

GAO

United States General Accounting Office

Report to the Honorable
Gillespie V. Montgomery, House of
Representatives

October 1989

RURAL DEVELOPMENT

Feasibility of Requiring Larger Water Pipes in FmHA Water Projects



RESTRICTED—Not to be released outside the
General Accounting Office unless specifically
approved by the Office of Congressional
Relations.

RELEASED

Resources, Community, and
Economic Development Division

B-236945

October 24, 1989

The Honorable G. V. Montgomery
House of Representatives

Dear Mr. Montgomery:

This report responds to your request that we determine whether mandatory use of 6-inch or larger size pipes in all Farmers Home Administration (FmHA), Department of Agriculture, water distribution projects would be feasible and lead to lower fire insurance rates for rural Mississippi homeowners. You expressed concern over high fire insurance rates in rural Mississippi and FmHA's reluctance to study the cost impact of mandatory use of 6-inch or larger water pipes.

On the basis of information we obtained during preliminary work at FmHA and through discussions with your office, we agreed to analyze several Mississippi water distribution projects to determine (1) the feasibility and cost impact of substituting larger pipes for 4-inch diameter pipes, (2) whether 6-inch or larger pipes would improve fire protection, and (3) whether large pipes would reduce fire insurance rates for Mississippi's rural homeowners.

Results in Brief

Mandatory use of 6-inch or larger pipes on all FmHA water distribution projects does not appear to be feasible and would be very expensive. Six of the nine water distribution projects FmHA had funded with fiscal year 1989 combined grants and loans in Mississippi as of May 16, 1989, included 6-inch or larger pipes. The other three projects did not include 6-inch pipes because potential demand for water use would not be sufficient to maintain the proper hydraulic pressure needed for 6-inch or larger pipes to deliver safe and sanitary water to consumers. Substituting 6-inch for 4-inch pipes on one project currently awaiting FmHA funding approval would increase the estimated cost of the project from \$240,000 to \$430,000. The community requesting FmHA funding said that the intended users of the system could not afford the higher costs.

Mandatory use of large water pipes in all FmHA projects would not necessarily improve fire protection and thereby lower fire insurance rates for rural homeowners in Mississippi. Large diameter pipes will not ensure improved fire protection because the pipe is only one component of a water system and a water system is only one element in fire protection.

According to the Mississippi State Rating Bureau (MSRB), the water supply system is only one element of an effective fire protection system that must also include (1) established, properly equipped, and trained fire companies; (2) adequate warning and communications equipment; and (3) safety features such as enforceable building codes. Upgrading the water supply system, according to MSRB, without corresponding improvements in other deficient elements would not necessarily improve fire protection or lower fire insurance rates. Also, competitive market forces rather than MSRB ratings now play a major role in determining insurance rates since Mississippi enacted a law in 1987 that deregulated the fire insurance industry.

Background

The Secretary of Agriculture under the Consolidated Farm and Rural Development Act, as amended, is authorized to provide grant and loan financial assistance for water distribution system projects in rural communities with populations of 10,000 or less. Water distribution systems include many configurations and combinations of components, such as wells, storage tanks, valves, pumps, purification plants, and various sizes of distribution pipes. Each system is unique because of its size, geographic location, physical layout of the component parts, and hydraulics, that is, the amount of water to be flowed and the pressure in pounds-per-square-inch needed to maintain the system in working order.

Each system must be designed to meet specific community needs. A rural water distribution system may include any combination of pipe sizes ranging from 3/4-inch for residential service to 8-inch water mains. FmHA recommends at least 6-inch pipes for fire hydrants at critical locations such as churches, schools, and hospitals but does not require 6-inch minimum size pipes for all water distribution systems. For rural Mississippi water projects, FmHA engineers consider any pipe size above 4 inches in diameter as "large" in the context of water distribution systems and fire protection.

FmHA allocates fiscal year funds to individual states based on a formula using the most current census data. For fiscal year 1989, about \$109 million in grant, and about \$330 million in loan assistance was available for allocation. As of May 16, 1989, FmHA had obligated \$3.3 million in grants and about \$6.4 million in loans for Mississippi projects. States are not required to match the federal grants or loans.

FmHA state offices determine applicant eligibility, select and approve projects for funding, and track project development. FmHA policy

requires state offices to rank applications for funding assistance based on criteria such as the community's population, health factors, and income. FmHA state directors are to make every effort to direct funds to projects located in communities with the greatest financial need.

Water Projects Included 6-Inch or Larger Pipes

Six of the nine Mississippi water distribution projects funded by FmHA with fiscal year 1989 combined grants and loans between October 1, 1988, and May 16, 1989, included 6-inch or larger pipes. According to an FmHA professional engineer, the other three projects used 4-inch and smaller pipes because these sizes of pipes would be sufficient to maintain the proper hydraulic pressure needed to deliver safe and sanitary water to consumers. The following are examples of projects using 6-inch or larger pipes.

The town of Hickory, Mississippi, for example, specifically addressed fire protection and insurance rates in its application for FmHA funds. The town requested funds to finance replacement of its deteriorated water distribution system, including fire hydrants, and to extend service to 486 new users. The project included 6- and 8-inch pipes among 70 miles of new pipe and was justified on the basis that the deteriorated condition of existing pipes negatively affected fire protection and insurance rates. FmHA approved and funded the project with a \$980,400 grant and a \$675,600 loan.

FmHA also approved a \$150,000 loan for a project in Edwards, Mississippi, that included 6- and 8-inch pipes to enhance fire protection and expand services to 36 new users. Among other water-related improvements, Edwards has installed 22 fire hydrants during the last 3 years and has applied for a \$352,500 Department of Housing and Urban Development (HUD) Community Development Block Grant to help cover the cost of its improvements.

Cost Impact of Using Large Pipes in All FmHA Projects

Requiring large pipes in all FmHA projects could impose significant cost burdens on communities that have limited financial resources. An FmHA loan specialist and FmHA engineers said that to require all FmHA water projects to include 6-inch or larger pipes could impose unreasonable costs on a community and eliminate the community's local option of how to use its limited financial resources. The loan specialist pointed out that rural communities' local funds are limited by the income base of the communities, and that Mississippi state funds for water distribution projects are nonexistent. The engineers pointed out that, because FmHA

water projects generally are targeted to rural community water districts with incomes below poverty level, the systems' costs are a prime consideration as to what can be funded. In addition, the engineers told us that mandatory use of large pipes may also require other larger more expensive system components such as wells, pumps, and tanks to ensure that system hydraulics function properly.

A water distribution system project for Crawford, Mississippi, illustrates the significant cost of larger pipes. Crawford submitted a project application to FmHA in early 1988 to extend its water distribution system to about 80 new users. This project included mostly 4-inch and smaller pipe and was estimated to cost \$240,000. After Crawford submitted the application to FmHA, the potential new users asked that the system capacity be increased to provide for fire protection. Engineers redesigned the system to include fire hydrants and mostly 6-inch pipe. The redesign increased the project's estimated cost to \$430,000. Crawford sought HUD Community Development Block Grant funds to finance this additional cost but was unsuccessful, and the project was scaled back to \$240,000. Crawford's application was awaiting FmHA funding approval at the time we completed our review.

Impact of Large Pipes on Fire Protection

Large diameter pipes will not ensure improved fire protection because the pipe is only one component of a water system and a water system is only one element in fire protection. A responsive fire protection system, according to the MSRB Superintendent of Public Protection, also includes fire fighting companies, communications equipment, and safety features. Water distribution systems with large size pipes must be complemented with these additional resources in order to achieve adequate fire protection.

The Mississippi State Insurance Commissioner's consultant on fire protection said that the keystone for fire protection in rural areas is the water supply system and that 6-inch water pipes are better than 4-inch pipes. However, according to Mississippi FmHA engineers, upgrading a system with larger pipes may change the hydraulics of the water distribution system and require enhancements to other system components such as wells, pumps, valves, and tanks to enable the system to function safely and properly. Rural communities may lack the financial resources to pay for these enhancements. However, both FmHA and MSRB officials stressed that fire protection is possible with 4-inch piping if the other additional resources are in place and that a community should not forego this option if 4-inch piping is all that the community can afford.

Impact of Large Pipes on Fire Insurance Premiums

Large pipes in all FmHA water distribution system projects would not necessarily ensure lower fire insurance premiums. The water distribution system is only one of four elements considered by the MSRB in rating fire protection systems for insurance purposes in Mississippi and accounts for only 39 percent of the total value of the community fire protection system being rated. The other elements and their relative values are: fire fighting companies, 39 percent; communication systems, 13 percent; and safety features, 9 percent. MSRB officials pointed out, for example, that because fire fighting companies are as important as water supply in rating the relative insurance risk of a community, large size pipes cannot compensate for an inadequately equipped fire fighting company.

The MSRB Manager told us that competitive market forces rather than MSRB ratings now play a major role in determining insurance rates. The Manager also said that insurance underwriters operating in Mississippi are no longer required to base their fire insurance premium rates on the ratings determined by the MSRB. Before the enactment of a Mississippi law in 1987 that deregulated the operations of fire insurance underwriters in the state, underwriters were required to set fire insurance premiums based on the MSRB ratings. Insurance underwriters now assess the risk they are willing to accept and set their fire insurance premium rates accordingly. Consequently, according to the MSRB Manager, MSRB ratings may influence the insurance premiums that companies charge, but there is no direct correlation between MSRB ratings and current premiums.

We discussed a draft of this report with FmHA national office and Jackson, Mississippi, field office program officials and have incorporated their comments where appropriate. However, at your request, we did not obtain formal agency comments. We performed our work during the period January 1989 through June 1989 in accordance with generally accepted government auditing standards. Our scope and methodology is included in appendix I.

Unless you publicly release its contents earlier, we will make copies of this report available to other interested parties 10 days after the date of this letter. Should you require any additional information on this report, please call me at (202) 275-5525.

Major contributors to this report are listed in appendix III.

Sincerely yours,

John M. Ols, Jr.

John M. Ols, Jr.
Director, Housing and
Community Development Issues

Contents

Letter		1
Appendix I Scope and Methodology		10
Appendix II Fiscal Year 1989 Mississippi Water Distribution Projects Funded With FmHA Loans and Grants Selected for Review		12
Appendix III Major Contributors to This Report	Resources, Community, and Economic Development Division Washington, D.C. Dallas Regional Office	13 13 13

Abbreviations

FmHA	Farmers Home Administration
GAO	General Accounting Office
HUD	Department of Housing and Urban Development
MSRB	Mississippi State Rating Bureau

Scope and Methodology

To determine the feasibility and cost implications of mandatory use of 6-inch or larger size pipes in all Farmers Home Administration (FmHA) projects, we reviewed all 12 of the Mississippi water distribution system projects that FmHA had funded with fiscal year 1989 combined grants and loans at the time of our visit to FmHA's Jackson, Mississippi, office in May 1989. Three of the 12 projects did not include any requirement for water pipes; therefore, we eliminated these projects from our review. Appendix II contains pertinent data regarding the remaining nine projects.

We selected projects with combined grant and loan financing because (1) the applicants' financial resources in such cases generally are slim and (2) such applicants are most sensitive to cost options. We judgmentally selected two other projects to document the cost increase associated with larger pipes and to illustrate that FmHA continues to approve projects with larger pipes to enhance fire protection in rural communities. We analyzed the projects' files to identify the size of water pipe in the distribution system and determine whether the projects included fire protection in their justifications for receiving FmHA funding.

We interviewed FmHA's Program Management Branch, Water and Waste Division Chief, at FmHA national office, Washington D.C. At FmHA's state office in Jackson, we interviewed the Community Programs Acting Chief, a loan specialist, and professional engineers to identify system design considerations regarding large size pipe and cost factors associated with large size pipe. We obtained the views of the Mississippi State Insurance Commissioner's Consultant on Fire Protection and MSRB officials concerning the use of 6-inch or larger pipes in rural water distribution systems.

To determine whether the use of larger pipes would improve fire protection, we interviewed the Mississippi FmHA's Professional Engineers on the impact of requiring 6-inch or larger pipes in water system configurations. We also interviewed the Mississippi State Insurance Commissioner's Consultant on Fire Protection about the role of larger pipes in fire protection and the MSRB Superintendent of Public Protection on fire protection systems in general.

To determine whether the use of larger pipes would reduce fire insurance premium rates, we interviewed the MSRB Superintendent of Public Protection about the elements required for a fire protection system to be rated for insurance purposes, and the relative importance of the water supply element in the rating formula. Also, we interviewed the MSRB

Manager about the Mississippi insurance underwriters' fire insurance rate-setting practices and the correlation between these rates and MSRB ratings. We viewed a video tape provided to us by the Mississippi State Fire Academy that discussed the need to develop a community fire protection system and the Mississippi insurance underwriters' fire insurance rate-setting practices.

We reviewed federal statutes regarding funding for rural water systems and Mississippi statutes regarding fire protection and insurance rate-setting practices. We obtained funding data and administrative procedures on the rural water program from the FmHA Mississippi office.

We performed our work during the period January through June 1989 in accordance with generally accepted government auditing standards.

Fiscal Year 1989 Mississippi Water Distribution Projects Funded With FmHA Loans and Grants Selected for Review

Project sponsor	Project description	Loan	Funding grant	Total
Town of Brooksville, Mississippi	Extension with 3/4-, 2-, 3-, 4-, and 6-inch pipe; pumping station	\$121,500	\$274,000	\$395,500
Buckatunna Water Association	Extension with 3/4-, 2-, 3-, and 4-inch pipe; new well; pressure tank	174,500	125,500	300,000
Darlove-Murphy Water Association	New system with 3/4-, 1-1/2-, 2-, 2-1/2-, 3-, 4-, 6-, and 8-inch pipe; well; fire hydrants	28,700	73,500	102,200
East Pike Water Association	New system with 3/4-, 1-, 1-1/2-, 2-, 2-1/2-, 3-, 4-, 6-, and 8-inch pipe; new well; treatment plant; hydropneumatic tank; fire hydrants	461,200	816,800	1,278,000
Gaines Trace Water Association	Extension with 3/4-, 2-, and 2-1/2-inch pipe	15,000	36,000	51,000
Town of Hickory, Mississippi	Extension with 3/4-, 2-, 3-, 4-, 6-, and 8-inch pipe; 2 wells; elevated storage tank	675,600	980,400	1,656,000
McCarley Water Association	Extension with 3/4- and 4-inch pipe; booster station; chlorinators; pneumatic tank; storage tank	40,000	103,000	143,000
Pattison Water Association	Extension with 3/4-, 2-, 3-, 4-, and 6-inch pipe	50,500	105,500	156,000
Southeast Greene Water Authority	Extension with 3/4-, 2-, 3-, 4-, 6-, and 8-inch pipe; elevated storage tank	206,000	478,000	684,000

GAO analysis of FmHA Jackson, Mississippi, Project Files.

Requests for copies of GAO reports should be sent to:

**U.S. General Accounting Office
Post Office Box 6015
Gaithersburg, Maryland 20877**

Telephone 202-275-6241

The first five copies of each report are free. Additional copies are \$2.00 each.

There is a 25% discount on orders for 100 or more copies mailed to a single address.

Orders must be prepaid by cash or by check or money order made out to the Superintendent of Documents.

Major Contributors to This Report

Resources,
Community, and
Economic
Development Division
Washington, D.C.

Ed Kratzer, Assistant Director
Robert J. Mancuso, Assignment Manager

Dallas Regional Office

Frank Borkovic, Regional Management Representative
James Smoak, Evaluator-in-Charge
Michael Buell, Evaluator