,540		250		140	200			2,000				21,790
1925	13,240	560		40	90	2,040		210	3,720	40	1,080		750	1,310				23,680
1926	2,740	220		10	20	320	520		180	60	60	380		3,450				7,960
1927	3,600	30			70	20	20	20	1,900	40	20	220		4,680				10,630
1928	1,940	640		(2)	60	130	110	170	850	20	20	290		820				5,040
Total	109,350	11,160		850	11,830	13,710	5,280	26,150	22,050	1,260	5,920	1,320	3,330	12,620				224,840

[1] Amounts represented in this table are shown for convenience to the nearest $10,000. The totals shown are the correct totals for each State and for each year, to the nearest $10,000, and, therefore, are not necessarily the sums of figures in the several columns or lines. [2] Irrigation-district act passed. [3] Less than $10,000.

TABLE 7.—*Summary of bonded indebtedness of irrigation districts in 13 Western States as of December 31, 1928* [1]

State [2]	Bonds			Districts having voted or authorized bonds			Districts having sold bonds			Districts having bonds outstanding			Districts, operating or under construction, having bonded debts					
	Voted or authorized [3]	Sold	Outstanding	Number	Area	Bonds voted or authorized to date	Number	Area	Bonds sold to date	Number	Area	Bonds outstanding	Number	Area		Bonds voted or authorized to date	Bonds sold to date	Bonds outstanding
														Total	Average per district			
	Dollars	*Dollars*	*Dollars*		*Acres*	*Dollars per acre*		*Acres*	*Dollars per acre*		*Acres*	*Dollars per acre*		*Acres*	*Acres*	*Dollars per acre*	*Dollars per acre*	*Dollars per acre*
Arizona	42,319,975	12,620,600	12,606,100	21	380,497	111	11	182,951	69	11	182,951	69	10	180,951	18,095	80	69	69
California	164,018,997	109,348,711	97,174,087	116	4,241,900	39	97	3,061,188	30	76	2,637,807	37	71	2,556,198	36,003	43	40	38
Colorado	53,660,100	26,153,200	8,047,339	63	1,343,119	40	46	933,928	28	31	642,220	13	23	468,267	20,359	43	37	11
Idaho	37,015,794	13,707,580	11,736,300	67	1,214,974	30	55	914,733	15	53	874,233	13	48	847,803	17,663	18	15	14
Montana	7,383,685	5,923,985	5,437,485	43	572,467	13	36	530,187	11	36	530,187	10	28	170,114	6,076	31	30	28
Nebraska	5,756,509	5,284,850	3,431,750	32	305,235	19	31	260,235	20	20	178,632	19	20	178,632	8,932	29	28	19
Nevada	2,205,500	846,500	846,500	2	195,970	11	1	160,000	5	1	160,000	5	1	160,000	160,000	6	5	5
New Mexico	3,155,700	1,324,300	1,073,000	7	73,145	43	5	46,745	28	4	42,773	25	4	42,773	10,693	40	25	25
Oregon	25,779,316	11,833,900	11,234,300	43	592,842	43	35	403,366	29	34	400,366	28	30	267,397	8,913	44	42	40
Texas	51,457,500	22,054,700	20,459,000	36	1,116,973	46	31	979,228	23	30	965,228	21	24	580,468	24,186	48	37	35
Utah	4,611,000	3,325,600	2,183,600	11	146,502	31	8	111,502	30	7	81,502	27	5	71,189	14,238	30	29	27
Washington	41,499,321	11,159,471	10,046,395	79	1,083,558	38	75	1,069,937	10	71	1,051,605	10	60	215,375	3,590	68	45	42
Wyoming	4,954,000	1,260,000	750,303	14	216,787	23	11	190,018	7	7	81,563	9	7	81,563	11,652	10	10	9
Total or mean	443,817,391	224,843,197	185,026,159	534	11,483,969	39	442	9,444,018	24	381	7,829,067	24	331	5,820,730	17,585	40	35	31

[1] Bonds of local improvement districts within irrigation districts are not included, except those of irrigation-lateral districts in Idaho. See discussion of local improvement districts, p. 65.

[2] Bonds have not been voted or sold by irrigation districts in Kansas, North Dakota, Oklahoma, and South Dakota.

[3] Voted by district electors, or authorized by court in States which do not require bond elections.

PRESENT STATUS OF IRRIGATION-DISTRICT BONDS

Data on all irrigation-district bonds sold from 1888 to 1928, inclusive, are summarized by States in Tables 6 and 7, and certain features are shown graphically in Figure 4. All bonds reported herein are original bonds. Sales, therefore, are of new issues, not refunding issues. Refunding bonds are treated in all cases as continuations of original bonds which they supplanted, whether the refunding bonds were traded directly to holders of original bonds or were sold elsewhere to provide funds to retire the original issues. Likewise, the retirements shown in part 2 of the classification of principal in Table 8 (p. 39) are outright cancellations and not refundings. Bonds of local improvement districts within irrigation districts are not included, although those of the two irrigation-lateral districts in

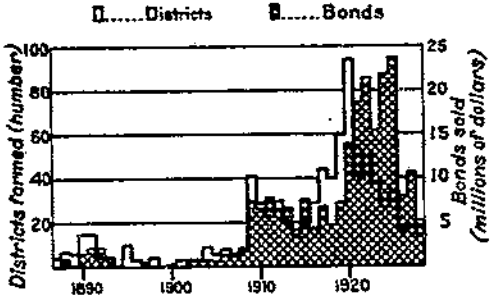

FIGURE 4.—Comparison of rates of formation of irrigation districts and sales of bonds by years, 1887 to 1928, inclusive

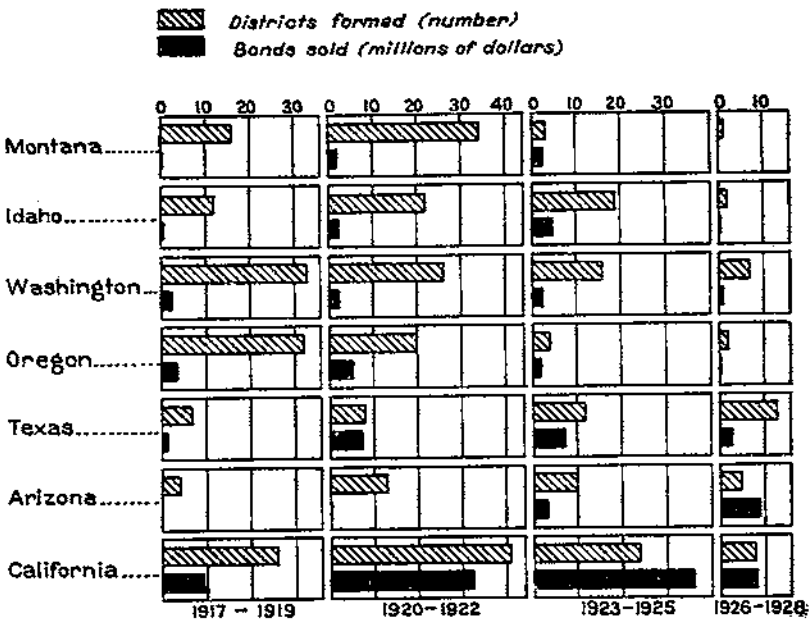

FIGURE 5.—Comparison of districts formed and bonds sold in the seven leading States from 1917 to 1928, inclusive, grouped into 3-year periods

Idaho are included inasmuch as these are organized as independent irrigation districts. (See Local Improvement Districts, p. 65).

Figure 4 compares the rate of formation of irrigation districts with the rate of bond sales for all States in the aggregate throughout

the 42 years of district activities. The lag between organization and sale of bonds is noticeable, as would be expected. It will be observed that following the two organization peaks of 1909 and 1920, the formation of new districts, considering the West as a whole, declined throughout periods during which bond sales were holding up or increasing. Reference to Tables 1 and 6 will show the part played by Colorado districts in the first of these periods, that is, the large proportion of new districts and bonds for that State in 1909 to 1911, inclusive, and the small proportion in 1912 and 1913. All five years, however, are comparable as to total sales of bonds from all States. The tables show that the four Northwestern States, Montana, Idaho, Washington, and Oregon, contributed two-thirds of the districts formed in all States during the peak year 1920 but only one-fifth of all bonds sold during the five years following. Eliminating the large California figures, these fractions become four-fifths and one-half, respectively.

Figure 5 shows graphically the relative positions of the seven leading States in regard to district organization and bond sales during the war period of 1917 to 1919 and the three 3-year periods following. This chart shows that in recent years interest in new irrigation-district activities has been at a low ebb in the Northwest, although relatively high in Texas and Arizona.

INTEGRITY OF IRRIGATION-DISTRICT BONDS

The principal amounts of all irrigation-district bonds sold to December 31, 1928, have been classified as of that date according to integrity of bonds, that is, as to fulfillment of contract to make payments as due, and according to status as outstanding, retired, or invalid. (Table 8.)

TABLE 8.—*Bonds of irrigation districts in 13 Western States as of December 31, 1928, classified according to integrity of bonds and status as outstanding, retired, or invalid*

Item	Arizona	California	Colorado	Idaho	Montana
According to district's fulfillment of contract to pay interest and principal:	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Illegally issued; unpaid		2,061,750	2,849,400		
Presumably void under statute of limitations; unpaid		163,300			
Validity in litigation; as yet unpaid		471,500			116,000
Interest and/or principal defaulted			730,000		206,000
Interest and/or principal compromised		6,648,300	16,982,900	1,940,880	875,500
Interest and/or principal payments overdue, with present outlook for some adjustment		4,167,000	1,637,400	4,092,800	1,224,800
Interest and/or principal payments overdue, with present outlook for eventual payment in full	95,600	186,000	320,600	29,000	91,500
Exchanged for securities of equal face value			194,000		
Bonds and consideration returned on change or abandonment of plans			117,500		
All interest and principal due paid in full to date	12,525,000	95,650,861	3,521,500	7,644,900	3,310,185
Total bonds sold	12,620,600	109,348,711	26,153,200	13,707,580	5,823,985

See footnotes at end of table.

TABLE 8.—*Bonds of irrigation districts in 13 Western States as of December 31, 1928, etc.*—Continued

Item	Arizona	California	Colorado	Idaho	Montana
According to whether outstanding, retired, or invalid:					
Outstanding—	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Validity established or presumed	12,606,100	96,702,587	8,047,339	12,736,300	5,321,485
Validity in litigation		471,500			116,000
Retired at face value—					
Redeemed in cash	14,500	5,923,524	2,240,035	1,089,400	471,500
Bonds and consideration returned on change or abandonment of plans			117,500		
Exchanged for securities of equal face value			194,000		
Used in paying bond fund taxes [2]			9,428,272		
Retired at less than face value under compromise agreements—					
Outstanding issues canceled		3,813,300	1,871,900	531,100	
Portions of issues canceled, balances in most cases refunded by new issues of district bonds [3]		212,750	1,604,754	350,780	15,000
Invalid—					
Illegally issued		2,061,750	2,049,400		
Legally issued, but presumably void under statute of limitations		163,300			
Total bonds sold	12,620,600	109,348,711	26,153,200	13,707,580	5,923,985

Item	Nebraska	Nevada	New Mexico	Oregon	Texas
According to district's fulfillment of contract to pay interest and principal: [4]	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Illegally issued; unpaid	11,000				
Validity in litigation; as yet unpaid			159,800		
Interest and/or principal defaulted				100,000	
Interest and/or principal compromised	2,186,882		250,000	276,000	
Interest and/or principal payments overdue, with present outlook for some adjustment	410,000			7,471,700	352,500
Interest and/or principal payments overdue, with present outlook for eventual payment in full	21,000				498,000
Exchanged for securities of equal face value				130,000	
Bonds and consideration returned on change or abandonment of plans	532,000			9,700	
All interest and principal due paid in full to date	2,123,968	846,500	914,500	3,846,500	21,204,000
Total bonds sold	5,284,850	846,500	1,324,300	11,833,900	22,054,500
According to whether outstanding, retired, or invalid:					
Outstanding—					
Validity established or presumed:	3,431,750	846,500	913,200	11,234,300	20,459,000
Validity in litigation			159,800		
Retired at face value—					
Redeemed in cash	826,063		1,300	373,900	1,595,500
Bonds and consideration returned on change or abandonment of plans	532,000			9,700	
Exchanged for securities of equal face value				130,000	
Retired at less than face value under compromise agreements—					
Outstanding issues canceled			250,000		
Portions of issues canceled, balances in most cases refunded by new issues of district bonds [3]	482,037			86,000	
Invalid—					
Illegally issued	11,000				
Total bonds sold	5,284,850	846,500	1,324,300	11,833,900	22,054,500

See footnotes at end of table.

TABLE 8.—*Bonds of irrigation districts in 13 Western States as of December 31, 1928, etc.*—Continued

Item	Utah	Washington	Wyoming	Total	
According to district's fulfillment of contract to pay interest and principal:	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Per cent*
Illegally issued; unpaid				4,722,150	2.10
Presumably void under statute of limitations; unpaid				163,300	.07
Validity in litigation; as yet unpaid				747,300	.33
Interest and/or principal defaulted	240,100			1,376,100	.61
Interest and/or principal compromised		897,400	541,000	30,593,882	13.61
Interest and/or principal payments overdue, with present outlook for some adjustment	1,815,000	2,519,700		23,690,900	10.54
Interest and/or principal payments overdue, with present outlook for eventual payment in full				1,241,600	.55
Exchanged for securities of equal face value		10,000		334,000	.15
Bonds and consideration returned on change or abandonment of plans	1,050,500		335,000	2,044,700	.91
All interest and principal due paid in full to date	220,000	7,732,371	384,000	159,924,285	[1] 71.13
Total bonds sold	3,325,600	11,159,471	1,260,000	224,843,197	100.00
According to whether outstanding, retired, or invalid:					
Outstanding—					
Validity established or presumed	2,183,600	10,046,395	750,303	184,278,859	81.96
Validity in litigation				747,300	.33
Retired at face value—					
Redeemed in cash	91,500	384,726	87,500	13,581,448	6.04
Bonds and consideration returned on change or abandonment of plans	1,050,500		335,000	2,044,700	.91
Exchanged for securities of equal face value		10,000		334,000	.15
Used in paying bond fund taxes [2]			87,197	9,515,469	4.23
Retired at less than face value under compromise agreements—					
Outstanding issues canceled		229,000		6,686,800	2.98
Portions of issues canceled, balances in most cases refunded by new issues of district bonds [3]		18,350		2,789,671	1.23
Invalid—					
Illegally issued				4,722,150	2.10
Legally issued, but presumably void under statute of limitations				163,300	.07
Total bonds sold	3,325,600	11,159,471	1,260,000	224,843,197	100.00

[1] A canvass of California districts, made by the California Bond Certification Commission in the summer of 1930, shows that $9,661,330 of bonds of 7 districts in good standing Dec. 31, 1928, were in default on either principal or interest on July 1, 1930. On this basis the percentage of bonds on which all payments due had been made in full is reduced from 71.13 to 66.83, as of the last named date.

[2] Final holders usually bought these bonds at discounts pending financial settlements. Some bonds, however, were bought at par.

[3] Refunded balances aggregating $4,362,063, and balances of $377,146 remaining after cancellation of portions of 2 issues which were not refunded, are included in other portions of this table.

In the classification in Table 8 "compromised" indicates bonds on which adjustments of principal or interest, or both, have been completed at a loss to bondholders. The three classes "defaulted," "overdue, with present outlook for some adjustment," and "overdue, with present outlook for eventual payment in full" comprise all bonds on which payments are overdue. Segregation of overdue bonds into these classes necessarily involves personal judgment but is based upon a careful consideration of facts in each individual case and upon the known performance of defaulted irrigation bonds in general. The arrangement is believed to reflect in the aggregate the outlook in 1929 for the bonds of each project concerned. In

general, defaulted bonds are those on which all payments are long overdue, with little apparent salvage in the projects and little outlook for any adjustment of indebtedness. The second group, overdue, with present outlook for some adjustment, includes bonds on which payments are overdue with adjustments in prospect, or with sufficient salvage in the projects to warrant an expectation that adjustments will be made at a loss to bondholders, but with little or no present likelihood that all past-due payments will be made in full. The third group includes bonds on which delinquencies are due to causes which seem temporary or superficial and likely to be overcome completely in the near future. Changes in economic or other conditions may alter these respective totals. They are necessarily based upon the conditions and outlook in 1929 only.

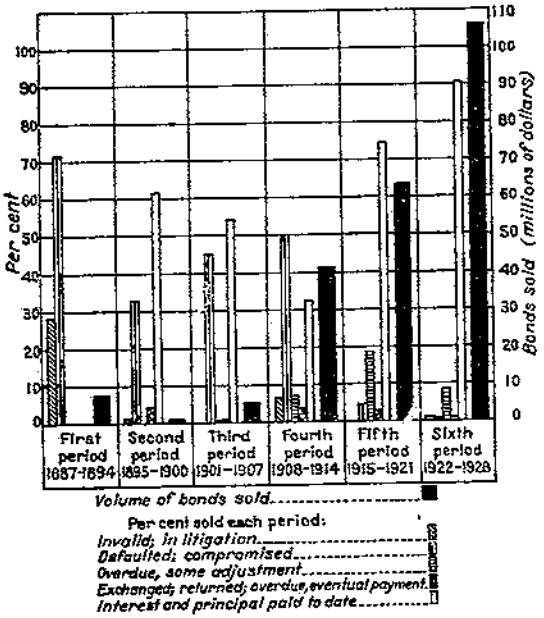

FIGURE 6.—Integrity of irrigation-district bonds as of December 31, 1928, classified by 7-year periods in which the bonds are sold

For purposes of comparison, the history of irrigation-district bond integrity has been divided into six 7-year periods, and the results are summarized in Figure 6. The first and fourth periods, as well as the latter part of the third, were times when speculation in district bonds was rife. Effects of the war boom appear in the showings for both the fifth and sixth periods.

At the end of 1921, 71 per cent of all bonds sold to that time were in good standing—that is, all interest and principal due had been paid. The percentage at the end of 1928, for all bonds sold to and including 1928, is shown in Table 8 to have been practically the same. However, as indicated in footnote 1, Table 8, material defaults have developed since the 1929 canvass was completed. Information from all States is not available, but it is evident that the amount of bonds which were in good standing December 31, 1928, should be reduced by at least $9,661,330 as of July 1, 1930. Thus the proportion of bonds from all States in good standing over the entire period is reduced from 71 per cent as of December 31, 1928, to 67 per cent or less as of July 1, 1930. Necessarily a large proportion of the bonds issued during the fifth and sixth periods, particularly during the latter, represent issues of which few or no payments of principal have yet become due.

The situation with reference to bonds sold during the fifth period obviously is not so good now as it was at the close of that period in

1921. The percentage of those bonds on which all interest and principal due had been paid in full was 99 per cent then and was 74 per cent in 1930. This situation may be viewed in two ways: (1) One-fourth of these bonds then in good standing were not in good standing in 1930. (2) On the other hand, three-fourths of all bonds sold during that fifth period of peak prices and general optimism came through the following period of unfavorable agricultural conditions with all payments made in full as due.

The principal reason for the very material defaults on bonds sold during the fifth period was insufficiency of reserve to carry the districts through the postwar depression. These districts were predicated upon costs which appeared feasible at that time, but which proved out of proportion to the earning power of the districts in question under the unfavorable farming and land-settlement conditions of the following years. Had prices for farm products continued high and had settlers come in the numbers anticipated, the history of many of these enterprises would undoubtedly have been quite different.

The same statement holds generally true as to defaults on bonds more recently sold. Prices for agricultural commodities have not become favorable and land-settlement conditions have not improved. Each year of the continuing depression has witnessed fresh defaults and has strained the resources of other districts still in good standing. The imminence of years in which assessments must be increased to care for payments of bond principal, with the bond market unfavorable for refunding on a satisfactory basis, led during 1930 to a campaign to secure Federal aid in financing and refinancing district enterprises.

In considering the postwar performance of irrigation-district bonds, it is necessary to recall that irrigation is not an isolated industry; it is essentially a part of the Nation's agriculture and it thrives or suffers accordingly. As a matter of fact, the record of irrigation-district successes and failures during the postwar period compares not unfavorably, on the whole, with that of the banks.[7] Likewise, the United States Department of Commerce, in publishing the results of studies of failures in the retail grocery business, points out frankly the weaknesses leading to such failures, but does not advise on that account that the retail grocery as an institution is a failure (*14*).

MAINTAINING BOND INTEGRITY AND IMPROVING THE STANDING OF DISTRICT BONDS

The foregoing discussion has dealt with irrigation-district bonds as a class. As with other statistics, the averages are based upon the performances of districts of all sizes, kinds, purposes, and degrees of excellence. The value of bonds of a single district varies with the conditions affecting that district. This value does not always depend wholly upon agriculture, for some districts are composed

[7] The chief, division of bank operations, Federal Reserve Board, advised under date of Mar. 25, 1930, that the total number of bank suspensions, temporary and permanent, in the United States during the 8-year period 1921–1928, as reported to the Federal Reserve Board, was 5,000; the total number of suspended banks reopened during the same period was 601. The total number of national and State banks operating at the end of 1928 was 25,576, exclusive of private banks not under State supervision. The total number of banks in operation, including private banks not under State supervision, was 30,078 in June, 1920; 30,748 in June, 1921; 26,145 in June, 1928; and 25,260 in June, 1929.

largely of suburban residential property and others have marketable power and other natural resources. But in most of the districts now operating the value of bonds depends primarily upon the income from the farming business of the district land operators, much as the value of bonds of a commercial enterprise depends upon the business of that enterprise, rather than upon the market value of the land liable to assessment. The market value of lands within a district may or may not reflect their earning power and is not a safe criterion of economic feasibility. Nor is the capital cost per acre a criterion, for many districts with high bonded debts are paying their bills and promise to continue paying them, while some with much lower debts are in trouble. Irrigation districts have much in common, but they vary widely in financial integrity and in capacity for discharging their obligations, and the bond investor must necessarily rely upon an analysis of the earning power in each individual case.

The tendency for years has been to increase the bonded indebtedness of communities, and the growth of irrigation-district indebtedness is one phase of this. Since 1921 the aggregate bonded indebtedness of operating districts and of those under construction increased some 77 per cent, while the areas subject to such bonds were increasing only 46 per cent. Stated differently, the aggregate outstanding bonds of such districts averaged $25 per acre in 1921, and $31 per acre in 1928. Considering those districts operating and under construction at the end of 1928, the net bonded indebtedness added since 1921, divided by the net bonded acreage added since 1921, gives as a result $42 per acre, some of which was applied against lands previously bonded. Necessarily the unit cost for works installed during the last nine years has been higher than that for the 35 years preceding, for the era of simple construction and utilization of easily accessible water supplies has definitely passed, and both new and supplemental development involve larger and more expensive construction as well as higher prices per unit of work. An increase in bonds per acre is, therefore, to be expected, but the responsibility of those having to do with development from now on assuredly lies in keeping the costs well within the economic need for it. Maintenance of district-bond integrity depends upon this.

Much discussion has taken place within the last few years on the subject of stabilizing the irrigation-district bond market. Various measures have been suggested, frequently along the line of amending the laws to strengthen the remedies of creditors in case of default. It has also been suggested that the bondholders be given authority to intervene prior to an actual default whenever the course of local management appears to be leading clearly in the direction of default. A further opportunity for improving the standing of district bonds lies with the operating districts themselves. Among the various possibilities the following appear practicable:

Provision from current revenues for the reduction of indebtedness to the extent justified by the productive powers of the lands. The wisdom of this policy may not always be evident, but in certain notable examples it has been justified by the results. A natural tendency is to consider one's own affairs paramount, and pressure cer-

tainly is brought to bear to hold down the rate of assessment to that required for immediate needs. Nevertheless, it would seem that a more widespread policy of providing sinking funds for redemption of bonds at maturity or in advance of maturity would create a favorable impression upon bond investors, in addition to being good business for the districts themselves. Deferred maturities are intended to allow districts to become established before being required to make heavy payments, but certain years are better than others, and these favorable years offer a real opportunity to districts to reduce their indebtedness. The sudden advent of maturities is sometimes a hard experience, and refunding during a poor bond market is expensive. This statement is not intended to apply to those districts that have worked out their programs and that are meeting their bond maturities regularly. It is based upon the fact that delinquencies in certain districts are reported to be largely avoidable, and the tendency of certain others is to let the future take care of itself.

Cooperation among districts in maintaining credit. An irrigation district with bonds to sell usually has to place them upon the general market. In practice the district's ability to sell bonds and the price received depend not alone on the investor's analysis of the individual case, but on the record of other districts in meeting their obligations. Defaults unfortunately are emphasized, and a single defaulting district seems to affect the market more keenly than many sound ones. Irrigation districts are really dependent for their welfare upon the performance of one another.

The extent to which districts should go in supporting each other is a controversial matter. Creation of a fund to insure districts against delinquencies was seriously considered by a large group of districts recently but to the present time has failed to receive substantial support. Objections were due partly to the unwillingness of established enterprises to sponsor the less stable ones, and partly to the complications which would ensue in the handling of delinquent lands. Such procedure, if carried out, would be useful principally in overcoming temporary troubles, rather than in correcting the results of unsound development.

Without assuming financial responsibility for one another, good is actually being accomplished in at least two States at meetings of district representatives at the present time, through interchange of experiences and consolidation of policies. Growth of a sense of responsibility on the part of individual districts to a group is evident in several places at present. Enlargement of this attitude to include the district movement as a whole would seem to promise beneficial results. This would necessarily include a willingness on the part of existing districts to support ample appropriations for determinations by the State of the economic feasibility of proposed developments and the real need for them, and to give State officials statutory authority to require such developments to conform to their economic need. The State is the logical custodian of this authority and if provided with adequate backing from the districts themselves is fully capable of carrying it out.

Publication of facts concerning the districts' financial condition. A common statement of bankers to whom district bonds are presented as collateral is that no source exists from which authentic

information is obtainable as to financial conditions. Installation of adequate systems of accounting, frequent publication of complete financial statements, and submission of statements of economic fact to a readily available source of centralized information should go far toward overcoming this objection. Definite progress along this line is being made in certain States. The full cooperation of districts is essential.

INDEBTEDNESS TO THE UNITED STATES NOT COVERED BY BONDS

Contractual relations between the United States and irrigation districts on Federal reclamation projects (see Relations with the United States, p. 59) have involved the creation of noninterest-bearing indebtedness not covered by bonds but nevertheless comparable with bonded indebtedness. The sums involved have become very large and are an important element of aggregate district indebtedness. The Bureau of Reclamation has provided the following statement (Table 9) as of June 30, 1929, showing for each State: (1) Total indebtedness, or repayment contract value, under contracts between the United States and irrigation districts, not covered by bonds and repayable as construction charges over a period of years provided the United States performs all construction work contracted for; (2) total amounts paid by or credited to districts on the contracts; and (3) total unpaid balances, including both amounts due and unpaid and amounts not yet due.

TABLE 9.—*Indebtedness of irrigation districts to the Bureau of Reclamation*

State	Total	Paid	Balance due
	Dollars	*Dollars*	*Dollars*
California	1,600,000.00	640,000.00	960,000.00
Colorado	999,768.00	28,901.72	970,866.28
Idaho	33,393,555.28	6,819,229.67	26,574,325.61
Montana	19,508,372.81	811,878.86	18,696,493.95
Nebraska	16,692,123.62	2,226,216.09	14,465,907.53
Nevada	3,248,743.00	871,456.04	2,377,286.96
New Mexico	7,470,000.00	1,087,025.40	6,382,974.60
North Dakota	1,436,834.90	25,663.92	1,410,170.98
Oregon	19,843,391.05	841,769.01	19,001,622.04
South Dakota	5,432,258.07	467,702.46	4,964,555.61
Texas	6,030,000.00	701,290.50	5,328,709.40
Washington	14,657,985.72	1,932,947.65	12,725,038.07
Wyoming	8,956,626.38	665,138.63	8,291,488.25
Total	139,268,669.33	17,119,220.05	122,149,449.28

These figures are explained by the Bureau of Reclamation as follows:

The amounts shown in column 2 include the limit of expenditures under the contracts with irrigation districts, although construction work has not been completed, e. g., contracts have been entered into between the United States and irrigation districts embracing the Owyhee project in Oregon-Idaho for the expenditure and repayment of $18,000,000. Construction work is now in progress, but water will not be available for the lands for several years, and repayment of the construction charges will not commence until one year after public notice is issued that water is available. It is believed that the amounts shown in column 2 are analogous to * * * the amount of bonds that would have been necessary had the irrigation districts financed the construction and financial readjustments granted, exclusive of the element of interest. Column 3 would be analogous to bonds retired, and column 4 would be analogous to

bonds sold and outstanding and bonds voted but not issued. There are no amounts that can be given by the bureau which would be analogous to bonds sold. Such a figure would be only problematical.

The above tabulation covers only irrigation, drainage, and reservoir districts. The various canal companies, ditch companies, irrigation companies, etc., such as have been organized in the States of Idaho and Nebraska and have purchased water under the Warren Act, have not been included. Neither have water users' associations been included.

The foregoing figures, together with those in Table 5 in the three columns under "Bonds," cover the major obligations incurred by irrigation districts in the several States.

WARRANTS AND NOTES

The warrant is the usual instrument through which money is obtained in small amounts prior to the collection of assessments, although some statutes authorize the issuance of negotiable notes or certificates of indebtedness for temporary needs. Warrants draw interest at rates fixed by the board of directors, within statutory limits. They may be made payable at a certain future date or on demand. Warrants payable on demand are registered by the district in order of presentation if funds are not then available to pay them.

A large accumulation of registered warrants is usually indicative of heavy delinquencies in payment of assessments. This is not always the case, however. For example, a large California district at the end of 1928 had outstanding nearly $500,000 in warrants which had been issued for construction work for which bonds had been voted but were being held up because of litigation; the bonds have since been delivered. Some districts with large accumulations of warrants have refunded them with district bonds.

Several Texas districts have issued notes maturing serially in from 1 to 10 years, in preference to long-term bonds, for replacement of pumping machinery. Others have issued notes to pay the costs of organizing and making preliminary surveys.

STATE SUPERVISION

The policy of requiring State officials to inquire into the desirability, from a public standpoint, of forming an irrigation district first received legislative sanction in Idaho. The failures in the early nineties had caused the California Legislature, in 1897, to make more stringent the conditions precedent to formation and bonding of districts without, however, imposing outside control. But Idaho in the same year required the State engineer to examine and make an advisory report upon plans of each district prior to a bond election, and in 1907, after having tried several different checks on the formation of districts, settled upon the plan now in effect. With the sole exception of Kansas, the States having district laws have since provided for State supervision in one form or another.

CHARACTER OF SUPERVISION

Control by the State applies in certain cases to the formation of the district and in others to plans and estimates formulated later. One theory is that no irrigation district should be organized unless there is ample indication of its feasibility and the sufficiency of its

proposed water supply. The other thought is that the formation of districts should be encouraged to the end that machinery may thus be provided for the actual investigations of feasibility and water supply, but that actual construction of works or issuance of bonds shall be subject to State approval. With reference to bond issues, one plan is to have the State investigate and report prior to all proposed issues; another is to establish certain standards to which bonds must conform if they are to receive State approval as investment for certain types of funds. The usual supervision is advisory rather than mandatory.

ORGANIZATION

In California and Idaho, investigations and reports are required prior to the formation of irrigation districts. These reports, if adverse, are sufficient to prevent formation unless three-fourths of the landowners petition otherwise. The organization petition in Wyoming must contain an engineering, water-supply, and land report bearing the approval of the State engineer. In Texas, petitions for organization of water-improvement districts, as well as for water control and improvement districts, are heard and passed upon by the State board of water engineers if the lands are located in two or more counties, and by the county commissioners' court if wholly within one county. The district court may set aside the order of the State board in case of water control and improvement districts, and that of the commissioners' court in case of either kind of district. Districts in New Mexico and Oregon may be formed without the consent of any State official, but with the exception of districts in New Mexico formed to cooperate with the United States, they must go to the State engineer before proceeding further. In Washington the director of conservation and development is required to investigate the water supply of a proposed district and report his findings to the board of county commissioners, who "shall establish and define the boundaries of the district along such lines as in the judgment of the board will best reclaim the lands involved." Montana now imposes no restrictions on the formation of districts, the law governing the alternative class of districts formed under the Montana Irrigation Commission having been repealed. However, Montana requires a report from the State engineer on engineering features and water supply, except in case of districts proposing to cooperate with the United States. In Utah the State engineer is required to make a water survey and allotment of water to each 40-acre tract in the proposed district, or smaller tract if in separate ownership, before the district may be declared organized. In Colorado, Nebraska, North Dakota, Oklahoma, and South Dakota investigations and recommendations are provided for by State officials prior to district formation, but these are not binding upon the district electors, the purpose being simply to make known the conclusions reached.

In actual practice the State engineer or other corresponding official receives a copy of the petition from the county body or from the petitioners, checks the preliminary plans, and as a rule either visits the proposed district in person or sends a deputy to make such actual field studies as time and available funds may permit. Com-

paratively few proposed districts have been completely disapproved by the State. However, it is not unusual for the State engineer to call attention to the lack of certain information, or to require additional data, or the elimination of certain tracts of land before granting approval.

PLANS AND ESTIMATES FOR BOND ISSUES

A number of State laws provide that the plans and estimates of the district directors formulated before issuing bonds shall be reviewed by State officials but in most cases do not make the resulting State recommendations binding upon the districts. Some statutes, however, state that districts issuing bonds to carry out any plans approved by a State commission may make no material change in such plans without the commission's consent, or provide otherwise for State approval. The disposal of bonds is subject to partial control by State officials in several States.

State supervision over plans and estimates upon which bond issues are to be based necessarily goes further than over the question of formation of the district, for the former involve definite costs of construction which are sometimes dealt with only in a general way when organization is being considered. The State is also deeply concerned with the security for the bonds. It sometimes occurs that the bond issue proposed, and which the State is to inquire into, is inadequate to complete the construction called for. In such a case it is the function of the State to revise the estimates and recommend a greater bond issue. Likewise the maturities proposed may not be best suited to the particular type of district. For example, a comparatively undeveloped district may propose to issue short-term bonds which it would have little chance of retiring when due; or a well-settled district, fully able to discharge capital indebtedness at an early date, might plan to throw a heavier burden upon posterity than is justified. Proper maturities are recommended by the State supervision in such cases.

Security for the bonds involves many factors, important among which are the value of the land both with and without a water supply, adaptability of certain crops, potential earning power, relation to markets, character and sufficiency of the water supply, engineering and economic feasibility of the plans, limitation of indebtedness, degree of settlement of the land, and character of the settlers. All these influences must be considered in determining the proper amount of bonded indebtedness to be created against a district to insure prompt payment of the interest and principal. While the district electors and district officers in any given case may be perfectly capable of deciding the amount of indebtedness they wish to incur and may use good judgment in reaching their decision, nevertheless it is the modifying influence of a public viewpoint, shaped by a knowledge of State-wide conditions and past experience and unhampered by purely local considerations, that the various statutes on this subject have attempted to provide. Such examination is usually made by the State engineer, though in several States by commissions composed of the heads of the engineering, banking, and legal branches of the State governments.

CERTIFICATION OF BONDS

A step farther in the matter of State control over bonds of irrigation districts is the certification of such bonds as legal investment for funds which the law authorizes for investment in county, school, and strictly municipal bonds, and the consequent elevating of certified bonds to a higher plane than those not certified. Submission of bonds to the State for such purpose is voluntary, but in most States districts that have had any bonds certified are forbidden to issue further bonds without certification.

The principle of State certification was first worked out in California in 1911, and has since been introduced into Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Washington. The certification law, however, was repealed in Utah in 1923, and in Idaho and Montana in 1929. The principle grew from a desire to provide a wider market for sound irrigation-district bonds and to put them on the same basis for investment purposes as bonds of other public corporations; that is, to give notice that the State had investigated the bonds of a particular district and approved them as investment for trust and savings funds. Indirectly, it was thought that the setting of a high standard for such bonds would tend to raise the standard of irrigation-district bonds in general.

The California plan, upon which those of the other States are based, is as follows: The directors of a district who wish to have bonds certified make application in prescribed form to the California Bond Certification Commission, composed of the attorney general, State engineer, and superintendent of banks. The commission makes an investigation dealing with water supply and water rights; fertility of the soil and its susceptibility to irrigation, probable duty of water, and probable need for drainage; feasibility of the irrigation system; reasonable market value of water, water rights, and all irrigation works owned or to be acquired or constructed with the proceeds of the bond issue; and reasonable market value of the lands in the district. The commission also ascertains whether or not the aggregate amount of bonds of the district, including those under consideration, exceeds 60 per cent of the aggregate market value of lands and water, water rights, and irrigation works owned or to be acquired. No bonds may be certified if the aggregate amount exceeds the 60 per cent limitation. If the commission's report is favorable, the bonds issued are enumerated in a supplementary report by the commission as entitled to certification by the State controller. Bonds so presented to the State controller and certified by him are legal investments for all trust funds and for funds of all insurance companies, banks, trust companies, and State school funds, and they enjoy the same privileges as bonds of cities, cities and counties, counties, school districts, and municipalities with reference to purposes of investment and deposit as security for the performance of any act. As many consecutive issues of bonds may be certified as the commission may deem proper. After any bonds of an irrigation district have been enumerated as entitled to certification, no uncertified bonds of that district may be lawfully issued. No expenditures may be made from the proceeds of certified bonds until the commission shall have approved a schedule of proposed expenditures.

Points of difference in the certification laws of the several States are the ratio which certified bonds may bear to aggregate market value of lands and works, extent of control over expenditures of proceeds of certified bonds, and whether bonds may be issued subsequently without being certified.

To December 31, 1928, the following total amounts of irrigation-district bonds had been approved for certification by commissions in the several States:

Arizona	$14,645,000	Oregon	$11,935,000
California	111,325,057	Utah	1,100,000
Idaho	11,043,869	Washington	1,304,130
Montana	1,930,000		
Nevada [1]	2,205,500	Total	156,316,156
New Mexico	827,600		

OPERATION OF STATE CONTROL

ORGANIZATION AND BOND ISSUES

State control over district activities has advanced slowly in the face of opposition by many established districts, by persons who have feared the influence of political considerations upon decisions of State officials, and by others whose viewpoint has been purely speculative. Efforts made in Colorado, and recommended by each succeeding State engineer, to provide some check upon the rapidly increasing speculation in district bonds during the first decade of this century came to naught largely, it is stated, because of the influence of persons interested in unhampered promotion of irrigation districts. But the prevailing tendency has been to strengthen State control rather than to limit it, because of the salutary influence it has unquestionably exercised in restraining the promotion of wildcat enterprises. An effective State supervision renders the financing of a project without engineering or economic justification more difficult than would be the case otherwise and to that extent lessens the chances of district failure. The various State officials, in administering district affairs, have very generally shown their feeling of responsibility in guarding the State from the consequences of possible failures. While State supervision has not been uniformly successful, it has unquestionably been beneficial.

Persons who have agreed upon the general principle of State control have disagreed upon its extent. As a result the permissible degree of supervision varies considerably in the several States, as has been shown. In no case does it extend to centering in one official or commission control over all activities of all districts. On the contrary, supervision is frequently limited to the making of recommendations, in which event its chief practical value has consisted in bringing to light the strong and weak points of proposed plans of reclamation.

While the statutes are the foundation for State supervision, the administrative policy of each State is important, for States having the same general statutory provisions often exercise different degrees of supervision. Some flexibility exists, for instance, in determining the economic feasibility of a project—a matter of the utmost importance, particularly when bond issues are under consideration.

[1] In addition to the total shown for Nevada, bonds of local improvement districts within irrigation districts aggregating $358,600 had been certified.

The larger developments of the last 15 years have emphasized the need for providing State officers with accurate, up-to-date information concerning irrigation districts. Statutory provisions for financial statements and reports have accordingly been given increasing attention. The State engineers particularly have found it necessary to keep in touch with all matters pertaining to organization, bonding, progress of construction, and general operation, whether by reports or by personal contacts, for ultimately they are called upon to shoulder most of the State's responsibility. Installation of uniform systems of accounting has been advocated in various States and has made substantial progress in several States in spite of the practical difficulties involved.

CERTIFICATION OF BONDS

The principle of certification has been an important element in the financing of irrigation districts in several States, notably California. In others, including Washington, Montana, and Colorado, it has had little or no effect. As stated, the certification laws of Utah, Idaho, and Montana have been repealed.

Many controversies have centered about the provisions for certification and their administration. Commissions have been charged on the one hand with being too lax and on the other too stringent, depending upon the effects of their decisions in given cases. On the whole, the principle of certification is in less general favor than it was 10 years ago, owing to the fact that of bonds which have defaulted since then a considerable proportion has been certified bonds.

The certification statutes recognize the distinction between income-producing and speculative bonds and provide criteria for eliminating essentially speculative bonds from certification. These criteria include feasibility of the irrigation system but do not specifically include economic feasibility of the whole enterprise. In fact, according to an attorney who participated in framing the original California bond-certification act, the proponents of the act were not willing at that time to delegate to the commission any specific discretionary authority to approve or disapprove bond issues as the result of determinations of economic feasibility. Such determinations have come to be recognized as very important and have been given considerable attention by the California commission under the general authority contained in the act.

The State assumes no obligation to pay certified bonds in case of default. Its responsibility extends to investigating and reporting favorably upon bonds which fulfill the requirements of law, and thereafter to supervising in greater or less degree the expenditure of funds derived from sales of certified bonds. Certification of bonds, then, is clearly not a State guaranty. It is essentially a passing of judgment upon the suitability of the bonds for investment of trust funds provided plans are properly carried out.

The three criticisms of certification probably most frequently voiced, with comments thereon, are as follows:

(1) That the State in placing its certificate upon the bonds without assuming financial responsibility for their payment is not fulfilling its moral obligation. This objection involves the extent to which the State should subsidize irrigation development, which is

everywhere a controversial matter. Granted that the State is not to undertake subsidies, the obligation assumed in case of irrigation-district bonds is not fundamentally different from that concerned in certifying bonds of other types, nor in administering the blue-sky laws or the laws regulating issuance of public-utility securities. In none of these cases does the State assume financial responsibility. Differences in the motives in passing the irrigation-district-certification law and the blue-sky and public-utility laws, and in the administrative procedure in approving securities, may be considerable but do not affect the essential character of the State's obligation.

(2) That purchasers of certified bonds are misled by the certificate into thinking that the State has assumed financial responsibility. A clear reading of either the certification act or the certificate on a certified bond leaves no ground for concluding that the State promises to pay the interest or principal in case the district defaults. To avoid such presumption or the possibility of misrepresentation, a positive statement in the certificate that the State disclaims financial responsibility could be provided by amending the law. The Oregon law, in fact, was amended in 1927 to require the certificate to contain the words: "This bond is not an obligation of the State of Oregon."

(3) That the State has not provided adequately for the investigations and checks upon expenditures needed to justify placing its seal of approval upon the bonds. This objection, where valid, involves defects in administrative procedure which presumably can be remedied. That the criticism is evidently valid in some States may be concluded from the experiences of certain officials in attempting to exercise effective control over the execution of plans which they have approved. Considerable opposition to the further extension of State control exists in many quarters and is shared by representatives of certain established districts unwilling to submit to additional restraints upon their own activities. Much serious objection to certification should be removed, however, by overcoming this opposition to further State control and giving the certification commissions the authority and the money they need for making complete investigations of all factors, including economic feasibility, and for really effective control over expenditures.

The certification laws are not uniform throughout the several States and it is true that in some States certified bonds have gone to default. Failure in some of these cases has been due to elements of unsoundness which existed at the time of certification but which were not sufficiently considered or understood, and in other cases to unfavorable developments later. Opposition to the principle of certification, based upon one ground or another, has forced the extreme measure of repeal in three States. In other States where the principle has strong support, opposition has led to discussions of means of strengthening the law and making less likely the certification of potentially unsound bonds. The certification plan has proved valuable in those cases in which the commission has been given ample funds to make determinations of feasibility and has full authority to require expenditures to conform to approved plans, and the plan appears susceptible of greater usefulness under enlarged legislative provisions. Favorable results can hardly be expected unless the officials charged with administration of the certifi-

cation plan are given a measure of control over expenditures that is consistent with the reasons which induced them to certify.

INVESTMENT OF STATE FUNDS IN IRRIGATION-DISTRICT SECURITIES

The question of public aid to irrigation districts for the purpose of stimulating or making possible needed development has been under discussion many times. Efforts made from time to time to induce Congress to provide for Federal guaranty of district bonds have not yet been successful. A number of the States, however, have granted statutory authority for the investment of State funds in irrigation-district bonds, and several have actually made such investment, as shown below. Two different viewpoints have governed the purchase of district bonds with State funds—investment and development—and the selection of bonds has varied accordingly. Where the prime motive has been investment, the State has chosen bonds from the standpoints of security and net return and has made purchases mainly in small blocks. Where the benefit to accrue to the State from the development of resources has been sought, aside from the benefit of a good investment, the conclusion reached was that the public funds should be placed where they would do the most good, even to the point of purchasing bonds, much of the security for which remained to be created. These motives, however, have not always been clearly defined. In certain cases, for example, several in Washington, the motive has been frankly development; in others it has been solely or primarily investment, owing to the absence of any immediate need of State assistance; whereas in still others it is not possible to say to what extent the desires or representations of districts themselves have influenced the selection of bonds for State investment. States in which purchases of district securities from State funds are reported are as follows:

UTAH

Utah in 1911 authorized funds derived from the sale or rental of State lands to be used in purchasing irrigation-district bonds. Apparently this was not a well-defined policy of public aid to districts, for it was accomplished merely by enlarging the scope of investment of State land funds and introduced no new features. During the next two years a total of $90,200 was invested in bonds of three districts, covering in all 23,320 acres, the purchases ranging from 25 to 50 per cent of the total amount of bonds sold by the districts. As two of the investments proved unsatisfactory, the amendment was repealed in 1915. The State has since disposed of its interest in one of the districts at a nominal figure.

CALIFORNIA

In 1915 and 1916, when the market in California was less favorable than it became later, the State purchased $75,000 of certified bonds of two districts from the teachers' permanent fund and school-land fund. Additional purchases from time to time through the year 1929, from the school-land fund, compensation-insurance fund, and estates-of-deceased-persons fund, have brought the total to $339,000 of certified bonds of eight irrigation districts. The State's

purchases have been only a small fraction of the total amount of bonds sold by each district, in no case exceeding 2.5 per cent and being less than 1 per cent in case of five of the eight districts. Several of these blocks of bonds were bought at a premium. All bonds purchased are in good standing, although one of the districts is under a burden which has caused it to seek Federal relief.[9]

NEBRASKA

For some years Nebraska has made purchases of irrigation-district bonds from the permanent school fund. To date $556,800 of bonds of 11 irrigation districts have been purchased, of which the State now holds $433,100. In case of five districts the State purchased all bonds sold, in one case 92 per cent of the total, and in the five other cases 1 to 38 per cent. The total areas of the six districts of which the State bought all or nearly all bonds amount to 34,598 acres; of the other five districts, 100,180 acres. A portion of one issue was refunded at 95 cents on the dollar, and interest in another case is overdue, with outlook for a compromise. All other bonds are in good standing.

WASHINGTON

The Washington Legislature in 1919 provided that the State reclamation revolving fund, raised by an annual levy of one-half mill upon all taxable property in the State, might be used for investment in bonds of reclamation districts, including irrigation, diking, and drainage districts. The law was "based on the proposition that the State should encourage, direct, and aid in the reclamation of its waste land" (*17*). The fund was created a revolving fund in that bonds bought by the State were intended to be resold when marketable and the proceeds applied to the development of other districts. Administration of the fund is controlled by the department of conservation and development.

The original plan was to buy the bonds at 90 cents on the dollar, on the assumption that a district able to sell bonds elsewhere for more than 90 had no need of State assistance. For the first few years the State bought only portions of district bond issues. The purpose was to give limited aid where possible by buying partial issues at 90 and reselling them when the development thus made possible should have enhanced the security and made the bonds more attractive to private investors. This procedure proved unsatisfactory, for it left some projects only partly financed and unable to sell more bonds. Later plans have contemplated giving individual districts all the help they need.

To the end of 1928 the State had purchased a total of $1,674,805 of bonds of 15 irrigation districts including a total area of 90,129 acres. The State bought the entire issues of five districts and 93 per cent or more of bonds sold by two districts. Of these seven districts, the six which may be regarded as fully financed to date include an aggregate area of 7,504 acres, of which 4,757 acres were irrigated in 1928 and have outstanding bonded debts per acre ranging from $59 to $127 with a weighted average of $84. In the other eight cases the portions of total issues sold which were purchased by the State

[9] Since this was written this district has defaulted in payment of bond interest.

ranged from 4 to 74 per cent. Of bonds purchased, the State subsequently sold $512,500 of bonds of eight irrigation districts to private purchasers.

Of the total amount of irrigation district bonds purchased by the State, $936,805 of bonds of nine districts are in good standing and $738,000 of bonds of six districts are in default or have been compromised. One of the districts with bonds in good standing, however, gave the State $253,805 of bonds in satisfaction of claims for advances aggregating approximately $825,000, so that the State's actual investment was refunded at considerable loss.

The plan has proved disappointing, not only in the financial losses involved, but in the failure of its main purpose of placing new irrigation district development on a sound basis.[10] This is brought out by the fact that of the nine districts with bonds in good standing, only three were formed for entirely new development; furthermore, one of these three was the case of essential refinancing referred to above in which the State's actual investment was refunded at a loss, and another was a case in which the State bought only 6 per cent of the entire amount of bonds sold. One of the districts formed for supplemental development was aided by the State through the purchase, as an emergency measure, of bonds bearing 1 per cent interest to finance additional storage required for an increasing orchard area.

Of the 6 districts with bonds not in good standing at the time of this survey, 2 were formed for entirely new development, 2 for principally new development, and 2 for principally supplemental development. The State has accepted or is faced with losses in all six cases. It is the largest or the sole bondholder of three of these districts. Where the State takes the entire refunding bond issue of a refinanced district, maturities and interest rates are designed to carry the projects successfully through their development periods. The purpose of the 1 per cent interest rate is to ease the settlers' burdens as much as possible without allowing them altogether to lose sight of their obligations to repay the State.

The Washington plan is still in operation, notwithstanding losses of State funds and the resulting criticism and opposition, but has been restricted in its scope by legislative and administrative measures designed to guard more carefully against repetition of heavy losses.

OREGON

In Oregon a plan of State assistance to irrigation and drainage districts was provided by constitutional amendment in 1919. This involves the payment by the State of interest on district bonds for

[10] The third biennial report of the department of conservation and development above cited (*17*) thus summarizes the results to September, 1926: "But what does the record disclose? Not only losses of State investments running into millions but actually negative results so far as real reclamation is concerned. Not a single new project has been established on a firm footing. On several projects that were new or substantially so a debt has been created so great that the landowners can not see their way out, and instead of increased settlement it has been the reverse—many homes deserted and the land again turning to desert. * * * True, some existing projects were helped through being able to borrow from the State money needed for extensions or renewals, at lower rates than they could have secured elsewhere. But this assistance to established projects was probably not contemplated in the original State reclamation act, and it was cut off from the district most in need of it by an amendment passed by the legislature of 1923 which limited investment of the State reclamation fund to those districts which should be found by the director to be 'in sound financial condition.' This amendment has made it mandatory upon the director to refuse during the biennium to purchase the bonds of some districts voted for betterment and extension work because of the fact that these districts, on their own book showing, were not financially sound."

periods of not to exceed five years. The purpose was to give districts an opportunity to get on a paying basis before any demands for interest should fall due. The amendment provided that the money advanced by the State for payment of interest should be repaid after the maturity of the last bond on which the State had paid interest. Funds are obtained by the State for this purpose by the sale of State bonds upon which the districts benefited are required to pay interest, in order that the State, although lending its credit, shall be fully reimbursed for expenditures. The amount of indebtedness that the State may incur for this purpose is limited to 2 per cent of the assessed valuation of all property in Oregon. Administration is in the hands of a commission composed of the attorney general, superintendent of banks, and State engineer, but an act passed in 1927 provides that the State reclamation commission (governor, State treasurer, and secretary of state, with the State engineer as secretary of the commission) shall investigate requests for such payments by the State and shall recommend that the State grant or refuse the requests. These recommendations are advisory only.

To the end of 1928 the State had advanced money for payment of interest on $9,384,000 of bonds of 15 irrigation districts, the total issues per district ranging from $30,000 to $1,550,000. These districts cover a total area of 150,355 acres, of which 70,995 acres were being irrigated in 1928, and have outstanding bonded debts ranging from $22 to $118 per acre with a weighted average of $62 per acre. Of such bonds outstanding at the end of 1928, only $2,235,000 issued by two districts were in good standing. The State's obligations in connection with these advances as of June 1, 1928, are shown by the following figures (*11*):

Oregon district interest bonds issued and outstanding	$2,158,960.00
Annual interest on such bonds	101,548.32
Total annual interest to June 1, 1928	514,694.27
Portion of total annual interest paid by districts	245,938.58
Accrued interest credited to districts	5,105.44
Interest due and unpaid by districts	263,650.25

These figures show that the districts had paid less than one-half of the amount of interest on State bonds with which they are chargeable. The State is liable for the interest and principal of these "district interest bonds," in case the districts fail to repay the State. That there will be material failures to repay is evident from the situation in a number of these districts. The situation caused the 1927 legislature to authorize the State reclamation commission to compromise the districts' indebtedness to the State and accept refunding bonds on the same terms as such bonds should be accepted by other creditors. The 1929 legislature authorized the release of the whole or any part of such indebtedness, provided other creditors agree that annual payments on indebtedness due them shall be reduced to an amount which the commission finds to be within the district's ability to pay. Plans were under way to release this indebtedness in connection with refinancing and reorganization of several districts.

The fact that three-fourths of the bonds on which the State contracted to advance interest are in default shows clearly the extent

to which this plan has failed to place new irrigation development on a sound basis. Of the 13 districts in default, 7 were formed for entirely new development, 2 for principally new development, and 4 for principally supplemental development. While development in these last six projects was more or less advanced prior to district organization, the obligations incurred in connection with the new work financed by the districts have proved to be out of proportion to ability of the lands to pay. Therefore, when the respective 5-year periods during which the State advanced interest on district bonds had passed, these districts as well as those formed entirely for new development found themselves unable to meet their annual charges. This situation was aggravated by two general conditions, namely, the undertaking of construction during and immediately following the war at prevailing peak prices and the ensuing unfavorable agricultural conditions.

The State is obligated under present contracts to advance an additional $13,800 for payment of interest. There is no present sentiment for undertaking new obligations of this character. On the contrary, repeal of the constitutional amendment authorizing these advances is to be voted upon at the next general election.[11]

WYOMING

Wyoming, in 1923, authorized investment of permanent funds of the State in bonds of irrigation and drainage districts. Such investments require (1) a favorable report by the State engineer upon the necessity and feasibility of the improvement and sufficiency of the security; (2) a favorable report upon legal features by the attorney general; (3) unanimous approval of the fiscal board, consisting of the governor, secretary of state, State treasurer, State auditor, and State superintendent of public instruction; and (4) final approval by the governor, State treasurer, and attorney general. Estimates of cost and investigations of water rights, water supply, and title and character of lands are provided for. At least 80 per cent of the lands must be held by fee-simple title in private ownership. State funds may not be invested in bonds of any irrigation district in excess of 40 per cent of the actual cash value of lands and water rights, and in recent cases outstanding private obligations have been considered and outstanding public obligations have been deducted from the statutory 40 per cent loan value before making the loan.

The first purchase of irrigation-district bonds under this act was made in 1924, and total purchases to the end of 1928 amounted to $296,500 of bonds of six irrigation districts. These districts cover a total area of 54,513 acres, of which 31,170 acres were irrigated in 1928, and have outstanding bonded debts ranging from $2 to $13 per acre, with a weighted average of $5.44 per acre. Bonds of another irrigation district were reported upon favorably by the State engineer late in 1928 and were being prepared for delivery to the State in the summer of 1929. Drainage-district financing has been considerably more extensive.

[11] The provision was repealed at the November, 1930, election.

In the case of each irrigation district the State is the sole bondholder. All bonds bear 5 per cent interest and all were bought at par. The first five issues purchased consisted of amortization bonds, that is, the principal of each bond is payable in installments. The latest issue purchased and the one being prepared for purchase in 1929 are serial issues.

All seven districts were formed for principally supplemental development—to take over going concerns, refund indebtedness, and finance improvements. In four cases the sale of bonds to the State was sought for the sole purpose of liquidating indebtedness of completed systems, the favorable terms involved in the refinancing making it particularly desirable to the districts. In another case about one-half the bond issue and in the two remaining cases only small percentages were used to refund indebtedness, the balances being devoted to completion or reconstruction of works or to provide storage. Advances of funds for purchase of bonds are made by the State as needed to pay approved claims. All irrigation-district bonds purchased by the State were in good standing at the end of 1928.

RELATIONS WITH THE UNITED STATES

BUREAU OF RECLAMATION

The most prominent relations between irrigation districts and the Federal Government have been with the Bureau of Reclamation. Districts which have had such dealings may be subdivided in two classes.

(1) Districts formed at the instance of the bureau on reclamation projects, as substitutes for water users' associations, "for the assumption as principal or guarantor of indebtedness" of project lands to the United States.

(2) Districts which have contracted with the United States under the provisions of the Warren Act for the purchase of water supplies or for the construction of irrigation or drainage works, or both.

The water users' associations were mutual stock companies composed of settlers on reclamation projects, through which the Bureau of Reclamation could deal with the settlers and through which the settlers could eventually operate the systems. They have proved successful in some cases, the outstanding example being Salt River Valley Water Users' Association, Arizona. From the bureau's administrative standpoint, however, the only remedies in case of nonpayment of charges were individual suits, and there was no means of compelling lands within projects which had not applied for water rights to contribute their share toward operation and maintenance. On the other hand, the irrigation-district plan made collection of charges a function of the district or county machinery provided for collection of taxes, and so far as new projects were concerned, offered one contract in place of many. The bureau, therefore, adopted the policy of urging amendments to the State laws providing for contractual relations between irrigation districts and the United States and of urging settlers on many of the existing projects to adopt the irrigation district in place of the water users' association or to form districts where no associations existed. The results have

been that all the States except Kansas that have irrigation-district laws have now authorized districts to cooperate with the United States and that districts have been organized on most of the Federal reclamation projects and in case of many completed projects have assumed control of the irrigation systems. The functions of active districts on Federal projects which have not yet assumed operation of the systems but which have contracted with the United States usually consist in guaranteeing and collecting charges due the United States, or in representing the project settlers prior to the execution of contracts for the repayment of existing or future charges.

While forms of contract between these districts and the United States have varied, the essential features of agreements for complete substitution of irrigation districts have been the dissolution of water users' associations where they have previously existed, the discharge of liens contained in stock-subscription contracts, and the assumption by the irrigation districts of all indebtedness due the United States, the charges to be collected by the districts under their general taxing power. In actual practice thereafter the bureau determines the annual amounts due for various purposes, and the district levies assessments to meet such charges and turns the money over to the United States at the times provided in the contract.

Districts of the above-described type—with the exception of King Hill irrigation district, Idaho—have been formed at the instance of the Bureau of Reclamation on the reclamation projects proper. Other irrigation districts, however, originally formed independently of the United States, have found it to their advantage to contract with the United States for the purchase of water supplies or for the construction of irrigation systems without strictly becoming a part of any Federal reclamation project. The Warren Act (*15*), passed in 1911, authorized the sale of water in excess of the requirements of the authorized projects to individuals and various types of associations, including irrigation districts, and the cooperation of the United States with such bodies for the construction and use of irrigation systems. Districts of two classes have contracted under this act—those needing total or partial supplies of water, other provision having been made for construction of works—and those which desired irrigation or drainage systems to be constructed by the Bureau of Reclamation. Up to the present time, in addition to the fact of securing financial aid, the greatest advantage to the districts of this plan over that of disposing of bonds in the open market has been that interest has not been required on deferred payments. The United States has also reaped benefits from these contracts. Wider markets have thus been secured for water developed, and to this end the bureau has been willing, to the extent of available funds, to construct systems for districts adjacent to projects. Furthermore, in connection with the drainage of Boise project, Idaho, the bureau has been able to construct drainage systems for neighboring irrigation districts that have been of material benefit to the project as a whole.

It was the original policy of the Bureau of Reclamation to require the deposit of bonds to secure the payment of contractual indebtedness over a period of years, but with the clarifying of State statutes on the subject the assessment for payments called for in the contract is now considered a sufficient lien upon the land. The only districts

required to deposit bonds were the first ones to enter into such contractual relations in Yakima Valley, Wash.

The total amounts involved in contracts between the United States and irrigation districts, grouped by States, is given under the heading, Indebtedness to the United States Not Covered by Bonds (p. 46).

INDIAN IRRIGATION SERVICE

Irrigation-district relations with the Indian Service have been limited. Contrary to the policy of the Bureau of Reclamation, the Indian irrigation service has not encouraged the formation of irrigation districts on the Indian projects. The needs of the case, of course, are different, for the reclamation projects are designed for eventual operation and repayment by the settlers themselves, whereas the Indian projects may continue under Federal operation indefinitely.

Nevertheless, it was felt by the white settlers on Yakima Indian Reservation, Wash., whose lands comprise a large portion of the Wapato project, that an organization was needed through which to deal with the Indian Service. So an irrigation district was formed there to include the "white" lands and any additional lands that might thereafter come into white possession. The district was formed in 1920 and is still active, but its sole function is to afford a medium through which the white settlers and the project management may consult.

There have been only a few cases of cooperation between irrigation districts and the Indian Service in the construction and ownership of irrigation works.

GENERAL LAND OFFICE

Relations with the General Land Office deal with the inclusion of public lands in irrigation districts. Prior to 1916 the various State courts that had passed on the subject held conflicting views as to the liability of public lands of the United States for district obligations, both before and upon the issuance of patent. But the situation was cleared when Congress in 1916 passed the Smith Act (*16*), which subjects both unentered and entered, but unpatented, public lands to the district lien in districts approved by the Secretary of the Interior and not comprising a majority acreage of unentered land.

An irrigation district desiring to come within the provisions of the Smith Act is required to submit an application to the local land office containing data on organization, water rights and water supply, plans and specifications, and to file maps upon which land ownership is classified. Where the unpatented lands lie within a Federal reclamation project, the application is referred to the Bureau of Reclamation for a report as to feasibility, otherwise the General Land Office makes its own investigation of feasibility of the irrigation system. Upon approval by the Secretary of the Interior, the irrigation district files with the local land office a list of assessments against each legal subdivision of public land. Although unentered land is not subject to tax sale, and the United States does not become obligated for assessments, nevertheless these charges constitute a lien against the land which must be removed before entry is allowed. Entered but unpatented land, however,

may be sold for taxes, in which case the purchaser assumes the rights of the original entryman.

In connection with applications for Carey Act segregations and desert-land entries the General Land Office has had occasion to investigate a number of irrigation districts.

OTHER SALIENT FEATURES

APPORTIONMENT OF WATER

The functions of an irrigation district include distributing as well as procuring the water supply. The first question that arises in connection with water distribution deals with the amount to be delivered to each user. Where a district takes over a going irrigation company it usually takes it subject to any existing rights of individual tracts to receive definite quantities or proportionate quantities of water. But if a new system is to be built, or additional land included, or additional supplies of water obtained for lands already wholly or partially irrigated, it then becomes necessary to determine just how the water is to be divided. Some States merely provide that the directors shall adopt rules and regulations for the equitable distribution of water.

The California law has always provided that district lands shall be assessed at their full cash value and that water shall be apportioned according to the ratio of the last assessed valuation of each tract to the total district assessed valuation, the landowner being privileged to assign the right to the whole or any portion of the water apportioned to him. Thus, the more valuable a tract the more water it is entitled to. The same rule holds in Oklahoma. However, the rule may not always be workable, for if carried to conclusion it would result in giving a totally insufficient quantity of water to a tract of porous soil with normally a high water requirement, although the tract might be so low in fertility or so far removed from transportation facilities that its assessed valuation would be relatively low. Care has been taken not to disturb the California law on this subject, inasmuch as the United States Supreme Court in passing upon the constitutionality of the original Wright Act cited with approval these features of the law and held that such an apportionment of water, coupled with the right of assignment, "operates with as near an approach to justice and equality as can be hoped for in such matters, and does not alter the use from a public to a private one." The rule is being followed in some districts, with adjustments in assessed valuations to take care of cases in which it might work an injustice, but is not followed in others.

Certain other States provide that water shall be distributed pro rata, that is, an equal amount to each acre. Still other States, of which Washington is an example, require that the board of directors shall provide for "the equitable distribution of water to the lands within the district, upon the basis of the beneficial use thereof," which is the end that most well-conducted irrigation enterprises strive to attain. The Utah provision for an allotment by the State engineer before organization of the district, with a final revision after organization and after the amount of water available has been determined, is a refinement of this principle in that it embodies a survey of all existing water rights, classification of the soil, deter-

mination of the water deficiency on each tract, and resulting determination of the amount of water to be supplied by the district to each tract.

Authority to charge tolls for water, which is granted by most of the States and which has been taken advantage of to some extent, offers a means of apportioning water in any particular year according to the needs of the water users.

Irrigation districts are often given conditional authority to sell or rent excess water to outside lands.

EMINENT DOMAIN

An important power granted by all the State statutes to irrigation districts is the right of eminent domain—the power to condemn land, water, water rights, and other property necessary to the purpose of the district. In California an irrigation district, in common with other political subdivisions, may take immediate possession upon bringing eminent-domain proceedings and depositing the required security. California furthermore authorizes an irrigation district to condemn the use of property of another irrigation district so long as it does not interfere with use by the district first acquiring the property. Under this authorization Waterford irrigation district in 1915 instituted proceedings to acquire the right to enlarge the main canal of Modesto irrigation district for the conveyance of water to the Waterford lands, but the case was settled without going to trial.

DRAINAGE

The right to construct drainage works is now generally recognized to be as vital to the success of an irrigation district as is any other of its powers. Although such provisions were not included in the early district laws, the experience of all types of irrigation enterprises has brought the question of drainage of irrigated lands very much to the fore and has resulted in effecting legal means in practically all of the States for the undertaking of drainage by irrigation districts. Until recently comparatively few irrigation districts had done drainage work on any great scale. Very frequently only portions of districts had become affected by the rise of water, in which cases the general tendency was to afford local relief only and to leave preventive measures to the future; for the possibility of future injury proved to be a far less potent incentive to the expenditure of money for drainage construction than the injury already visible. However, instances of drainage construction by irrigation districts, financed either by special assessments or by bond sales, are now to be found in a number of the States, and the organization plans of several districts have contemplated, as an integral part of the districts' engineering plans, drainage construction and the use of the drainage water for the irrigation of other lands. Several large districts in San Joaquin Valley, Calif., have important pumping installations for drainage purposes.

In some sections, as Yakima Valley, Wash., the numerous irrigation districts have been largely relieved from the consideration of drainage problems by the widespread existence of drainage districts. The important thing obviously is to get the land drained by whatever kind of district is most practicable. Without reference to the merits

of either type of district in any given case, however, it is highly advantageous for an irrigation district to be allowed to construct drainage systems. In certain cases, for example, relatively small amounts of such work need to be done. Again, it may prove easier and speedier to accomplish drainage work by an existing organization than to organize another district to do it. Furthermore, the simultaneous consideration of irrigation and future drainage problems by a new irrigation district may result in an ultimate saving of money. Finally, as a matter of self-preservation, the power of an irrigation district to relieve its own water-logged lands and make them valuable again is of the utmost importance.

The Bureau of Reclamation has cooperated with adjoining irrigation districts in drainage construction on Boise project, Idaho; Klamath project, Oregon; and North Platte project, Nebraska. Such cooperation, which has been in addition to drainage cooperation with irrigation districts on the projects proper, has consisted usually in the construction of drainage works for the irrigation districts as parts of the general project drainage systems. In other cases the right to discharge drainage water from district systems into the project ditches has been the subject of contract.

ELECTRIC POWER

The development of electric power by irrigation districts and its use either within or without the districts are authorized in several States as a means of making the irrigation plan more economical and effective. Power-development programs have been confined to relatively few districts but are highly important to those few. The largest undertakings have been in California in connection with the development and storage of water for irrigation purposes. These are as follows: (1) Construction of a power plant in connection with Don Pedro Reservoir by Turlock and Modesto irrigation districts. Modesto distributes the whole of its share of the power, while Turlock distributes power within certain boundaries and sells the surplus to a private corporation. At the end of 1928 Modesto was distributing power through 7,572 active meters and Turlock through 5,374. Combined capital expenditures of the two districts for power, aside from the cost of Don Pedro Dam, exceed $4,000,000; (2) construction of a power house at Exchequer Dam by Merced irrigation district and sale of all power to a private company at the plant. The contract with the power company runs for 20 years, with option of renewal by the district for an additional 20 years. The district's investment in power construction exceeds $1,000,000; (3) contract between South San Joaquin and Oakdale districts on the one hand and two private companies on the other, under which the districts jointly built Melones Dam and the companies built a power plant below the dam. Payments to the districts for use of the water for power are used to pay the interest and principal of district bonds issued to build the dam, of which the principal amounted to $2,200,000; and (4) contract between Nevada irrigation district and a power company under which district water is to be used by the company for power purposes for a period of 50 years. The revenue from this source is estimated to pay the interest on all district bonds now outstanding, aggregating nearly $8,000,000, construction of the

district's irrigation distribution system being not yet completed or wholly financed.[12]

A different phase of the subject appears in the operation of Yuma and Queen Creek irrigation districts, Ariz., which have fulfilled their sole purposes of organization by constructing transmission and distribution systems for the delivery of power purchased elsewhere for use by individual pumping plants within the district. Arizona now has a satisfactory electrical district law under which projects of this type may organize. Two districts in Washington have proposed this same type of development, but have not yet carried it out.

Truckee-Carson irrigation district, Nev., is distributing power through the medium of local improvement districts.

INCLUSION OF MUNICIPALITIES

Cities and towns may be included in irrigation districts and assessed for district purposes in California and certain other States, but in still other States may not be so included. In Oregon, for example, residence property may not be included in districts, but city or town property used or suitable for agriculture is subject to inclusion. The justification for including town lots, which may themselves never be irrigated, is that some municipalities owe their existence in whole or in part to the success of surrounding irrigation districts and should consequently be made to share in the districts' upkeep. While the control of district affairs by city residents has sometimes been feared, particularly in California where the general election laws apply, it usually happens that city residents take much less interest in district affairs than do the farmers, and in relatively few cases have they been known to control affairs for their own particular advantage.

INCLUSION OF PUBLIC LANDS

The inclusion of public lands in irrigation districts is of course at the option of the Federal or State Governments holding title to such lands.

The question of including public land of the United States has been discussed heretofore under the relations of irrigation districts with the General Land Office (p. 61). As stated, congressional authority now exists for the inclusion of unpatented land under certain conditions at the discretion of the Secretary of the Interior.

Several States, recognizing the possible hindrance to development by withholding State lands from inclusion in irrigation districts, have made provision for such inclusion under restrictions and under the supervision of the proper State officials. Such provisions usually deny the right of districts to assess the State, but either grant liens similar to that contained in the Smith Act (*16*) or authorize the State land offices to contract with individual districts for the payment of assessments by the State.

LOCAL IMPROVEMENT DISTRICTS

The local improvement district is a subdistrict within an irrigation district in which improvements may be made of particular value to

[12] The details of these contracts and their effect upon the financial structures of the districts are discussed in (*2*). The effect of power development upon the storage debts and annual assessments of five of the above six districts is discussed in (*18*) on pp. 43 and 49.

the lands included. In the usual type of irrigation district the local improvement district is useful in cases in which the main irrigation district builds and operates only the main canals and main laterals and leaves to individuals or groups the responsibility for constructing and operating sublaterals leading from the main system to individual farms. However, even in districts which deliver water to each farm or small unit of land the local improvement district may be used, where the statute permits, for drainage purposes or for other construction for which the district as a whole does not assume responsibility. Operation of local improvement districts in the several States is as follows:

WASHINGTON

The plan of permitting subdistricts to be organized for local improvement purposes within irrigation districts was first worked out in Washington. It was proposed at one time to organize one large irrigation district to include all lands irrigated from the Sunnyside Canal system of the Bureau of Reclamation in Yakima Valley. This system serves lands under widely divergent conditions, embracing gravity and pumping systems and areas more lately put under irrigation, which are reached by more costly construction than that needed for the earlier irrigation. If this entire system were included in one irrigation district certain units would be under heavier construction and operation costs than other units. This situation led to the idea of authorizing the users under one lateral or other unit of an irrigation district to make repairs or reconstructions or to construct extensions themselves, and to handle the cost of doing this. Such local improvement would also include drainage work.

In 1917 Washington authorized the creation of local improvement districts within irrigation districts. Provision is made for the formal organization of such a local district by petition of the owners of one-fourth of the acreage to the board of directors of the irrigation district and hearing before the board of directors, or by initiation of proceedings by the directors themselves. A protest by a majority of holders of title to lands within the proposed local district is sufficient to prevent formation in either instance. No local government is provided for, all affairs being handled by the central board of directors, which adopts plans, issues local improvement-district bonds, and consummates the work. The bonds may bear a higher rate of interest (8 per cent) than the usual type of irrigation-district bond and are an obligation of the entire irrigation district. The cost of the local improvement, however, is assessed in the usual way against the lands benefited, and the law provides that no tract on which an assessment is paid is thereby released from liability to assessment for deficiencies or delinquencies until the principal and interest of all bonds have been paid in full. In case of failure of lands in the local district to provide sufficient money to pay principal and interest, the main irrigation district is required to pay the deficiency in general warrants.

Twelve irrigation districts in Washington are reported as having adopted the local-improvement-district feature, with a total of 65 such districts. Against these local districts there have been issued a total of $675,296 of bonds (aside from main irrigation-district bonds), of which $355,213 have been redeemed and $320,083 are out-

standing. Their purposes have been principally lining lateral ditches, replacing earth ditches with pipe, installing measuring devices, and in a few cases building new laterals.

The most extensive development of this character has been in Sunnyside Valley irrigation district on Yakima project, which has 42 local improvement districts covering a total area of 9,962 acres. Against this $458,750 of local-improvement-district bonds have been sold, of which $268,625 have been redeemed. Some of the earlier work is stated to have been unsatisfactory, with the result that the main district has had to take over some tracts of land at tax sale and make good the local district obligations out of its general funds. Such cases, however, are few, and on the whole this feature has proved satisfactory.

A further application of the local district idea in Sunnyside Valley irrigation district is in the formation of "maintenance districts," a type of organization not provided for by statute but formed and functioning only under resolutions of the board of directors. A maintenance district is initiated by petition of owners of at least 25 per cent of the acreage served by a lateral or sublateral, and formed only after written notice to all landowners affected and an opportunity for a hearing. The district is not formed if substantial opposition develops. The purpose of the maintenance district is to distribute the cost of maintenance as equitably as possible on laterals carrying less than 10 second-feet, in as much as the Bureau of Reclamation maintains laterals on this unit down to that figure only. No permanent construction is handled. The farmers do the canal cleaning themselves, choosing a local foreman who is satisfactory to the Sunnyside district directors and arranging the time of work to suit themselves. The foreman is considered to be the agent of Sunnyside district. Payments for labor and materials are made by the district directors, and the cost is assessed equally to the lands in the maintenance district and collected as part of the general irrigation-district assessments. The Sunnyside district directors have reserved the right to establish a maintenance district upon each lateral covered by a local improvement district in order to assure the board that the construction work performed by the local improvement district shall be properly maintained. To the present time, 89 maintenance districts covering a total area of 33,939 acres have been formed and are in operation. It is to be noted that this area is a substantial fraction of the total 81,000 acres in Sunnyside Valley irrigation district.

NEVADA

Nevada has two local improvement district laws. The earlier law authorized a division of an irrigation district to provide for local improvements, the division to have a local board of directors, including as one member the main district director from that division. This arrangement did not prove altogether satisfactory, so in 1923 the legislature provided an alternative plan, based upon that of Washington, under which several local districts are operating. There are important differences between the Washington and the Nevada plans, mainly as to organizing the districts, providing for issuance of securities, and the character of the obligations. For example, bonds, notes, or certificates of Nevada local districts may bear not over 6 per cent interest and are not a general obligation of the main

irrigation district. Prior to the issuance of such securities any landowner may pay off the amount of local improvement benefit assessed against his land. The law does not state specifically whether such land continues to carry a joint liability for repayment in case of delinquencies on the part of other landowners, and apparently the courts have not yet passed upon this point, but it is locally considered that the provisions of the main irrigation district law relative to joint liability apply to local improvement districts as well. In other important respects the Washington and Nevada plans are essentially similar.

In Walker River irrigation district three local improvement districts have been formed covering a total of 65,976 acres. These have sold a total of $144,000 of local improvement-district bonds, of which $11,000 have been redeemed and $133,000 were outstanding in 1928. These expenditures have been partly for drainage and partly for purchase and reconstruction of a canal and distributing system. In Truckee-Carson irrigation district 6 local improvement districts have been formed and 3 more are contemplated, the 9 covering almost the entire irrigation district. These six improvement districts issued a total of $118,600 of local improvement bonds in 1928, of which all are outstanding, for construction of electrical distribution systems and formation and financing of such districts continued during 1929. The Truckee-Carson district owns and operates the main power line and substations which supply these local distribution systems.

IDAHO

The Idaho plan is very different. The legislature in 1925 authorized the creation of "irrigation lateral districts" within territory already organized as irrigation districts in the same manner as irrigation districts are created from unorganized territory. The irrigation-lateral district has its own directors, officers, and employees and is not subject in any way to the parent district, except, of course, in that its purpose is to build and operate a lateral ditch of an organized irrigation district. The lateral district has all the powers of a parent district, including the power to issue bonds and levy assessments. The law specifically provides that creation of obligations and levy of assessments by an irrigation-lateral district shall not affect the obligations and assessments of the irrigation district of which it is a part.

Two irrigation-lateral districts have been formed in Weiser irrigation district covering town lots and suburban property adjacent to Weiser. They include, respectively, 35 and 230 acres, and had sold $5,800 and $23,000 worth of bonds to the end of 1928. The larger district had redeemed $3,500 of its bond issue.

CALIFORNIA

California in 1927 enacted an "irrigation district improvement act" based generally upon the original local improvement district law of Washington, but with important differences in procedure and with added features. Assessments are apportioned according to benefits rather than on the ad valorem basis provided by the main irrigation district law, and include interest on deferred payments at not over 7 per cent per annum with 10 per cent additional for anticipated delinquencies, payable in not over 10 annual installments.

Coupon warrants, bearing the same rate of interest provided for the assessment installments, may be issued payable only out of funds derived from the improvement assessments. Before warrants are issued any landowner may pay his assessment in cash. In such event his land is not thereafter subject to assessments for such improvement, but remains liable for maintenance and operation and for supplementary or additional assessments. Such supplementary assessments must be made upon all lands sufficient to pay the cost of improvements or warrants in full in event the original assessments prove insufficient.

The most important new feature is authority for the irrigation district directors to levy an additional assessment for operation, maintenance, and repair of the works of the improvement district, or, in lieu of an assessment, to fix tolls for the use of water or any other public use within the improvement district.

To the end of 1928, 13 improvement districts had been organized in Turlock irrigation district, including a total area of 10,197 acres and with a total warrant indebtedness of $91,478, mainly for the purpose of canal lining, and a number of others have since been formed. In Modesto district one had been organized and several were in process of formation. Further operations were being delayed pending a court decision as to the validity of the district improvement act. The decision upholding the validity of the act was handed down January 13, 1930.[18]

UTAH, NEW MEXICO, OREGON, AND TEXAS

Utah provided for local improvement districts within irrigation districts in 1919, and New Mexico in 1921 authorized their formation in irrigation districts formed to cooperate with the United States. Both of these laws are based generally upon the Washington law. No local improvement districts have been formed in Elephant Butte irrigation district, New Mexico, which is the only irrigation district yet formed in that State to cooperate with the United States, and so far as could be ascertained, none has been organized in the Utah irrigation districts. Amendments to the Oregon district law in 1927 and to the Texas water control and improvement district law in 1929 authorized the making of local improvements and levy of taxes therefor in designated areas within districts.

COOPERATION WITH OTHER DISTRICTS

Irrigation districts are sometimes authorized to cooperate with other districts in the same State or in adjoining States, in the construction, acquisition, and operation of irrigation systems. There are numerous instances of intrastate cooperation, particularly in California, Oregon, Washington, Idaho, Colorado, and Nebraska, of which the earliest notable examples were the building of La Grange Dam by Modesto and Turlock districts and the Goodwin Dam by Oakdale and South San Joaquin districts in California. More recent examples of cooperation are mentioned in connection with power development (p. 64). Cooperation between districts in adjoining States has been limited to a few cases in lower Snake River Valley in Idaho and Oregon, including operation of Arrowrock

[18] Moore *v.* Thornburg et al., 208 Cal. 657, 284 Pac. 218.

division of the Federal Boise project, and to operation of the several divisions of North Platte project in Wyoming and Nebraska turned over to the users. The way has been opened for eventual cooperation between districts on other interstate projects of the Bureau of Reclamation when the districts shall have taken over the operation of the irrigation systems concerned.

DISSOLUTION

The Wright Act made no provision for the dissolution of irrigation districts, but subsequent legislation in California and in other States has provided for dissolution by the courts, by the county governing bodies, or by the districts themselves. This procedure is advisable in the case of defunct districts, not only to clear the records of possible tax liens but also to prevent ill-considered plans of resuscitation. No district may escape its obligations through disorganization, and the decree of dissolution is dependent upon liquidation of indebtedness.

Of the 302 irrigation districts in the United States classed as inactive, 85 were reported as formally dissolved.

IRRIGATION-DISTRICT DEVELOPMENT

EARLY UTAH DISTRICTS

The first irrigation-district legislation in the United States was enacted by the Territory of Utah, January 20, 1865, providing for irrigation districts within counties, but making no provision for bond issues. This law was immediately put into operation, with the result that a large number of such enterprises were formed during the following quarter century in various parts of the Territory. No attempt has been made to ascertain the exact extent of operations under this law, for the present investigation has been concerned primarily with the type of district first authorized by the Wright Act; but it is known that the number of early Utah districts was large,[14] and it is also apparent that very little in the way of actual construction was accomplished by them.[15] They have, in fact, had small share in the irrigation achievements of the State, and have been generally forgotten in the communities in which they were organized. The very few that still exist are thought of rather as mutual companies and are similarly operated. They bear little analogy to the present-day irrigation districts.

THE WRIGHT ACT OF CALIFORNIA

Following a number of unsuccessful legislative attempts to provide for public irrigation enterprises, and in response to a demand from farmers of San Joaquin Valley, Calif., for a means of organization by which an obstructing minority could be compelled to contribute to the cost of building an irrigation system, California in

[14] Thomas (*13*) states that a conservative estimate would place the number of such organizations at about 100. Brough (*3*), writing in 1898, states that there were then 41 such irrigation districts in Utah.

[15] Numerous unsuccessful attempts to build irrigation works under this law are reported (*10*).

1887 passed the Wright Act.[16] Briefly, this law provided that 50, or a majority, of freeholders owning lands susceptible of one mode of irrigation from a common source and by the same system of works might propose the organization of an irrigation district by petition to the board of county supervisors, which petition if sufficient in form must be granted. Thereupon the supervisors were required to call an election at which all electors in the area described were allowed to vote for or against the organization of the proposed district and for district officers, an affirmative vote of two-thirds of those voting being necessary to authorize formation. If declared organized, the board of directors of the district was given power to acquire, by purchase or condemnation, the necessary property, water rights, and irrigation works; to call elections on the question of issuing bonds, at which a majority of the votes cast was sufficient to authorize a bond issue; to issue and sell bonds in the amount authorized, and to use the proceeds for the purchase or construction of irrigation works; to levy annual assessments to meet the interest and principal of outstanding bonds, and to call elections on the question of special assessments; and generally to manage and conduct the affairs of the district to the end that a system of irrigation works should be constructed or purchased, water delivered, and the district obligations paid as due.

The essence of the Wright Act, then, was the permission given to a part of the residents of a given area to incur indebtedness for which all the lands in such area were held liable. Fifty or a majority of the landowners might propose the organization of a district; but once organized, a majority of the electors voting at any bond election, whether landowners or not, might bond the district in any amount they pleased. The advantage thus given to groups of small landowners is obvious, and just as apparent is the certainty of resulting opposition of unwilling owners of large tracts to a scheme of things which had not yet been tried in the courts and which was soon seen to involve constitutional questions. If those who wished irrigation could have built systems to cover only their own lands, much of the early litigation would have been avoided. But the situation in San Joaquin Valley which gave birth to the Wright Act resulted from the decreasing yields of grain due to farming the land year after year to this one crop and the consequent unprofitableness of dry-grain farming on small areas while large acreages could still be made to yield a profit. At the same time the cost of bringing water to the small areas alone might be prohibitive, yet be entirely within reason if spread over additional adjacent areas. It was to remedy such conditions and to enable the needed additional areas to be brought within districts, supplied with water, and taxed to pay their proportion of the cost of irrigation that the irrigation-district law was enacted in California.

Much litigation arose over the formation and bond issues of the early districts. The objecting landowners claimed that the sale of their lands for district taxes constituted an infringement of the Federal Constitution in that it involved taking property without

[16] The history of irrigation districts in California from 1887 to 1915 is detailed by Adams (*1*). The recent publication by Adams (*2*) gives very full statements concerning developments from 1915 to 1928.

due process of law. The California State courts held repeatedly that neither the State nor the Federal Constitution was violated, and although in the first Federal case to pass on the question the circuit court held the Wright Act unconstitutional, the United States Supreme Court in 1896 reversed the decision and established for all time the constitutionality of the irrigation-district law.[17] The broad ground was taken in this decision that in a State like California, embracing millions of acres of arid lands, the irrigation and bringing into possible cultivation of such areas is a public purpose and a matter of public interest, not confined to the landowners or to any one section of the State, and that an act of the legislature providing for irrigation may well be regarded as an act devoting the water to a public use. The court held, furthermore, that the detailed procedure provided for in the act constituted due process of law.

In the meantime, and while the ultimate fate of the district law was still unsettled, Washington, Kansas, Nevada, Oregon, Idaho, and Nebraska, in the order named, had enacted irrigation-district statutes. These followed for the most part the phraseology of the Wright Act, altered to suit local conditions. There was no immediate reaction to the Supreme Court decision, in the enactment of additional laws or the formation of new districts, but with the constitutionality of the law established the way was opened for the ever-increasing development which began a few years later. Seventeen of the Western States now have irrigation district laws embodying the principles first expressed in the Wright Act.

With the changes that have taken place since the enactment of the early district laws, and the experience the States have had with the actual operation of districts, it has been inevitable that frequent and radical alterations and additions should be made to the original laws. Even at the present time, although the fundamental principles of the irrigation-district type of organization may be considered as well settled, many details of formation and operation are undergoing change.

EARLY DISTRICTS UNDER THE WRIGHT ACT

Three States soon followed California in passing irrigation-district statutes, but actual operations prior to 1895 were confined to California and Washington. Little was accomplished at this time in Washington, for only two of the seven districts formed issued bonds, and none did much in the way of construction. In California, however, extensive operations were carried on, the results of which may be summarized in the statement that 49 districts were organized, of which 26 went beyond the point of organization and seriously attempted to function, and that only 8 of these have survived to the present day, 6 of the 8 having been compelled to pass through financial reorganizations before their survival became assured. Furthermore, of the $7,917,850 of bonds issued by the early districts only $2,000 were paid in full, $5,690,800 having been compromised at losses to holders, and $2,061,750 illegally issued. The remaining $163,300 were unpaid and are now presumably outlawed. With an initial handicap of this magnitude, the present extent of

[17] Fallbrook Irrigation District v. Bradley, 164 U. S. 112.

development by irrigation districts in California and their preponderance in the irrigation affairs of that State offer striking testimony to the adaptability of the irrigation district, when properly safeguarded, to certain types of development.

A great many of the early California districts were involved in litigation on one point or another, largely as the result of the opposition of landowners unwillingly included, although the earliest districts were undoubtedly bona fide enterprises and free from speculative features. After a few years, however, speculation and promotion of irrigation-district schemes became rife and brought with it the train of misfortune that usually follows such unhealthy development. It is true that the bonding of irrigation enterprises was a new departure in irrigation development in the United States and that much had to be learned of the soundness of and security for such bonds; but it is also true that excessive optimism, fraud, carelessness in the matter of water supply, and the use of this new means of promoting land sales entered largely into many district enterprises. On the other hand, some legitimate and entirely feasible undertakings of the early period that were started were carried under in the reaction that followed the panic of 1893. Several of the feasible districts managed to weather the storm and eventually to effect bond settlements which have been the forerunners of their present success.

THE PERIOD OF CONSERVATIVE DEVELOPMENT

Following the close of the first and generally disastrous phase of development no districts were formed for some years in any State but Nebraska. With the beginning of the present century, however, irrigation-district activity began in Idaho and Colorado, followed shortly by Oregon. Operations were on a very conservative scale at first but eventually increased in extent, particularly in Colorado, until by the end of the first decade very many districts of a speculative character were issuing and disposing of bonds. Although no definite date can be assigned as marking the close of the second period of district development, the years 1906 and 1907 represent approximately the turning point.

The conservatism shown in the formation and bonding of irrigation districts during this period, while not so spectacular as the financial failures of the preceding and immediately following years, are deserving of more than passing comment. In Nebraska and Idaho, and to a less extent in Colorado, the district was used largely for the purpose of taking over and reconstructing existing irrigation works. Bonds were issued directly in payment for the works or sold locally for improvements. Thus, the bonds were issued against an established security having a developed earning power sufficient to pay the interest and principal, in addition to the cost of maintaining and operating the irrigation system. Such districts generally succeeded. Several Nebraska districts have completely discharged their bonded indebtedness; others in all the States mentioned have paid interest promptly and have retired such portions of the principal as have fallen due. This situation affords a striking contrast to the two eras of speculation in irrigation-district bonds.

THE PROMOTION PHASE

The third phase, or second period of promotion, reached its climax about 1910 and ended two or three years later. The principal activities were in Colorado, but they extended to Wyoming, Utah, Idaho, and Oregon. Colorado, however, for reasons stated below, provided the most fertile and extensive field for speculation and furnished most of the financial failures.

The promotion of irrigation districts at this time was not an isolated feature of irrigation development, but was largely contemporaneous with Carey Act development in the Northwest. Activities under the Carey Act were chiefly centered in Idaho and Wyoming (*6*), in which States there were not so many speculative district enterprises. Speculation in irrigation projects was prevalent at the time and became identified with the districts in Colorado because of the lack of safeguards then provided by the irrigation-district laws. The promoter was not working alone in his efforts for large and immediate profits, but was ably seconded by landowners and bond dealers, many of whom had but one thought in mind, to exploit the situation to its utmost and then "to get from under." The result was a repetition of the early California experience, with a nation-wide discrediting of irrigation securities which affected good irrigation bonds as well as poor ones and from which the irrigation bond market has not even yet fully recovered. Not all Colorado districts organized at this time were of this type. Many were entirely worthy and feasible enterprises, but the effect of the large number of defaults and compromises on the investing public has overshadowed the fact that Colorado has some excellent districts that have paid all obligations promptly as due.[18]

WAR DEVELOPMENT AND THE POSTWAR DEPRESSION

About 1910 interest in irrigation districts began to revive in California, in which no district had been formed since 1895, and also in Washington. It also developed shortly afterwards in Arizona and Texas. Progress was slow for a few years, however, because of the unwillingness of eastern and middle-western investors to consider irrigation bonds, and the necessity of disposing of bonds almost entirely to local people who were familiar with the merits of the enterprises issuing them. In the meantime such additional safeguards had been thrown about the formation and bonding of districts in California that gradually a fairly dependable market developed there, and by 1917 and 1918 irrigation districts in a number of States began to find it possible to market their bonds. The substantial assurance of financing district development and the stimulus to agricultural production caused by the war resulted in many plans to promote both new and supplemental development projects. This activity was especially pronounced in the Northwestern and Pacific Coast States. The demand for farm products was apparently greater than the supply, opportunities for land settlement appeared excellent, and the scale of costs and returns was well above the experience of many persons. Consequently these projects involved relatively high costs of construction, which under prevailing conditions seemed

[18] The history of a large number of Colorado districts is given in (*5*).

within the ability of the lands to pay. Moreover, payments seemed assured, and on such basis the States approved and in some cases encouraged the initiation of projects which to-day would not be considered economically feasible.

The agricultural decline which began in the fall of 1920 not only reduced the incomes of farmers then operating but also inevitably reduced the demand for agricultural land. This threw the burden of paying operation and interest charges upon smaller proportions of the project lands than plans had allowed for. As irrigation-district bonds are a general liability in most States, there was no way of avoiding this legal contingency if the bondholders chose to enforce it. Three important features of irrigation-district development which, while by no means new or unknown, have been emphasized during the past 10 years are as follows: (1) The importance of economic feasibility of a project in assuring the integrity of its obligations; (2) the large margin of safety required to assure the economic feasibility of a project during protracted periods of depression; and (3) the failure of the general liability feature of district bonds to protect creditors in case of severe delinquencies, and the adverse effect of general liability as contrasted with individual liability, upon the morale of settlers who are striving to pay their own pro rata assessments.

On the other hand, a large number of going concerns have survived the unfavorable conditions and are paying their obligations as due. Success in these cases has been due in some degree to fortuitous circumstances, but mainly to existence of a reserve or margin of security sufficient to tide the districts over.

RECENT ACTIVITIES

More irrigation districts were formed during the years 1917 to 1919, inclusive, than in any previous 3-year period. The number formed in 1920 to 1922, inclusive, was even greater, on account of the very large number formed in 1920 and because many projects organized during this period were initiated prior to the beginning of the depression. Allowing for variations from year to year, the rate of organization has decreased markedly since the peak year 1920. On the other hand, the heaviest sales of bonds were in 1924 and 1925, after which years the decrease was abrupt. Taking the country as a whole, the year 1928 witnessed the formation of fewer districts than any other year since 1914 and the sale of a smaller aggregate principal of bonds than any other year since 1918. Complete data are not available for 1929, but indications are that the total number of new districts organized was somewhat smaller than in 1928 and that the amount of bonds sold was considerably less.

Throughout the country as a whole, at the end of 1928 there were 10 irrigation districts under construction covering about 183,000 acres, and 82 districts in preliminary stages covering more than 3,000,000 acres. Some of these districts are on Federal reclamation projects and will pass from the preliminary stage to the operating stage when the United States vests them with control over the irrigation systems. Others are awaiting the sale of bonds.

In 1929 new activities were most pronounced in Texas and Arizona. In the lower Rio Grande Valley, Tex., and in Maricopa and Pinal

Counties, Ariz., several new districts were organized and others were in process of formation, while still other districts in both States were maintaining engineering organizations in preparation for active construction work whenever conditions should permit the sale of their bonds at reasonable prices. Much of this development involves high capital costs for the irrigation of citrus and truck crops.

A statement of recent irrigation-district activities would not be complete without brief reference to the districts concerned partly or wholly with irrigation that have been formed under laws other than the irrigation-district laws. Their status in several States is important, and where this is the case they are discussed hereinafter in connection with development in the several States. The organization of so-called super districts with plans to include diverse smaller units, or even to cover entire stream systems, is one of the interesting and important developments of the last 10 to 12 years in cooperative control over common water resources.

DEVELOPMENT IN THE SEVERAL STATES

The foregoing discussion has dealt with irrigation district development in the Western States as a whole. The extent and rapidity of development in each State and the character of such development are briefly summarized as follows:

ARIZONA

The first irrigation district law of Arizona was approved May 18, 1912, and the latest complete codification is found in the revised code of 1928. By far the greatest part of the district development has taken place in comparatively recent years. The earliest attempts immediately following enactment of the district law were abortive, but activities began in earnest about 1918 and have continued without cessation to the present time, and interest in further development is apparently strong.

The largest group of active districts is in the Salt and Gila River Valleys in Maricopa County, extending as far west as Painted Rock Mountains below Gila Bend. Smaller groups are in Yuma County along the Gila River, in Casa Grande Valley, and along the Santa Cruz River below Tucson, with a few scattering districts in other parts of the State.

A rather large percentage of Arizona districts have been formed for new development, and of such districts the proportion now active is larger than in any other State except Texas. The active districts are evenly divided between new and principally new development on the one hand and principally supplemental on the other. Several districts in Maricopa County have contractual relations with Salt River Valley Water Users' Association regarding acquisition of water supplies or purchase of power for pumping for both irrigation and drainage. Roosevelt water conservation district paid the association to line a section of the latter's main canal and in return takes the quantity of water estimated to be saved by the lining, augmenting this supply by pumping from 47 wells spaced along its own main canal system. Pumping is a feature of a number of Arizona

districts, and pumping with high lifts for the irrigation of high-priced crops is a feature of several projects on the fringes of Salt River Valley. The Arizona districts have an exceptionally good record in payment of obligations, only one district being in default in payment of interest.

An important phase of district activities in Arizona is the supplying of electrical power to individual pumping plants within the district. The legislature made several attempts to provide for the formation of electrical districts for such purpose, the first of which was in 1915, and finally in 1923 passed an act which was held valid. There is also in force a power district act.[19] In the meantime two irrigation districts had been formed to accomplish the purpose aimed at in these electrical-district laws and at present are supplying power within an aggregate area of 14,400 acres, of which 9,200 acres were irrigated by pumps in 1928, with proceeds of bond sales totaling $185,000. The individuals finance their pumping plants privately. Information is available regarding two districts formed in Pinal County under the electrical district act and one in Yuma County under the power district act, covering an aggregate area of 277,639 acres. One of the two electrical districts was operating in 1929 with an included area of 120,000 acres, of which 17,000 acres were reported irrigated in 1928, and with $457,000 of bonds sold for construction of the main transmission and auxiliary distribution system, the power being secured from Salt River Valley Water Users' Association. It is planned to add an additional 100,000 acres to this district. The one power district reported includes 97,639 acres, of which about 3,900 acres were irrigated in 1928. It has sold $230,000 worth of bonds for construction of a pole-line system on north and south section lines, with two main east and west lines, to which individuals are required to build. Power is also supplied to an adjoining irrigation district. The system has been leased for a 5-year term to a power company, which operates the line and collects from individuals.

The agriculture improvement district act, passed in 1922, was designed for the special purpose of affording noncontiguous dry lands and outlying irrigation communities an opportunity to join the Salt River Valley Water Users' Association on the same basis as older association lands with the proceeds of sale of district bonds. Three such districts have an aggregate area of 34,900 acres and have issued a total of $2,343,000 of bonds, of which a portion represents the equivalent of back assessments which these lands would have been required to pay had they joined the association originally.

CALIFORNIA

The conditions which led to the enactment of the Wright Act, March 7, 1887, and the operations under that law have already been touched upon. In 1897 an entirely new law was passed, which, as amended, is still in force. Among other changes made by the act of 1897, the procedure for formation of districts and for issuing bonds was altered in an attempt to avoid further district disasters. For 12 years after this reenactment no new districts were formed in California, the main activity being concerned with winding up the affairs

[19] This is discussed by Smith in (*12*).

of insolvent districts and with solving the problems still faced by the few old districts that proved successful.

The second period of activity in California began about 1909, when two important districts were formed to extend an irrigated area contiguous to the successful Modesto and Turlock irrigation districts, and has continued to the present time. The postwar period was one of exceptional activity in undertaking new projects, for during the three years 1919 to 1921 one-fourth of all the California districts were formed. Interest was so intense at that time that certain projects were organized over the objections of the State engineer, and bonds were sold which the State had refused to certify. Sales of uncertified issues, however, were but a small fraction of the total. During the four years, 1922 to 1925, California districts sold more than $50,000,000 of bonds—nearly one-half of the total sales from 1888 to 1928, inclusive. Comparatively few new projects have been initiated within the last few years. No districts were formed in 1928, although two were in process of organization in 1929. Total bond sales in 1928 were lower than in any year since 1914.

In spite of the disastrous experiences of the early years, much has been accomplished under the irrigation-district law in California, notably in the reorganization and extension of existing systems and to a lesser degree in the development of new enterprises. Defaults on bonds sold since 1900 have been confined to a small percentage of the total sold. These defaults have developed mainly within the past five years, certain cases as recently as 1928 and 1929. On the other hand, many successful California districts bear testimony to the adaptability of the irrigation district, properly safeguarded, for conservative irrigation development.

The majority of districts formed during the first period were located south of Tehachapi Pass. By far the greatest activity from 1909 to 1921 was in the Sacramento and San Joaquin Valleys. Districts formed since 1921 have been located mainly in the two interior valleys and in southern California, with a few scattered over other parts of the State.

The operating districts in California have become an important factor in the irrigation affairs of the State. They far outrank mutual and public-utility irrigation companies in areas served and capital invested. They cooperate in matters of common welfare through the medium of the Irrigation Districts Association of California. This association maintains a permanent organization with executive offices in San Francisco. Its membership comprises 74 active districts, and it meets semiannually, usually at the headquarters of some district. The meetings have been devoted largely to matters of proposed legislation, on which the association invariably takes an active stand, but in recent years have come to include discussions of problems involved in administration, operation, and maintenance. One of the important activities in this line has been the development of a uniform system of accounting in cooperation with the State engineer's office.

California has districts formed for irrigation purposes under several laws other than the irrigation-district law. As reported by Adams (*2*) these are principally as follows: (1) Six operating county water districts with gross areas ranging from 1,300 to 54,000 acres, of which the two smallest have issued a total of $535,000 in

bonds; and one partly operating district covering 992,320 acres formed primarily to gather water-supply data. Of the large number of districts not formed under the irrigation-district law, these seven are the only ones concerned in an important way with irrigation. (2) One water district, including 16,234 acres, which has voted but not sold bonds and is not yet operating. (3) Three operating county waterworks districts and one in process of organization. This law was designed to provide a means by which water from Los Angeles Aqueduct might be distributed in San Fernando Valley. One such district covering 89,000 acres was bonded for $2,604,000. (4) Municipal improvement districts formed within municipalities. Of a large number, only three are concerned in any degree with irrigation, all being operated by the city of Los Angeles.

Districts of the above four types are not subject to supervision by State officials, except that in case of water districts the sale of bonds and execution of certain contracts must be approved by a board of three engineers, of which one member is appointed by the governor, one by the district, and one jointly by the governor and the district.

In addition to these four types, there are two types called water-storage districts and water-conservation districts, in the organization of which the State engineer takes an active part, and which have important possibilities. The first-named districts are designed to store and distribute water to individual or organized consumers who may have entirely different priorities. Of the 4 organized, 2 have been abandoned and 2 with assessable areas of 181,209 and 50,405 acres, respectively, are actively planning development. Water conservation districts are composed of irrigation and other districts already organized that are concerned with irrigation, reclamation, and drainage, and in reality are super districts. Water-storage capacity and power are apportioned to the constituent units, and bonds are issued and assessments levied and collected by the units themselves. No district has yet been formed under this law, but investigations leading to such an organization on Kings River have been carried on for a number of years.

Still other districts, also known as water-conservation districts, may be formed under another law, primarily to conserve and develop the underground waters of stream systems. One has been formed on Kaweah Delta and another on Santa Clara River, with respective areas of 342,360 acres and 111,899 acres. Both projects are in preliminary stages. These districts have no power to create bonded indebtedness, and their annual assessments are limited to 15 cents on each $100 of assessed valuations of land and improvements.

COLORADO

The first district act was passed April 12, 1901. The latest complete enactment came in 1921 as a result of the efforts of the irrigation district finance commission, which had been created in 1919 to examine into the causes of success or failure of Colorado districts with a view to recommending means for preventing further failures.

Early development in Colorado was generally conservative and dealt largely with the extension and improvement of existing systems. It was not until 1907 that the formation of irrigation districts for new development began to take place on any considerable

scale. About that year, however, when interest in irrigation was becoming widespread and was attracting an increasing amount of attention from eastern investors, it began to appear that large profits might be made through the reclamation of areas on the plains east of the Rocky Mountains. Sufficient time had elapsed since the early California failures to lessen the prejudice against irrigation-district bonds, and Carey Act bonds in the meantime had been selling well, so that, with the recovery from the financial stringency of 1907, it became possible to market such securities with comparative ease. Therefore, with no control on the part of any State official to act as a check, the allurements of large returns visualized by promoters, bond dealers, and landowners led during the next few years to the rapid organization of irrigation districts and to the issuance of bonds and expenditure of the proceeds—in many cases without adequate water-supply and engineering investigations. Some projects were fraudulently financed and constructed; others were entirely honest; but the general tendency of the times was to overestimate available water supplies, and it is this feature that has led to most of the troubles from which districts formed at that time have suffered.

Finally, in 1912 and 1913, following the default of interest on bonds of several districts and the failure of an eastern bond house which had been financing Carey Act and district enterprises, it became impossible to dispose of further district bonds. New development by irrigation districts ceased in 1913 and was not renewed until about 1922. Four districts have been organized and one reorganized under the 1921 law, and very little new activity is planned for at least the immediate future.

All district activity after 1907 was not by any means concerned with speculation. Several of the most successful districts in the State were organized during that period, and other thoroughly commendable projects were proposed but were unable to sell bonds. Over against the failures of this period of speculation, with their unfortunate effect upon legitimate irrigation-district development in Colorado and other States, must be set the records made by many very successful districts in Colorado which have accomplished much in the way of reconstructing and extending irrigation systems and in providing additional water supplies for the irrigation of late-season crops. It is not questioned in Colorado that the irrigation district has proved well adapted to this form of development.

Most of the irrigation districts in Colorado are found in the valleys of the South Platte, the Arkansas, the Rio Grande, and the Colorado Rivers (formerly known as the Grand River), the largest number having been formed in South Platte Valley. A few districts were located in other portions of eastern Colorado and in the extreme northwestern and southwestern parts of the State.

IDAHO

The first irrigation district act was passed March 9, 1895, and the latest complete enactment is found in the Idaho Compiled Statutes of 1919. Development did not begin until 1900 but has been fairly steady since then, except that the years 1920 and 1923 showed a

large number of new organizations and that there were no new ones in 1927 and 1928.

During the first decade of the present century, which was a period of great activity along all lines of irrigation development in the West, comparatively few irrigation districts were organized in Idaho, and they were essentially conservative enterprises. At the same time Carey Act projects were being initiated on a large scale and the widespread interest they created, coupled with the fact that conditions were not quite ripe for financing irrigation districts, caused the idea of new development by means of districts to be lost sight of temporarily. The type of early district development is shown by the fact that 11 of the first 13 irrigation districts were designed to take over the ownership and operation of existing irrigation works and that these 11 districts are to-day and always have been among the soundest, financially, in the entire West.

About the year 1909, which marked the height of similar activity in Colorado, irrigation districts in Idaho began to share the attention of promoters, with the result that 3 of the 4 districts formed in that year and 11 of the 20 districts organized from 1909 to 1913, inclusive, were connected with the development of entirely new projects. Since 1913 there has been proportionately less activity of this type, for most of the districts formed have had in view either the taking over and operation of existing projects or the construction of storage reservoirs to supplement water supplies for areas at least partly developed.

The great majority of districts lie in the Snake River Valley from St. Anthony, in Fremont County, to Weiser, in Washington County. This, of course, is the area susceptible of most extensive community development. Other districts are located in the valleys tributary to Snake River, and still others in the extreme southeastern and northwestern parts of the State.

Ten years ago Idaho districts had a better group record in meeting obligations than they have now. That is, while the proportion of outstanding bonds on which all payments had been made as due was smaller in 1918 than in 1928, the proportion of districts in good standing in 1918 was considerably larger. There had been several glaring failures, involving large bond issues, before the war, particularly among the districts formed for new development, but they were exceptional; likewise, relatively few cases of default have occurred since the war in connection with districts financed before 1918. Most of the trouble that has developed since then has been in connection with the postwar financing. The fact that the larger part of these bonds had been certified by the State lent impetus to the movement which resulted in repeal of the certification act in 1929.

Of the districts financed since the war which are not now in good standing, most were formed for principally supplemental development. This is a reversal of the situation existing in 1921, at which time cases of failure to meet obligations on the part of such districts were rare.

The organization and financing of American Falls Reservoir district, and the construction of American Falls Dam by the Bureau of Reclamation under contracts with this and other districts, con-

stitute an important development in the field of providing storage water for groups of communities. American Falls Reservoir district includes 420,453 acres, of which 388,634 acres are assessed, and has sold bonds amounting to $2,584,000 to finance its proportional part of the cost of construction. All of the district's allotment of water is delivered to users through other organized enterprises, the area thus irrigated in 1928 being 380,000 acres. This district was formed under the irrigation district law of Idaho, and data concerning it are therefore included in the totals in the various tables for Idaho.

KANSAS

Although Kansas has had an irrigation-district law since March 10, 1891, no district, so far as could be ascertained, has ever been formed in the State. All the larger irrigation projects had been constructed and put into operation before the law was enacted, and development since that time has been carried on largely by individuals. The lack of interest in this subject is reflected in the composition of the irrigation-district law, which was passed at a time when legislation affecting districts was in its infancy, and which until recently has been practically unchanged. Amendments were made at the 1929 session of the legislature, however, and a movement is reported to be on foot to organize a district in order to take over a small privately owned canal in the western part of the State.

MONTANA

Montana's first irrigation-district law was approved March 4, 1907. Two years later a new law was substituted which, as amended, is in force to-day and which is found in the revised codes of 1921. An alternative method of organization and government under State supervision was provided in 1919 for such districts as should elect to come within the provisions of the irrigation-commission act, but this was repealed except as to existing districts in 1929.

Prior to 1921 development actually financed had been almost entirely concerned with improving and enlarging existing irrigation systems. Since then the number of districts that have sold bonds for entirely new construction has been larger, and the amount of bonds sold for such purposes nearly twice as large, as for supplemental development. General interest in irrigation in Montana has been rather spasmodic and has resulted from the effects of a series of droughts upon dry-farming communities of the State. This helps to explain the fact that nearly half of all districts organized to date were formed in the two years 1919 and 1920 after a series of three dry summers. Interest in irrigation is apt to lag in times of high market prices for grain. On the whole the most sustained demand for irrigation-district development has come from those sections of the State where farming under irrigation has been carried on for a considerable time.

Most of the earlier Montana districts were conservative enterprises formed in response to a real demand for the district type of organization, and in the main these districts have been successful. A few have encountered financial difficulties resulting partly from expansion during the war boom and partly from insufficient reserve to

withstand the post-war depression, but most of those capitalized principally on a pre-war basis are in good standing. On the other hand, a number of the districts financed during and immediately after the war are not in good financial standing, and of nearly a million dollars' worth of bonds sold by 12 districts in the years 1919 to 1921, inclusive, less than 10 per cent have been paid in full as due. Of sales since 1921, more than three-fourths are in good standing.

One result of the large interest in irrigation immediately following the war was the passage of the 1919 act creating the Montana Irrigation Commission, with personnel the same as that of the board of railroad commissioners and with authority to encourage and supervise the organization, planning, and financing of irrigation districts. This act did not supplant the existing law but provided an alternative plan. Districts formed under the older law could elect to operate under the commission law. Some 24 projects were investigated by the commission, of which 10 were organized as districts. Results were generally unsatisfactory, for only one of these is in full operation and interest is delinquent on bonds of the three districts which issued them. As before stated, the law was repealed in 1929.

Districts are scattered over many parts of the State, a large proportion, however, being found in Yellowstone Valley.

NEBRASKA

Although the seventh State in point of time to pass an irrigation-district statute, Nebraska was the third to witness the actual formation of districts and was practically the only State in which districts were being organized in the last five years of the nineteenth century. Following a series of disastrous droughts during the early nineties, the irrigation-district law was approved March 26, 1895, practically contemporaneously with an irrigation code, both as the outcome of insistent demands upon the part of farmers in the western part of the State. Interest was immediate and widespread, with the result that 18 districts were organized in the four years following the passage of the act. But with the return of favorable growing seasons in 1898 and succeeding years, interest began to wane, particularly in the easternmost areas, so that 9 of the 18 districts organized up to that time were soon abandoned. Although the marked effect of wet and dry years upon district history in Nebraska has continued, nearly all of the districts formed since 1900 are active to-day. The latest complete district law is found in the compiled statutes of 1922.

Most of the operating districts lie in the North Platte Valley from the Wyoming State line to the city of North Platte and depend for their water supply upon the North Platte River and two northern tributaries. The other districts are on White River, Lodge Pole Creek, and on South Platte and Republican Rivers. Most of the districts now inactive were located along Platte River and in the Loup River drainage basin.

The geographical position of Nebraska on the border line between the humid and semiarid regions of the United States has had much to do with the character of irrigation-district activity in the State. The influence of droughts upon early district activity has already

been pointed out. Since 1900 the recurrence of seasons unfavorable for dry farming has not stimulated to any extent the formation of districts for new development. But due to the fact that irrigation in some years is not necessary to the successful production of crops, many farmers accustomed to use water only in dry years refused to pay assessments to the canal companies in seasons when water was not needed, with the result that the finances of the companies suffered severely. This situation led directly to the formation of irrigation districts to take over the canal companies and by the use of their taxing power to compel the payment of assessments in every season. The districts so formed have been more successful than were the companies they replaced. The districts often bought out these systems at cost or less than cost, so that there were no large promotion profits to be absorbed. The district enterprises for the most part are small, there being only one in operation covering more than 15,000 acres, aside from the districts formed to operate portions of the North Platte project. Engineering problems of the smaller districts have generally not been complicated, the supply of water has usually sufficed for the amount of land to be irrigated in an average season, and maintenance expenses as a rule have not been high.

As a consequence of these favorable circumstances nearly all the smaller districts made their bond payments regularly. A number of districts have been handicapped by accumulation of delinquencies not altogether unavoidable, in payment of assessments. As a result some have issued bonds to take up outstanding warrants necessitated by the delinquencies, while a number have adopted the plan of refusing water service to users more than two years in arrears, with beneficial results. One of the large districts had made adjustments of indebtedness at an appreciable loss to creditors, which considerably reduced the average record for Nebraska, and three small ones have not maintained their standing. On the other hand, of the 27 operating districts that have incurred bonded indebtedness, 17 of the older ones have been reducing their bond principal solely through payment of assessments, 7 of these having completely paid out by the end of 1928.

NEVADA

The first irrigation district act was passed March 23, 1891, and the latest complete enactment was in 1919. Activity has been confined to comparatively recent years and has never been extensive. There are two districts in operation, one of which operates the Newlands project and the other covers a large area on Walker River. Another district in Lovelock Valley has plans completed in anticipation of improvement in the bond market. All districts organized have been designed to include partly irrigated areas.

NEW MEXICO

The first law was enacted March 18, 1909. In 1919 two separate acts were passed, one relating to irrigation districts not cooperating with the United States and the other to districts formed for the purpose of such cooperation. Both acts are found in the 1929 compilation of the New Mexico statutes.

There has been no period of great activity along irrigation district lines in New Mexico. The two earliest districts were abandoned without material accomplishment. Six are active at present, one having been formed to succeed the water users' association on the New Mexico portion of Rio Grande project and eventually to operate the project, and the others mainly to take over and extend existing irrigation systems. The latter districts have issued bonds which are in good standing in three of the five cases.

The 1923 legislature passed a conservancy act under which the middle Rio Grande conservancy district was organized. The district includes a total benefited area of 126,517 acres, of which 123,267 acres, lying along the Rio Grande between Cochiti and San Marcial, are irrigable. The plan of improvement includes flood control and river improvement works, a coordinated system of irrigation, drainage works, and a stabilizing reservoir, at a total estimated cost of over $10,000,000 (4). Bonds amounting to $2,000,000 were sold in 1929. Data on this district are not included in the preceding tables.

New Mexico also has an electrical-district act, passed in 1929.

NORTH DAKOTA

In this State, the most recent one to enact irrigation-district legislation, the law was passed March 8, 1917. Only two districts have been formed, both in connection with Federal reclamation projects. The district which covers the North Dakota portion of lower Yellowstone project has not yet taken over the operation of the irrigation system. The one on Williston project has a quitclaim deed for the irrigation system, following abandonment of the project by the Bureau of Reclamation, and has tried to use it but without encouraging results. At present the district is inactive.

OKLAHOMA

The Oklahoma statute was passed March 29, 1915. The only district yet organized was formed in connection with the proposed construction of Lawton project by the Bureau of Reclamation in 1917. Construction was deferred, however, owing to the establishment of a military post at Fort Sill and the need there for all available water, and has not been resumed, so that the district is inactive. Oklahoma also has a conservancy district law, but there had been no development under it to the end of 1928. The conservation commission at that time had before it applications for the formation of districts to be financed by bond issues.

OREGON

The irrigation-district law of Oregon was passed February 20, 1895, the latest complete enactment having been in 1917. Little development took place for some years after the passage of the first act. Beginning with 1904, however, there have been three distinct periods of activity, namely, 1904 to 1906, 1910 to 1913, and 1915 to 1922. By far the most pronounced activity was in the third period.

The State took an active interest in irrigation development both

during and after the war. The policy of advancing money to pay interest on bonds for the first five years and the unfortunate results of that policy have been discussed heretofore under Investment of State Funds in Irrigation-District Securities (p. 54). Of the districts in default, those to which the State had advanced interest constitute two-thirds of the total, while their bonds are nine-tenths of the total; hence, the statement of results of that policy tells nearly the whole story of the unsuccessful districts in Oregon. Against this record should be cited that of a larger number of districts, with smaller aggregate bond issues, which have been paying their obligations as due. A considerable proportion of the development proposed immediately after the war was not carried out, mainly because of inability to sell bonds.

With a few scattering exceptions, the Oregon districts fall into six general groups: (1) Hood River Valley; (2) Umatilla and Columbia River Valleys; (3) the inland plateau; (4) Rogue River Valley; (5) Klamath Valley; and (6) Snake River, Malheur, and smaller tributary valleys. The last-named area has been the scene of several attempts to provide for irrigation on an extensive scale, only one of which has been accomplished. District development in this area is closely associated with that on the Idaho side of that portion of Snake River Valley involving cooperation and the use of common water and power supplies by districts on both sides of the State line.

SOUTH DAKOTA

The district law was enacted March 2, 1917. One district has been organized in connection with Belle Fourche project but has not yet taken over operation of the irrigation system.

TEXAS

Texas first provided for the creation of irrigation districts on April 15, 1905. The law has been twice completely reenacted, the latest revision, which appears in the revised civil statutes of 1925, having been in 1917. In this revision the designation of such districts was changed from irrigation to water improvement. In 1925 the legislature provided for water control and improvement districts, with broader powers than those of water-improvement districts, and in 1927 and 1929 broadened their powers further. Many water-improvement districts have become water control and improvement districts. The discussion herein refers to both types unless reference to one or the other is made specifically.

Texas is one of the few States in which interest in district development is still very strong. By far the largest group of districts in the State is in the lower Rio Grande Valley. The older systems in this region were originally built independently of each other, as parts of land-selling enterprises, but without specific provision for turning the systems over to the settlers. However, after a few years of operation a number of the irrigation companies became financially involved and were taken over by the settlers through the medium of irrigation-district organizations, and at present most of the irrigation development in the lower valley is under the district form of organization. The last two large commercial irri-

gation companies were in process of transfer to districts in the summer of 1929.

The districts that took over these commercial systems almost invariably made extensive improvements and enlargements, and much of their more recent financing has been devoted to lining canals, installing drainage systems, and replacing obsolete or worn-out pumping equipment. With a few exceptions, notably in case of districts formed to take over the Mission and Mercedes systems, those formed within the last few years have been for new development. Much of this new activity involves the setting out and care of citrus orchards by development companies for terms of three or four years under contracts of sale to individuals. A number of these recently organized projects propose bond issues of approximately $100 per acre. Approval of the State board of water engineers in certain cases has been made contingent upon storing storm or flood water pumped from the Rio Grande.

Another important group of districts lies in Pecos Valley and tributary valleys in Ward, Reeves, and Pecos Counties. These districts were all organized to take over going concerns and generally to improve them and to provide additional water by storage. The Red Bluff water improvement district, essentially a superdistrict (p. 59), was formed in 1928 to contract with the United States for construction of a storage reservoir on the Pecos River in order to provide a supplemental water supply for seven major subsidiary projects, five of which are already organized water-improvement districts. Preliminary investigations were in progress in 1929.

There are several other districts in full operation at widely scattered points in the State, of which those in Wichita County have brought the largest area under irrigation. A number of others are in various preliminary stages.

Most of the Texas districts have made their payments of bond interest and principal as due. Of the three districts not in good standing, the present outlook in two cases is favorable for eventual payment in full.

Water control and improvement districts, in addition to the usual powers of irrigation districts, may provide for the development of forests and other natural resources and for the navigation of coastal and inland waters. They may regulate residence, recreational, and business privileges upon any stream or body of land controlled by the district and may employ their own peace officers. Two districts are planning to develop lakes for recreational purposes as integral parts of their main plans, but most of those organized to the end of 1928 were concerned wholly with irrigation and drainage. An amendment to the law in 1929 provided for the formation of master districts for the correlation and control of improvements upon entire stream systems, or to enable constituent districts to pool their resources. The whole of the watershed of the Brazos River was included in a district created by the legislature in 1929 embracing about 30,000,000 acres.

UTAH

Mention has been made of the early Utah districts. The last of the early district laws was repealed in 1898, and it was not until

March 22, 1909, that a law based upon the Wright Act was passed; this law was completely revised in 1919.

The law of 1909 was enacted at a time of widespread district activity in the Rocky Mountain States and resulted in the rapid organization of districts in Uintah Basin. Very little real development was accomplished at this time, however, and there was no further activity until 1917. The years 1920 and 1921 saw considerable interest in irrigation district organization, all districts proposed having been intended to provide for the further development of communities already partly supplied with water. Many of these proposals were not carried out. The greater part of the district activity has been centered in Cache Valley, Salt Lake Valley in Weber and Davis Counties, Utah Valley, and Uintah Basin.

Four districts sold bonds before the war and four afterwards. Two of the early districts have made all payments as due, while two have been in default for many years and are almost wholly abandoned. One of those financed after the war recalled all bonds shortly after issuance and a mutual company was substituted for the district, while the other three are in default to greater or less extent. In two of these cases plans of reorganization have been discussed, but not yet consummated.

WASHINGTON

With its enactment of March 20, 1890, Washington was the first State to follow California in authorizing the creation of irrigation districts. The law then passed was nearly identical with the Wright Act, but included also the amendatory and supplemental California acts of 1889. The latest codification of irrigation-district laws was in 1922.

The early history of irrigation districts in Washington paralleled to a certain extent that of California, although the experience in Washington was neither so extensive nor so disastrous as that in California. District development occurred only in these two States in the early nineties, was affected by the financial panic of 1893, ceased in both States at about the same time, and was revived almost simultaneously a decade and a half later.

Little was accomplished by the early districts. Interest was revived in 1911 and has since been continuous, the greatest activity having occurred in 1917 and 1920. The Washington districts fall mainly into the following five groups: (1) Puget Sound region; (2) Okanogan, Methow, Columbia, Wenatchee, and tributary valleys in Okanogan, Chelan, and Douglas Counties; (3) Yakima and Columbia River Valleys from Kittitas County to Walla Walla County; (4) Walla Walla Valley; and (5) Spokane Valley. Much of the extensive development in Yakima Valley has been closely identified with the activities of the United States Bureau of Reclamation on Yakima River.

Of the 75 districts which had sold bonds to the end of 1928, 60 had made all payments as due; of the 62 operating districts which had sold bonds, 2 had redeemed their entire issues and 52 of the remaining 60 were making payments as due.

Two of the 15 districts which had not made all payments as due were pre-war enterprises, one a district financed in the nineties, and

both have compromised their indebtedness. The other 13 sold the larger part of their bonds either during or within the first few years following the war, and the present outlook is that most or all of such issues will be compromised at a loss to bondholders. Eight of these are going concerns, and the prospect of recovering a substantial part of the investment in such cases is considerable, but several others have been practically abandoned. The State of Washington is financially interested in 6 of these 15 districts through having purchased their bonds, as discussed heretofore under Investment of State Funds in Irrigation-District Securities (p. —), and is actively concerned with plans of reorganization in cases where it is a heavy bondholder.

There are many small operating districts in Washington. A number of those in Spokane and Walla Walla Valleys and in several other parts of the State are suburban enterprises in which farming is not necessarily the chief occupation and the cost of water not an item of major importance. Only one fully operating district contains more than 13,000 acres, and that district has a water supply for only a small part of its organized area. Many of these are fruit-growing enterprises with relatively high bonded debts per acre. Much development in large districts—some of them very large—that was proposed during the war boom was never carried to completion.

WYOMING

The irrigation-district law was first enacted February 19, 1907, and was completely revised in 1920. Early activity practically ceased in 1911 with the collapse of the bond market and was not revived until 1920. It has continued since then to the present time, with one to three districts organized each year.

Only two of the seven early districts were operating in 1929. One took over a Carey Act project and sold bonds to retire indebtedness of the former company and to finance additional improvements, all of which it has redeemed. The other encountered financial difficulties at the start, has paid little of its indebtedness, and is in course of financial reorganization.

Thirteen of the 15 districts organized since the war were active, 10 being in operation. Of these 10, 3 operated divisions or subdivisions of Federal reclamation projects, 6 have been financed by the State, and 1 has taken over the system of a Carey Act project for the completion of which it has recently voted bonds. Two of the districts in preliminary stages are on Federal reclamation projects. The prevailing purpose of district organization since the war has been to assume or refund the indebtedness of existing communities and in some cases to complete or extend the irrigation systems. All irrigation district bonds sold since the war have been purchased by the State, as discussed under Investment of State Funds in Irrigation-District Securities (p. 54). Lands in these bonded districts are devoted mainly to production of hay, small grains, and legumes, with potatoes and sugar beets in some cases. Their indebtedness for irrigation purposes ranges from $2 or $3 to about $13 per acre. All had made payments of interest in full up to 1929. No payments of principal had yet fallen due.

SUMMARY

The irrigation district is a public, cooperative organization, the purpose of which is to provide water for irrigation and to assess the lands benefited in order to pay the costs.

Irrigation districts are organized under specific statutes of the 17 Western States. The Wright Act of California, upon which the other statutes were based, was passed in 1887.

Throughout the 44 years of its history the irrigation district has occupied an increasingly important place in western irrigation affairs. In many sections of the West the district is now the dominant type of irrigation organization. At the end of 1928, 801 irrigation districts had been formed, of which 407 were then operating, 10 under construction, 82 in preliminary stages, and 302 inactive. The 499 active districts included 10,311,098 irrigable acres, of which 6,908,277 acres were in operating districts. Approximately 4,060,600 acres in operating districts received water in 1928 from district-operated systems.

The district movement has encountered many vicissitudes. On the one hand, it has been exploited for the gain of individuals and has been used both honestly and dishonestly for the furtherance of developments which subsequently proved to be unsound. On the other hand, it has led in whole or in part to the establishment of many important agricultural communities and to the improvement of many others.

On the whole, the district has proved better adapted to the improvement and extension of existing communities than to entirely new irrigation development. This is true, mainly, because of the greater ability of established or partly established communities to begin paying capital irrigation charges within the first few years after financing the improvement.

Irrigation-district bonds aggregating $224,843,197 had been sold to the end of 1928. Of this amount 71 per cent were then in good standing; that is, all payments of principal and interest so far due had been made in full. This percentage is the same as it was at the end of 1921 for bonds sold to that time. During the 18 months from January 1, 1929, to June 30, 1930, the development of fresh defaults has reduced this percentage to 67 or less.

At the end of 1928, 398 districts were operating, or had once operated, systems financed from the sale of bonds, 258 of these, or 65 per cent, having maintained perfect records in paying interest and principal of bonds. Seventy-three per cent of the districts formed principally for supplemental development had perfect records, as had 53 per cent of those formed principally for new development and 51 per cent organized for entirely new developments.

The situation with reference to bonds sold during the seven years ended with 1921 was less favorable in 1928 than in 1921, in as much as one-fourth of such bonds in good standing in 1921 were delinquent at the end of 1928 in payment of interest or principal, or both.

The principal reasons the delinquent districts have failed to meet their obligations have been opposition of large and influential landowners to district organization, inclusion of unproductive lands, inadequacy of water supply, exploitation, engineering difficulties, and insufficient settlement of the land. The principal reason for defaults

on bonds sold during the war period was insufficiency of reserve to carry districts through the postwar depression.

The successful districts generally have been those formed to take over existing systems, to extend existing systems at costs which the lands could meet, to improve existing systems and provide supplemental water supplies, to cooperate with the United States on reclamation projects, and to build entirely new systems under particularly favorable circumstances. The older successful districts have had low capital and operating charges, and the more recent ones have had substantial reserves to tide them over the postwar depression.

The revenue of an irrigation district depends so largely upon the costs and returns of the landowners' individual business that it can not remain wholly unaffected by unfavorable economic conditions. Experience has shown the necessity for more extensive determinations of economic feasibility prior to district financing, and particularly for the inclusion in the cost estimates of a decidedly larger safety factor than was thought necessary 10 years ago. Maintenance of district bond integrity requires a full and frank recognition of this necessity. The only apparent alternative is the calling upon public or private investors to share in the cost of development. Public subsidy for irrigation is a controversial matter. The private investor in bonds for income purposes should obviously not be expected to incur a cost which experience shows to be in large measure avoidable.

The bonding feature has been and still is susceptible of abuse. Supervision by State officials over the organization and financing of districts has been of material influence in reducing the abuses. Such supervision may be made even more effective by amplifying the authority of the State officials and making adequate appropriations, particularly for determinations of economic feasibility.

Certification of bonds by the State has been authorized by law in 10 States. In three States the certification laws have been repealed as a result of severe criticism of weak features. Certification is of little importance in district financing in several States, but it is very important and has strong backing in several others.

The market for irrigation-district bonds was active about 1925, but at present is poor. Measures suggested to improve the standing of district bonds involve strengthening the remedies of bondholders in case of default and giving bondholders the right to intervene in district management prior to default. In addition, operating districts could create a favorable impression by providing from current revenues for the reduction of indebtedness to the extent justified by the productive powers of their lands, by cooperating in maintaining credit and in building up policies of management, and by publishing more extensively the facts concerning their financial condition.

Several States have invested State funds in irrigation-district securities. Washington, Oregon, and Wyoming have done this with a view to aiding district development. The first two States have suffered extensive losses through such programs, while all irrigation-district bonds bought by the State of Wyoming are in good standing.

Many districts have had close relations with the Bureau of Reclamation of the United States Department of the Interior. The bureau has financed the construction of various districts. The total indebt-

edness of irrigation districts to the United States provided by completed and uncompleted construction contracts not covered by bonds has amounted to $139,268,669, of which $17,119,220 had been paid by June 30, 1929, leaving $122,149,449 then outstanding.

Qualifications of voters at district elections in most States, particularly in elections to create indebtedness, include property qualifications.

District assessments for cost of construction or acquisition of works are based in some States upon the value of the land, are uniform upon all lands in others, are apportioned according to the benefits in still others, and according to water allotment in one State. The ad valorem and benefit methods afford the greater flexibility in levying assessments. Assessments for cost of operation are sometimes levied on a basis different from that of construction assessments and may usually be supplemented or superseded by tolls for water.

Distribution of water is pro rata to all lands in some States, according to beneficial use in others, and according to the value of the land as provided by several statutes. Distribution according to land values is not followed by all districts in States which provide for it, owing to possible inequities resulting from such requirement.

Power-development programs have been confined to relatively few districts but are highly important to those few. The largest undertakings have been in California, where the power investments of irrigation districts aggregate several million dollars.

Local improvement districts are authorized by the laws of several States. The most extensive use of local districts within irrigation districts has been in Washington. They are chiefly useful in cases in which the parent irrigation district builds and operates only the main canals and main laterals and leaves to individuals or groups of individuals the responsibility for constructing and operating sublaterals.

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