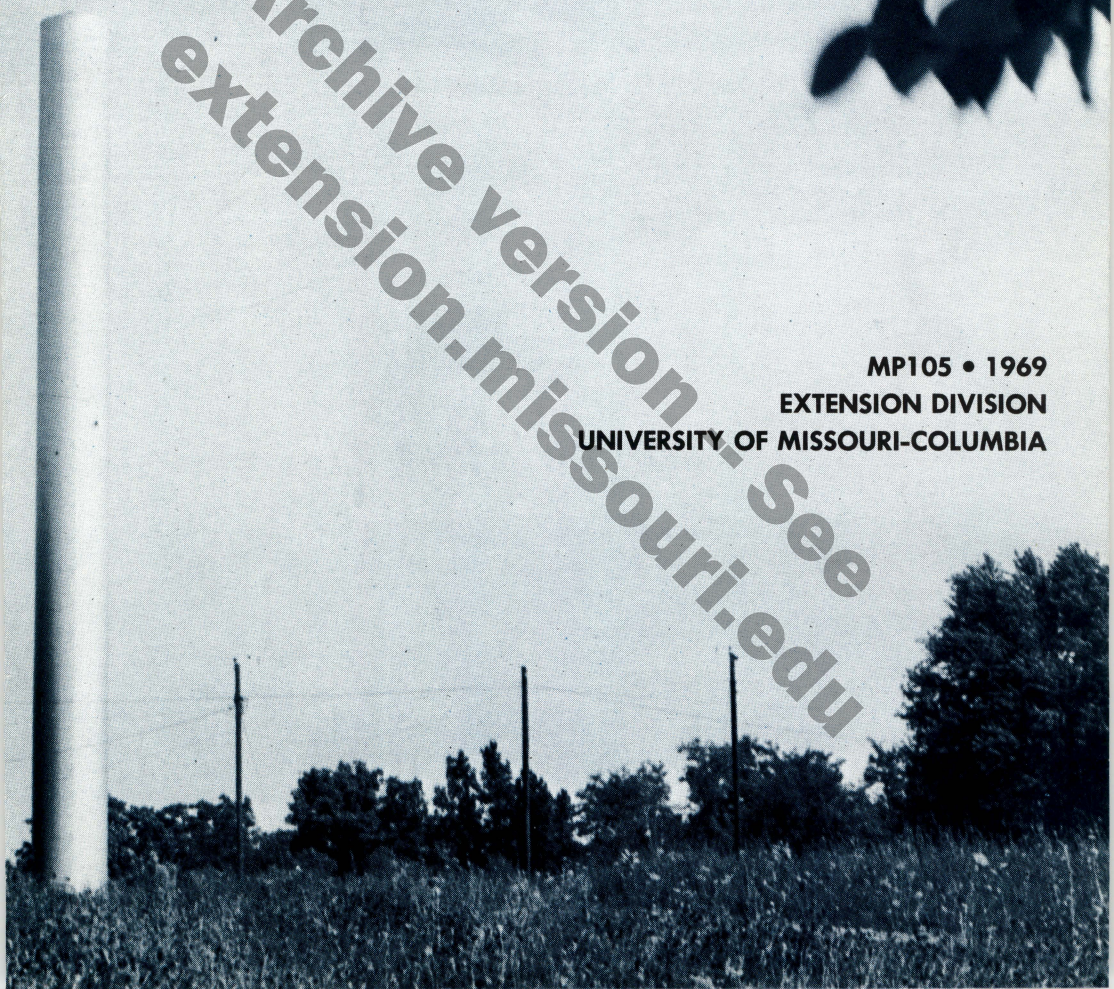
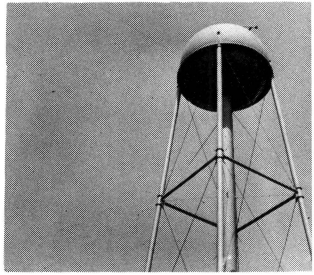
Public Water for Rural Areas and Small Towns

MP105 • 1969
EXTENSION DIVISION
UNIVERSITY OF MISSOURI-COLUMBIA





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Acknowledgment

Much of the information presented in this publication is based on a study by Wendell Gottman, "Planning and Management of Public Water Supply Districts," an unpublished M.S. thesis.

Special acknowledgment is also given to the Farmers Home Administration in Missouri which provided data and encouraged the study; and to the Water Resources Research Center, University of Missouri, for providing funds (project number A-018-Mo).

Public Water for Rural Areas and Small Towns

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New water towers and standpipes are becoming a familiar sight in the Missouri countryside. The number of rural water supply systems in the state has increased especially since 1965, the year the Farmers Home Administration expanded its loan program for this purpose.

FHA offers financial assistance to two general types of water distribution organizations, (1) municipal systems which include villages, towns, or cities with less than 5,500 population, and (2) rural districts. City officials serve as the governing body of the municipal systems. The rural districts differ in that a new organization is established (under Chapter 247, Revised Statutes of Missouri) to administer the water distribution program. This organization is usually outside the city and serves both rural residents and farmers.

There are similarities in the two types of organizations, but there are also significant differences. Both will be discussed in this publication. For clarification, when both small towns and rural districts are included, the term "districts" will be used. Separately they will be identified as (1) small town, or (2) rural districts, to distinguish between the two.

This publication describes problems and characteristics of districts which were financed by FHA and were in operation at the time of the study. Heads of the local boards and the FHA state office provided data.

Under Missouri law the responsibility for managing a water supply district is vested in a Board of Directors elected by the district. In view of the size of the investment involved, this responsibility is a major one. It requires dedicated service to their community by Board members. This publication, based on the experience of some of the initial districts, is designed to serve as an aid to Board members in carrying out their responsibilities.

Planning Water Supply Districts

By June 30, 1968, 94 districts were distributing water in Missouri. An additional 44 were in various stages of organization preliminary to water distribution. The districts in operation included 42 small town systems and 52 rural districts. Many of these, however, had been in operation less than 12 months so they provided limited data for analysis.

The districts were scattered over the state as shown in Figure 1. Many counties had not participated in the program at all, but others had several districts in operation.

The average small town system was roughly one-third the size of the rural district, as measured by number of users and capital invested. (See Tables 1 and 2).

Change in Number of Users

The number of users in each district did not remain constant after water distribution began. Some districts had a substantial increase in the number of users at the end of a two-year period. Presumably this was due to the location of many districts adjacent to growing municipalities with the accompanying increase in the number of rural residents. For example, District "A" located near a large city, had 341 users the second month of operation, but by the thirteenth month the number had increased to 684—a 100 percent increase in 12 months.

Other districts tended to lose customers as typified by District "B" which started out with 353

TABLE 1

CHARACTERISTICS OF 42 SMALL TOWN WATER SYSTEMS IN MISSOURI IN OPERATION AS OF JUNE 30, 1968

	Range	Average
Capital Invested	$38,000-286,000	$93,000
Number of Users	45 - 315	99
Miles of Pipe	1.2 - 20.9	4.6

TABLE 2

CHARACTERISTICS OF 52 RURAL WATER DISTRICTS IN MISSOURI IN OPERATION AS OF JUNE 30, 1968

	Range	Average
Capital Invested	$42,000-1,400,000	$293,000
Number of Users	40 - 1,794	269
Miles of Pipe	1.9 - 76.4	22.7

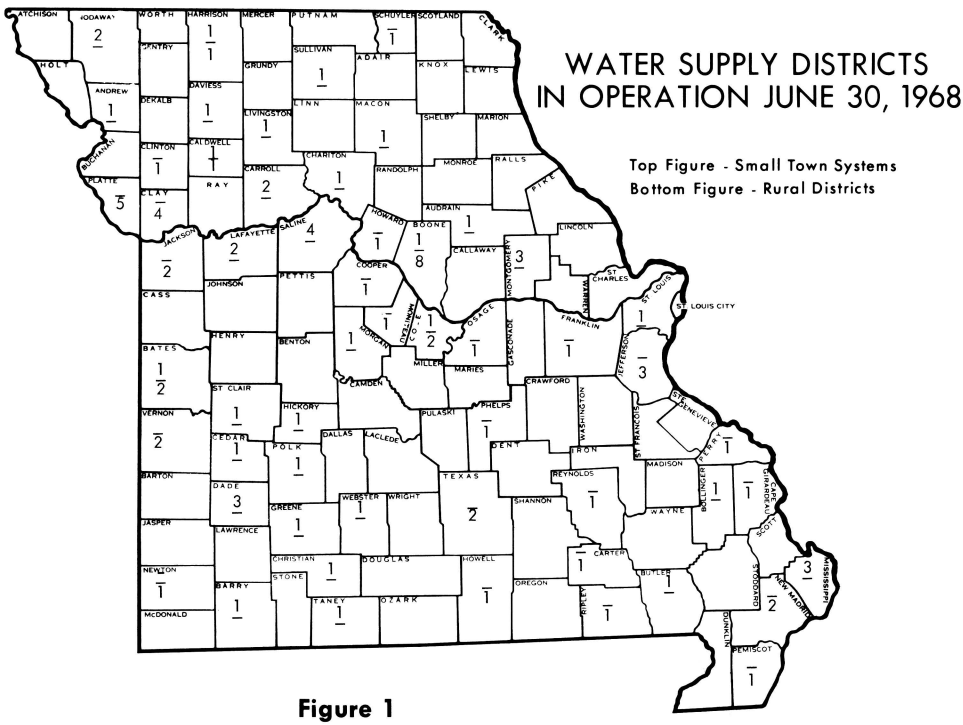

Figure 1

users. By the seventh month the number had dropped to 267—a 24 percent decline. (See the discussion which follows on drop-outs).

Still other districts had essentially the same number of users at the end of two years of operation. Overall, the seven rural districts in operation two years had only 2.4 percent increase and the 11 small towns had a 14 percent increase in the number of users during this time.

Estimating accurately the number of users in the years ahead is crucial to planning a successful district. Failure to foresee growth will result in inadequate capacity in pipe and storage. But failure to anticipate or prevent decline in number of users results in financial crisis.

Problems Districts Encountered

Many districts were operating smoothly and with stability. Others experienced problems which caused their Boards some concern.

Failure to Hook up. Hook-up failures (failure of individuals who earlier had indicated plans to hook on after the line was established, but failed to do so) were a problem faced by some districts. Only about one-fourth of the districts did not have hook-up failures. Slightly over one-fourth had more than 10 percent of those who contracted for water fail to honor their contracts. Two major reasons were given for failure to hook on, (1) some only wanted a public water line through their property for insurance against failure of their present water system, and (2) others wanted a line through their property to increase its value.

The hook-up failure problem was partially offset by the fact that those districts which had the most hook-up failures tended to have the greatest increase in the number of users during the first 18 months of operation.

Identification of an adequate number of potential users determines whether organization of a district is feasible. Thus, the number that contract for water is a major consideration during the planning stage. Citizens interested in seeing a district established usually attempt to get as many signees as possible.

Thus, two choices are faced by organizers of districts. One is to get many signers, quickly, and assure the establishment of a district. The other is to take longer and sort out those who will not use water when distribution begins, which can result in abandoning the attempt to organize a district. But a hasty sign-up results in the failure to hook up and, therefore, an increase in water rates for those who do.

The Problem of Drop-Outs. As contrasted to hook-up failure, users who discontinued purchasing water from the district after a few months were identified as "drop-

outs." In order to get the district organized and underway, drop-outs often were permitted but later became a concern in some districts where they became numerous. Both the feasibility of loan repayment and the water rate depend on the number of users expected during the life of the loan.

At the end of six months, about one-half of the districts had 10 percent or more of the original users drop out. A few districts lost almost one-fourth of their users as illustrated by District "B" where the number of users declined from 353 to 267 in six months.

In another case, a small town system began operation with 86 users but dropped to 55 by the seventh month—a decline of 36 percent. At the end of two years this small town system had not fully recouped its loss, as only 63 connections were in force.

When a significant number of drop-outs occurred, water rates were increased in order to meet the district's expenses, which did not decrease proportionally. When users drop out, districts cannot change their fixed costs, which make up most of their costs. Consequences resulting from drop-outs were essentially the same as those resulting from hook-up failures. The only difference was that financial difficulties resulting from drop-outs occurred a few months later than with hook-up failures.

Granting permission to drop out appeared to be one alternative for avoiding hook-up failures. By taking water for a few months and then dropping out, an individual, at least could be viewed as helping the district get underway.

Quantity of Water Used

Rural Districts. Data from only 19 rural districts could be used when the quantity of water consumed was studied. The remaining rural districts had either not been distributing water as long as 12 months or in other cases the data were not available.

Rural districts with usable data averaged about 3,200 gallons per month at the start of water distribution. Peak consumption, often about 8 to 10 months later, averaged almost 4,200 gallons per user. Subsequently, consumption dropped back to a volume slightly higher than the first few months.

Small Towns. Twenty-three small town systems had distributed water 12 months or longer. Consumption per user averaged initially about 2,600 gallons per month, increasing to around 3,200 gallons at the end of one year. Consumption varied substantially among small towns ranging from 1,000 to 7,000 gallons per user per month.

When a comparison was made, rural district users seemed to consume slightly more water than those in small towns; however, there was a greater variation in quantity consumed among small

towns and among rural districts than between rural districts and small towns. Thus, average figures have limited use when comparing the two types of districts.

It is useful to note the wide variation between individual districts in the amount of water consumed.[1] In 3 rural districts consumption began at a rate of 4,500 to 5,000 gallons per user per month, peaking at over 9,000 gallons.[2] In others, water use initially was only one-half this amount —2,000 to 3,000 gallons per user per month, and remained relatively constant over the study period. Clearly, systems must be designed in light of expected peak requirements, but those peak volumes vary significantly among districts. Each district must be studied individually in this regard.

Capital Required

More than 95 percent of the variation in total capital investment by the water districts was accounted for by variation in number of users and miles of pipe. Consequently, these are the two major costs to anticipate in building or expanding a system.

When planning a water district, expansion costs should be considered in determining the size of the district to be established. Later expansion may cost more per user than original installation if there are fewer users per mile of pipe. In that case, the financial condition of the district would be weakened and water rates for all users in the district might have to be raised. To avoid such problems, primary attention should be given to the number of additional users that will be obtained relative to the additional pipe needed when expansion of a district is being considered.

Other Factors in Planning

Respondents to the questionnaire listed other important factors to consider when planning public water supply districts. These included: hiring a competent engineer, setting up a workable record system, legally defining the boundaries, and properly informing the original users who contract for water.

Carefully planned and detailed engineering is important in planning a water district. Costs per user are calculated from the preliminary plan and these determine whether or not the loan is economically feasible. A competent engineer also should provide a complete and workable map showing size and location of all water lines, valves, and meters for the entire district.

A workable record system should be set up during the plan-

[1]In two districts, meters were not installed and a flat rate was charged regardless of the volume of water used. Consequently, the amount used could be expected to be higher.

[2]Includes one district which was providing water to a wholesale distributor located on district boundary.

ning stage. As Board members change, complete records, including those about finance and policies established by the Board, are essential. The financial record system finally adopted may have more use during the operation of the district than during the planning stage; however, reliable records are necessary at all times.

Community leaders wanting to establish a water supply district through the Farmers Home Administration should obtain as many interested individuals as possible. After each potential user is located on a map, the engineer should complete a feasibility study. The boundary is then established with the aid of an attorney. Boundary lines of the district may have to be shifted to make the project feasible, depending upon the density of population. But if this is done, it should be in accord with well understood guidelines.

Managing Water Supply Districts

If sound planning has been followed, the job of managing a water district is much easier. Heads of the 94 water districts in operation at the time of the study were asked to provide data which are summarized in this part of the publication. Their experience may be helpful to others who plan, organize, or manage a water supply district.

Required Clerical Time

The amount of clerical time required per district varied substantially. Most of this was due to a wide range in the number of users.

Approximately seven hours of clerical time was required per week for every 100 users. This suggests that from 500 to 600 users would be required before one clerk would be fully employed. The major portion of the clerk's time was spent in keeping records of the user's monthly payments. Management personnel in some water districts also published newsletters for the users; clerical personnel were involved in their preparation and distribution.

Operation and Maintenance

Monthly operating and maintenance costs remained relatively constant during the first two years of operation for both small town and rural districts. For small towns the monthly costs averaged about $250 compared to $500 for rural districts.

Ways to maintain systems also varied among districts. Members of the Boards of Directors performed the required maintenance in some, while in others a man was employed to perform maintenance when called. In still other districts, the management had on

duty at least one full time maintenance man.

Attitude Toward Voluntary Time

Members of the Board of Directors of some water districts contributed a large amount of voluntary time toward the development and management of their water districts. In other water districts, very little voluntary time was required of the members of the Board.

The attitude of Board Chairmen toward working voluntarily, changed as the amount of time required increased. Differences in attitudes toward voluntary time also existed between those working with small town water systems and those working with rural water districts.

Respondents to the questionnaire were asked to estimate the amount of time the Boards of Directors worked for the benefit of the water district. Since the Board of Directors for public water supply districts in Missouri serve without pay, these individuals were also asked if they thought this was too much time for them to donate.

In general, small town systems were smaller and consequently, Boards spent less time on official business than those of rural districts. All small town board members spent less than 2 hours per week on official business. Heads of Boards of small town systems were about equally divided on whether they should be paid for their services. In contrast, rural districts often require more than 2 hours per week; and 100 percent of the respondents believed they should be compensated when management required two hours or more per week from each Board member.

Attitude Toward Hired Management

A greater percentage of the respondents in the rural districts than in the small towns thought the Board should hire management personnel. Only 19 percent of the small town water system personnel felt they should have the assistance of professional managers, compared with 47 percent for the rural water districts. This difference of opinion is understandable because rural districts tended to be much larger, especially in miles of pipe and, thus, more complex management decisions had to be made when compared with compact small town systems.

Enforced Legal Contracts and Hook-Up Failures

As a means to prevent hook-up failures, respondents were asked how they felt about trying to enforce the legal contract signed by potential users when the district was organized. Only 11 percent of the people associated with small town water systems favored enforcement of legal contracts. They also believed this would cause more difficulty in obtaining initial

contracts with potential users. Forty percent of the rural group believed that legal contracts should be enforced. Two-thirds of this number believed this would have no effect on obtaining potential users.

Increased Fees and Hook-Up Failures

Heads of districts were asked about increasing the amount of the initial fees to decrease hook-up failures. They were about equally divided in their responses. Those who did favor increasing the fee thought it should not be more than twice its present amount. Both small town and rural area personnel said the present fee could not be increased without creating more difficulty in obtaining users during the initial sign-up. Consequently, this may be a means of discouraging hook-up failures in some districts, especially if deposits are not returned.

Additional Factors in Management

Other needs that management should consider, according to the survey, are: securing easements, hiring a competent contractor, educating users to read meters, dealing with users who fail to pay their water bills on time, and getting people to serve on the Board of Directors.

Board members of some districts now in operation reported faulty construction which caused leaking water lines and excessive water losses. In some instances, heads of Boards felt that poor construction occurred due to lack of adequate inspection and supervision. To provide adequate inspection, arrangements should be made for an inspector after consulting with the engineer. In some cases the on-site inspection might be done by the engineer but in others a different individual working with the engineer might perform this role.

Summary and Recommendations

The following observations were made when data obtained in this study were summarized.

1. Small town water systems averaged one-third the size of the rural area water districts as measured by capital invested and number of users.
2. Over one-fourth of the districts experienced more than 10 percent failures to hook-up among people who originally contracted for water.

   To help prevent hook-up failures, users should be provided complete information about the financing needs of the district. Hook-up failures oc-

curred because people only wanted a water line through their property, either to increase its value or for insurance against failure of their present water system.

3. About half of the water districts had more than 10 percent of the original users drop-out at the end of six months. Reasons given for drop-outs were the same as those listed for hook-up failures.

   Districts need to devise a way to discourage drop-outs. One alternative is not to refund water meter deposits when service is discontinued. Also these fees or deposits might be increased to discourage potential drop-outs.
4. Monthly water consumption in rural districts averaged 3,200 gallons per user at the beginning of distribution, compared to 2,600 gallons for small towns. More important was the wide range in water consumption among both small town systems and rural districts. Some districts reported consuming two to three times as much water as others. Peak consumption in some districts was more than 9,000 gallons per user per month.
5. The number of users and miles of pipe accounted for 95 percent the variation in the costs of building systems for districts studied.
6. Seven hours of clerical time was required for each 100 users on the average.
7. Respondents from both small towns and rural areas believed that doubling the initial fee would cause more difficulty in obtaining the original sign-up. Nevertheless, this may be needed to discourage potential drop-outs.
8. Respondents from small town and rural areas agreed that if the initial fees were increased, it should not be more than doubled.

The following additional suggestions are made based on the comments of respondents and discussions with experienced water district personnel.

1. The Board of Directors should hire a competent engineer during the planning and development stage of a water district.
2. In consultation with the engineer, plans should be made to provide for inspection during the construction period.
3. A workable record system should be initiated during the first sign-up.
4. A competent contractor should be hired by the Board of Directors.
5. Prior to the distribution of water the Board of Directors should establish a policy to deal with users who do not pay their water bills on time.

Issued in furtherance of cooperative extension work, acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. C. B. Ratchford, Vice-President for Extension, Cooperative Extension Service, University of Missouri, Columbia, Mo. 65201.