LET'S "MUDDY" THE DITCH WATER

"New problems take over when you remove all sediment from irrigation water"

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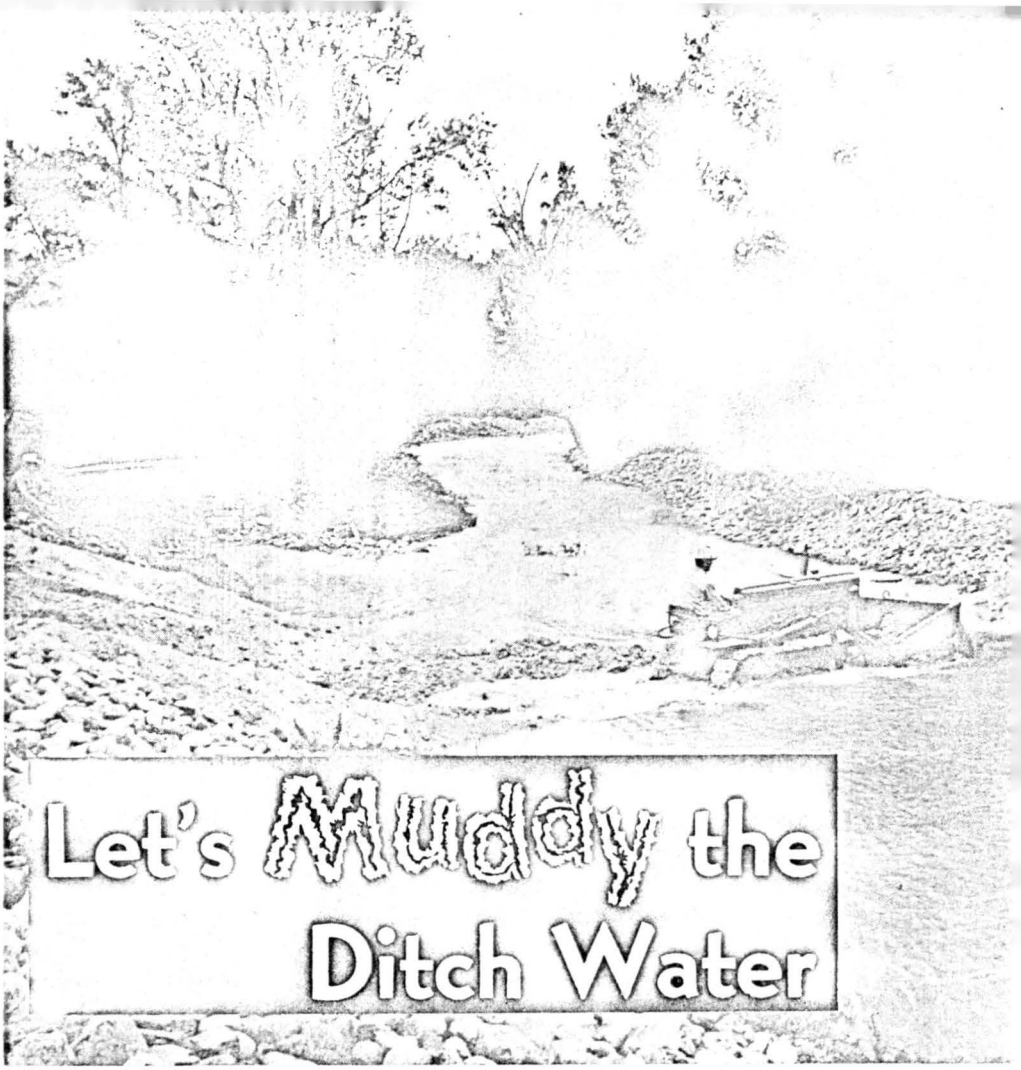

Crawler-type tractor aids in dispersing bentonite dam to put clay-like material in suspension and aid in sealing leaky irrigation canal.

IT IS commonly accepted that troublesome sediment should be excluded from irrigation water. Excessive amounts of sediment which often accompany uncontrolled flood flows will clog canals and may damage irrigated land. This is especially true of the bed-load sand part of the over-all sediment content.

But today many and perhaps most "irrigation" rivers are no longer of the uncontrolled type. Muddy waters are rare in the upper sections of many irrigation canal systems since the river mud is now trapped in upstream storage reservoirs.

Is this widespread trend toward sources of clear, sediment-free irrigation water an entirely favorable development? Obviously, it has been considered favorable in the past—and a relatively high value is still placed on the sediment-trapping potential for many proposed large reservoirs. Today, however, many thoughtful observers are wondering whether the mud removal brought about by the large river reservoirs is actually all benefit.

In many irrigation projects throughout the western United States—and in other irrigated areas of the world as well—this is a common observation: When a dominantly clear irrigation water follows and is substituted for a previously intermittently muddy water, new problems take the place of the eliminated silt problems. Nature has many ways of circumventing man's efforts to control her.

Clear water cuts previously stable canal banks and underwater weeds flourish where none grew before. Perhaps most serious of all, the clear water commonly seeps from the canals at much faster rates than muddy water. On at least one major river system in the West, increased canal seepage, due to clear water, cancelled out most if not all of the benefits of better water regulation which were to have been produced by construction of a major dam.

It would appear that while excess sediment, especially sandy sediments, can cause serious problems, a lack of the right kind of sediment—clay, not sand—can contribute to problems equally as serious.

The idea of artificial silting is not new. It is probably as old as irrigation itself, and many irrigation companies have tried it. But factual information is extremely scarce on the sediment used and the results produced. Determining favorable characteristics and installation methods for sediment sealing of irrigation canals is one of the major objectives of the CSU Experiment Station's bentonite research project.

From an over-all standpoint, the objectives of the CSU bentonite project may be summarized as follows:

(1) To inventory the clay de-

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posits in or close to major irrigated areas in Colorado and

(2) To develop methods of utilizing local clays in sealing canals and reservoirs in Colorado.

Thus, two important justifications for this state-funded work relate to (1) a potentially expanded use and market for Colorado clays, and (2) conservation or more efficient use of the available irrigation water supplies in Colorado.

The bentonite project was partially funded, starting February 1, 1960, by a contract between the CSU Research Foundation and Southeastern Water Conservancy District. The funding was completed, starting July 1, 1960, by the Colorado Legislature and the Colorado Water Conservation Board through the CSU Agricultural Experiment Station.

Current research and development work can be grouped into four main categories: (1) Sampling of Colorado clay deposits, both by project personnel and by local prospectors, (2) laboratory evaluations of clay samples, including development of appropriate testing procedures, (3) field trial evaluations of clay installations in canals and reservoirs in Colorado, and (4) cooperative activities with potential clay producers, clay sealing contractors, and irrigation companies and districts.

A detailed report or discussion of work is not included here since detailed progress reports are prepared periodically. Copies will be sent to any interested parties.

As background that may be of interest, some of the general project guide questions are listed below:

- What specifications should be used for a clay satisfactory for sealing purposes in canals and reservoirs?
- Where are suitable clays available in or near major irrigated areas in Colorado?
- What laboratory test procedures can be used to classify clays as suitable for sealing purposes?
- What clay mineral types are found in the Colorado clays?
- What are the important engineering and chemical properties of the Colorado clays that can be determined by laboratory testing?
- What is a practical, low-cost procedure for intermittently placing a suitable clay "mud" in irrigation water?
- What procedures, other than the sedimenting or "float-in" methods are recommended when using local clays for sealing purposes?
- What are the best "yardsticks" for measuring the effect produced in field trials with local clays in canals and reservoirs?
- What results have been produced in past sealing work with Colorado clays?

Colorado State University personnel assisting at one time or another in the various phases of the work include: D. V. Harris, E. N. Wolff and D. E. White of the Geology Department; W. R. Schmehl and Hunter Follett of the Soils Section of the Agronomy Department; R. W. Hansen of the Agricultural Engineering Department; and M. M. Skinner, R. T. Shen, C. C. Smith, and R. E. Lehman of the Civil Engineering Department.

Dirmeyer Seeking Methods for Using Colorado Clays

R. D. Dirmeyer, Jr., author of the article on page 3, has been with Colorado State University since July of 1953.

His major area of research has been on low-cost canal and reservoir sealing methods. He has served as a consultant to such organizations as the Wyoming Natural Resource Board and the Imperial Irrigation District in California, both of which have been engaged in canal and reservoir sealing activities with bentonite.

Dick Dirmeyer

Currently, as project leader for the CSU bentonite project, he is emphasizing development of methods for using Colorado clays for sealing purposes.

Dirmeyer was graduated in 1942 from the Colorado School of Mines with a geological engineer degree. During World War II, he served as an engineering officer in the Pacific. He was awarded the Bronze Star medal for his efforts as intelligence officer of the Engineer Section, XXIV Corps, during the Philippine and Ryukyu campaigns.

Following his Army duty, he worked for the U. S. Bureau of Reclamation as an engineering geologist, including six years as district geologist for the North Platte River district office at Casper, Wyoming.

He is a registered professional engineer in Colorado, is a member of the American Society of Agricultural Engineers and at Mines was a member of two honorary societies —Tau Beta Phi and Scabbard and Blade.

He and Mrs. Dirmeyer have three sons ranging in age from 4 to 13.