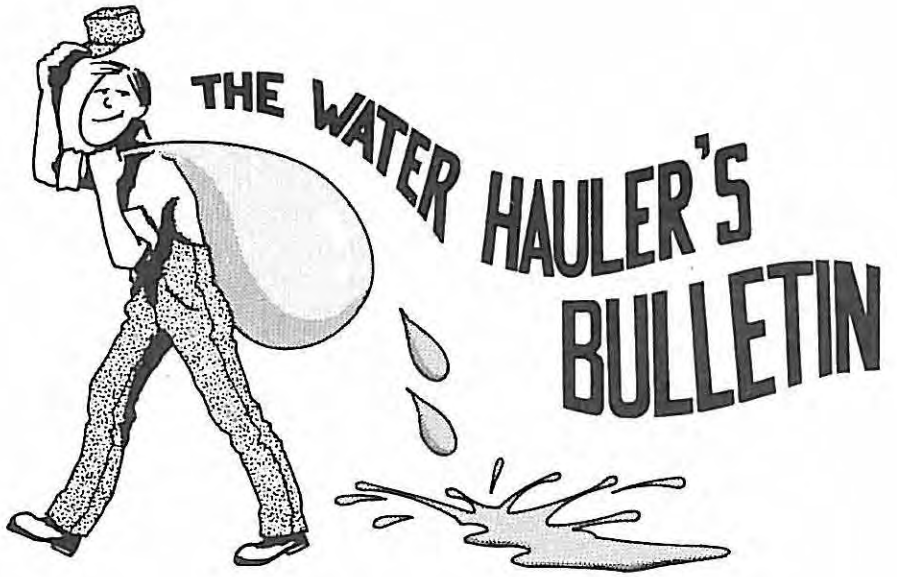

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FOCUS: WATER MANAGEMENT SYSTEMS

by J. C. Purnell, Director, Irrigation Division, Alberta Agriculture

As increased efforts are made to accelerate the rehabilitation of our irrigation systems, we may tend to pay too much attention to the physical attributes of the facilities being installed and not enough attention to the effectiveness or efficiency of their operation. We may lose sight of the purpose of these systems, i.e., delivery of water to the farmer in accordance with the operational requirements of his farm system. Satisfying on-farm water management objectives cannot be achieved without controlling water deliveries.

At present there is a distinct trend toward greater control and management of water on the farm. This is evident from the fact that farmers are increasing the use of sprinkler irrigation systems, particularly pivots, to the point where we now have approximately two-thirds of all irrigated farms in Alberta being irrigated by sprinkler systems. Coupled with this, irrigation districts are constructing waterproof canals, modernized works and control systems and giving greater attention to the installation of buried pipe systems wherever these are practical and within economic reach. By using sprinkler systems and pipelines in upgrading, modernizing and rehabilitating our irrigation systems, both the farmers and districts are continuing their efforts to conserve water and land, reduce the present and long term costs of operating and maintaining their water delivery systems, and increase farm income.

In order to achieve our long term objectives to increase irrigated acreage, improve efficiency of water use and preserve our agricultural land, a cooperative approach between the irrigation districts and the farmers should be promoted. More attention will need to be given to a systems approach to rehabilitation and away from single, isolated projects. More farmers will have to be consulted and agreements reached before these systems can be built. More advance planning will also be required to ensure compatibility of all system components.

This water management systems approach will provide maximum benefit to the farmer, the district and the community by improving the control, management and use of a rapidly diminishing and vital resource, water, and further guarantee a supply of high quality fodder and food for a growing world population. We must remain good stewards of our water resource so that other users may enjoy its benefits also.

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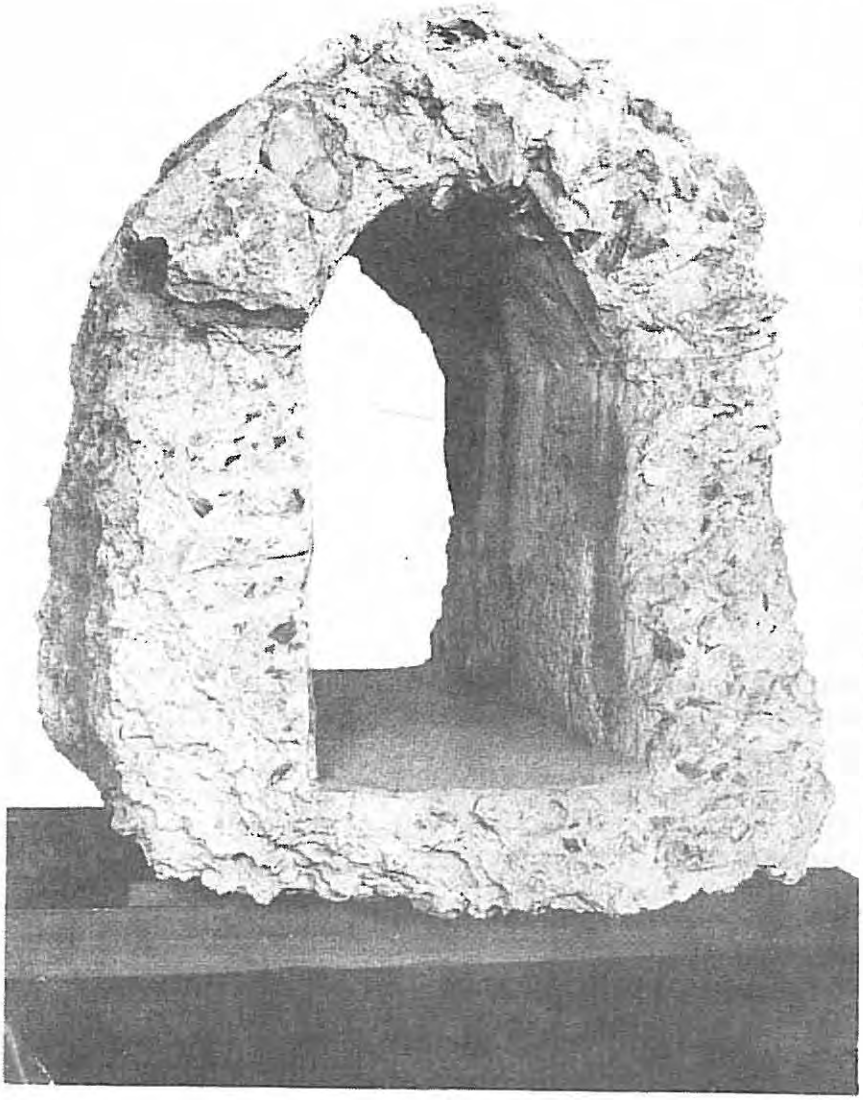

WORRIED ABOUT DURABILITY OF CONCRETE PIPE?

This section of concrete pipe came from an aqueduct built by the Romans around 80 A.D. The original aqueduct extended 56 miles underground between Fiffel and Cologne. Trass, a slightly hydraulic natural cement occurring along the Rhine, between Coblenz and Cologne, was used by Roman army engineers in constructing the aqeuduct. It is a volcanic mud made up of a mixture of pumice, trachyte, quartz pebbles and some vegetable matter. Mixed with slaked lime and water, it makes a fairly satisfactory binder for the broken limestone and gravel. The walls are approximately 380 mm thick, and this section weighs 4.4 tonnes.

Picture & text from "Concrete Pipe Handbook", American Concrete Pipe Association.

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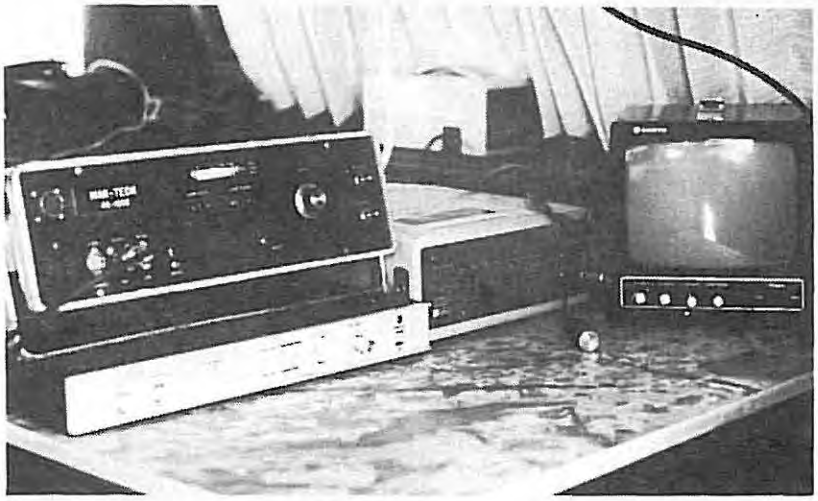
T.V. CAMERA USED TO INSPECT IRRIGATION PIPELINES

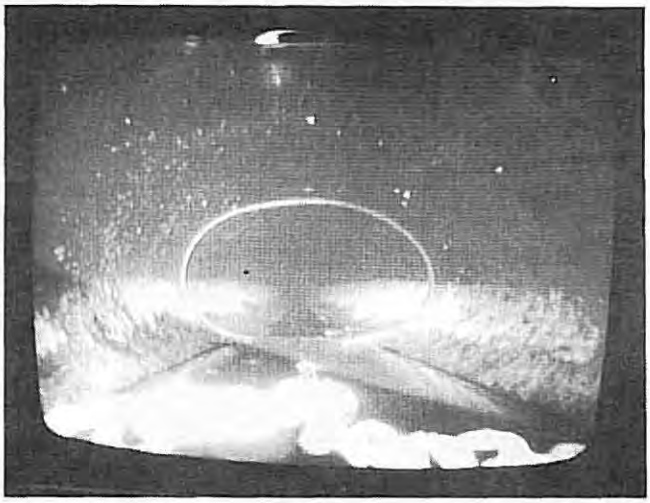
The Applied Research Section of the Project Planning Branch is currently engaging the services of an Edmonton firm, Mar-Tech Engineering Company Ltd. to provide internal video inspection of eleven irrigation pipelines in Southern Alberta.

There are two lines being televised in St. Mary River, Taber, Lethbridge Northern, and Eastern Irrigation Districts, and one in Bow River Irrigation District. There is a total of about 17.5 km of underground pipeline being video inspected under this contract. The pipes vary in diameter from 250 mm to 800 mm, and are of polyethylene, polyvinyl chloride, fibreglass, or concrete construction.

It is possible to detect many types of defects in the pipelines by televising them, such as: pulled joints, pulled gaskets, effectiveness of repair work done, presence of debris or silt, presence of air pockets, cracked or otherwise damaged pipe, improperly operating valves, infiltration and exfiltration, grade deviations and "squashing" of flexible pipes. It stands to reason that detection and repair of defects before complete failure occurs will reduce the operation and maintenance costs to the Irrigation Districts. Some cities in Alberta require a video inspection of all their new water and sewer lines during the installation contractor's warranty period to insure that the job has been properly carried out.

It is the hope of the Applied Research Section that this video inspection program will help pinpoint problems associated with buried irrigation pipelines and eventually lead to new designs and better installation procedures to avoid any future problems.





Left: Some of the equipment used to obtain a video picture of the inside of a pipeline. Shown are power supply, computerized image enhancer, video recorder, and video monitor.

Right: This shows the interior of a Series 45 black polyethylene 24" diameter pipe. The bead on the welded joint shows clearly that the pipe is "squashing". The white spots in the foreground is the chain fastened on to the front of the camera.

* * *

SAFETY EQUIPMENT NOW AVAILABLE TO IRRIGATION DISTRICTS

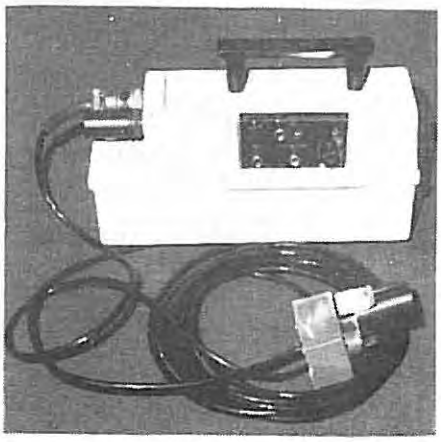
The Evaluation and Management Section of the Project Planning Branch has recently acquired a number of pieces of safety equipment for worker protection in confined spaces such as manholes, vaults, pipelines, sumps, etc. The equipment, along with a person familiar with its use, is now available to Irrigation District personnel upon two working days advance notice.

The list of equipment available is as follows:

1. A 60 minute self-contained-breathing-apparatus with an extra 60 minute tank.
2. A 115 Volt manhole ventilator blower with 15 feet of hose 8" in diameter.
3. Electronic warning device for low oxygen level and/or flammable gases.
4. Manually operated "sniffer" for detecting carbon monoxide, carbon dioxide, flammable gases, etc.
5. A manhole rescue or lowering harness.
6. A submersible sump pump.
7. A gasoline powered alternator to power sump pump and ventilator blower.

The equipment is available by contacting Roger Knibbs of the Evaluation and Management Section at 329-5164.

Some of the safety equipment now available on a loan basis to Irrigation District personnel.



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GENERAL REHABILITATION PLAN BEING PREPARED FOR ALBERTA IRRIGATION DISTRICTS

Purpose

The purpose of the Plan is to provide a comprehensive planning report for the districts. The report includes proposals for systems improvements, cost estimates and construction scheduling required to upgrade the distribution and drainage networks to modern standards.

These proposals are expected to represent the districts' requirements in the way of rehabilitation and enlargement for the foreseeable future.

Responsibility

Each irrigation district is responsible for the preparation and contents of its particular study reports. The several reports will be presented to Irrigation Council by the end of Calendar year 1984.

Irrigation Division Will Assist

Irrigation Division of Alberta Agriculture is committed to assist in the preparation of the various plans where such assistance is requested by the districts.

Proposals Drafted For Study Format

The area comprising the thirteen (13) irrigation districts is divided into blocks. Each district has at least one block with the larger blocks ranging in size up to 50,000 irrigable acres.

The study consists of sixteen (16) components:

1. An orthophoto base map 1:20,000 scale.
2. A sepia showing irrigable assessed acres for the block. 1:20,000 scale.
3. A tabular and plan file inventory of all existing district works. The plan is on sepia from the orthophoto base 1:20,000 scale.
4. A tabular and plan file inventory of wetlands and salinity areas in the district. The plan is on sepia from the orthophoto base.
5. A survey of surface drains and drainage problems in the district.
6. Level III land classification of --- (either all district lands, or all potentially irrigable lands).
7. A sepia or sepias showing layout and type of proposals for all rehabilitation under the plan.
8. Sizing of all proposals shown on layout sepia.
9. Seepage control measures to be added to proposals on layout sepias.
10. Drainage improvements to be added. Components 8, 9 and 10 will all utilize sepia(s) of No. 7 or additions if required.
11. A sepia or sepias showing all structures and tabular descriptions of each.
12. Detailed cost estimates and summaries for block rehabilitation proposals.
13. Conclusions reached from studies.
14. Recommendations for selected alternatives to be implemented.
15. Draft report.
16. Final bound report.

Each study report will consist of a number of volumes, one for each study block plus a summary volume.

Orthophoto Mapping Base Used

The entire irrigable area was flown in late 1981 and accurate 1:20,000 scale township size mosaic base plans will be produced early in 1982. These will present an up-to-date accurate picture of the present irrigation systems layout.

Land Classification Is Included

Extensive land classification to Level III standard will be included in the plans. This will include all projected new areas plus all existing irrigated parcels which do not have a classification at present. Land classification Level III reports will be bound separately and included as volumes in the district's plan.

On The Ground Systems Inventory Is Also Included

This inventory reports condition of canals, drains, and structures and identifies saline and wetlands.

Funding

The general rehabilitation plans for the districts are funded from the Irrigation Capital Works cost sharing accounts. The normal 86% - 14% Province to district cost sharing formula applies.

Study Schedule Drafted

A study schedule has been drafted for each of the districts as well as a composite schedule for the entire plan. Completion date is Dec. 31, 1984.

* * *

AGRIVISION SCHEDULE

Be sure to watch AGRIVISION Tuesday nights at 10:30 on TV Channels 2 and 7, CFAC Lethbridge. The hosts of this informative agricultural program are Len Ring, Irrigation Systems Engineer, and Don Wentz, District Agriculturist. Take note of the following schedule:

January 26 - Ron McMullin discusses irrigated soil in Lesson 1 of The Irrigation Home Study course. Visit to Alberta Sugar Company Factory in Taber.

February 2 - Dick Heywood discusses irrigation management in Lesson 2 of The Irrigation Home Study course. Don Wentz discusses Future Market and Hedging with Midland-Doherty.

February 9 - Dennis Roll discusses plant, water and nutrients in Lesson 3 of The Irrigation Home Study course. Don Wentz visits Lethbridge Weather Office.

February 16 - Lesson 4 of The Irrigation Home Study course on surface, trickle and subsurface irrigation methods.

February 23 - Len Ring presents Lesson 5 of The Irrigation Home Study course dealing with Sprinkler Irrigation methods. Special presentation related to Agriculture Week.

* * *

STUDY ON CONCRETE CANAL CRACKING CONTINUES

The Irrigation Division inititated a program in April 1981 to inventory the amount and severity of cracking on all concrete lined canals. The study is a follow-up to the one done in May 1979 on approximately 200 km of canals.[1] The aim of the study is to determine if additional cracks occur progressively over the operating years, or if the initial cracks become more severe. The eventual goal is to control cracking in concrete liners and develop successful methods of sealing the controlled cracks or joints.

The compilation of data for the Spring 1981 inventory was released in November 1981 in report form to each of the Irrigation Districts involved. The inventory data was collected by two two-person crews which covered a total of 248 km of canals during the month of April 1981. Lineal distances along the canals were measured using a string chain with an accuracy of ±1%. All cracks were measured for length and categorized for width, displacement, and location on the canal cross-section.

The 1981 report concludes that there is little change in the number of cracks in each category when compared with the 1979 report.

Some interesting facts can be derived from this study:

1. Out of all 248 km of canal inventoried, 65% remains virtually uncracked, 21% has cracks up to 5 mm, 13% has cracks from 5 mm to 40 mm, and less than 1% has cracks from 40 mm to 75 mm.
2. The total length of all cracks amounts to 246,743 m, or approximately 3 lineal metres of crack for every metre of canal that is in a cracked condition.
3. Just over 9% of all cracks show a vertical displacement.
4. Vertical displacement is the worst in Eastern, followed by St. Mary River, Lethbridge Northern, Taber, and Bow River.
5. Most of the cracking occurs in the bottom third of the canal cross-section.

The Spring 1981 Inventory of concrete canals found everything from no damage to severe frost heave buckling.

1. *"Inventory of the Condition of Concrete Canal Lining in Southern Alberta and Evaluation of Several Possible Damage-Causing Factors", February 1980, by Underwood McLellan (1977) Ltd.*

* * *

NEW HEAD FOR LAND CLASSIFICATION BRANCH

The recent retirement of Mr. Ray Schuler from the position of Branch Head of the Land Classification Branch left that position vacant until a new candidate could be hired through open competition.

The successful candidate in the competition was Mr. Kaljo Pohjakas, who had been working for the Farm Irrigation Services Branch.

Kaljo Pohjakas obtained his BSA and MSA degrees from the University of British Columbia. Following that he worked as a research scientist for the Canada Department of Agriculture Swift Current Research Station until 1967 when he went overseas as an FAO soil and water management specialist in Iran. After four years he returned to the Lethbridge Research Station to continue his soil and water related research. In 1972 he resigned and joined FAO in Malaysia as a senior advisor to the Malaysian Agricultural Research and Development Institute. In 1974 he joined the ADA operated CIDA project in Indonesia as the soil and water management consultant.

Kaljo and his family returned to Alberta in 1976 and he joined the Irrigation Division as a soil and water specialist. On December 15, 1981, he became the new Branch Head of the Land Classification Branch.

Congratulations are extended to Kaljo Pohjakas on his recent appointment as Branch Head of the Land Classification Branch.

* * *

THE WATER HAULER'S BULLETIN

Designed to provide the operation and management personnel of Irrigation Districts with items of interest in their line of work. Comments are welcome. Please contact Roger Knibbs at 329-5164, Lethbridge.

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