



DEPARTMENT OF THE INTERIOR
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BUREAU OF RECLAMATION

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RECLAMATION REPORTS SAVINGS OF \$20 MILLION IN CONSTRUCTION OF
LOW-COST CANAL LININGS

Bureau of Reclamation research and development work in low-cost canal linings during the past 15 years have contributed to total savings to western water users of more than \$20 million in the construction of irrigation canals, Secretary of the Interior Stewart L. Udall announced today.

"These impervious, lower-cost canal linings not only have been built at a greatly reduced cost, but they also have resulted in a tremendous savings of water in arid parts of the West," said Secretary Udall. "Program results demonstrate that use of such linings can reduce annual canal seepage losses in the foreseeable future by an estimated one and one-half million acre-feet of water. That is almost as much water as is now being delivered by the Bureau to farms in the 500-mile-long Central Valley Project in California."

Commissioner of Reclamation Floyd E. Dominy reported that under the Bureau's Lower Cost Canal Lining Program, now observing its 15th anniversary, more than 1,300 miles of lower-cost canal linings, representing 43,000,000 square yards, have been installed on Reclamation projects to prevent seepage of valuable irrigation water in its transit to irrigated areas. Reclamation projects have nearly 26,000 miles of canals and laterals in operation and another 600 miles under construction.

Commissioner Dominy said that the Bureau's program to develop and to disseminate information on lower-cost linings was initiated in June 1946. The research and field testing are done by technicians at the Bureau's Engineering Laboratories in Denver, Colorado, and in the Bureau's seven regional organizations, located in the major drainage basins of the West. Grant Bloodgood, the Bureau's Assistant Commissioner and Chief Engineer, is in general charge of the program.

"A number of new types of canal linings have been developed by the Bureau and cooperating organizations and they are performing satisfactorily in conveying water to irrigated land," said Commissioner Dominy. "These important developments have been achieved through the cooperation of State colleges, irrigation districts, construction contractors, equipment manufacturers, and producers of construction materials, coupled with the intensive work by our designers, laboratory researchers, and field engineers."

Four major types of linings have been developed in the first 15 years of this continuing program. These linings serve as economical and effective seepage barriers along the slopes and bottoms of canals, which range in bottom width up to 210 feet. The lower-cost linings not only reduce the initial cost of construction, but they also make possible the construction of certain projects which could not be economically justified if expensive linings were required, as well as the development of larger areas by increasing the quantity of water available for useful purposes.

The four most widely accepted lower-cost linings--as compared with more expensive linings used prior to the start of the Lower Cost Canal Lining Program--are unreinforced portland cement concrete, buried asphalt membrane, heavily-compacted earth, and pneumatically-applied cement mortar.

About 750 miles of unreinforced concrete linings, aggregating more than 20,000,000 square yards, have been placed on Reclamation projects during the past 15 years. The concrete is virtually watertight, and if cracks and grooves are sealed, there is little leakage. The average cost of the lining per square yard is \$2.75.

Asphalt membrane linings buried under an earth blanket have been used in many areas with considerable success. The membrane may be sprayed-in-place asphalt or a prefabricated asphaltic material. Recent evaluation indicates these materials to be tough, durable, and long lasting. The membrane is the water barrier and is protected against sunlight, hooves of livestock, erosion, and cleaning equipment by a cover of stable soils and gravels. Membrane linings are being installed for as low as \$1.05 a square yard. About 220 miles of canal linings, having some 5,000,000 square yards of asphalt membrane, have been placed on Bureau projects.

Heavily compacted earth lining is composed of impervious soils placed in thicknesses greater than 12 inches. Properly chosen materials available near the canal compacted according to laboratory standards permit very little seepage. This type of lining has been placed at an average cost of \$0.85 per square yard. About 6,000,000 square yards of the lining have been placed in more than 200 miles of canals.

Pneumatically-applied portland cement mortar, or "shotcrete," is applied through a hose to the canal subgrade by means of an air jet. The mortar is usually applied in layers to a total of one and one-half inches to two inches thick and consists of approximately one part cement to four and one-half parts of

sand and only enough water to secure proper placement, but enough to avoid sloughing of the mortar from the side slopes. It may or may not be reinforced with steel rods or mesh. This type of lining has been placed on 1,800,000 square yards of 145 miles of canals, and its average cost per square yard is \$2.80.

In addition to the four major linings being installed under the Lower Cost Canal Lining Program, other materials are being used at a cost of one dollar per square yard or less. Some of these are experimental and they cannot yet be recommended for general construction until they are more fully evaluated.

"Any additional reduction in cost of Bureau canal construction and further efficiency in the delivery of water certainly justify this research program," Commissioner Dominy said. "We believe continued reduction in costs is possible and will be achieved as new materials and techniques in their application in construction are developed."

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