the WATER HAULER'S BULLETIN

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DIG A HOLE TO DEADEN PUMPING NOISE

It can be annoying, with sleep interrupted and friendships strained or broken from the steady unrelenting pounding of a close-by internal combustion engine of an irrigation pump. "A summer of misery" terms Dr. Vincent Luykenaar, a medical physician, who, with his family, has had to endure this situation. Their home is located inside town boundaries but within 150 m of a farm pump station. Adding mufflers and a sound barrier did help, still the noise remained unbearable.

A similar situation, west of Medicine Hat, has been solved by the ingenuity of two local farmers. Simple, yet highly effective, describes the buried sound-deadening box that neighbor John Mann built, says St. Mary River Irrigation District board member Wayne Schlenker. So impressed was Schlenker that he built a modified version with the financial help of his county residential neighbors.

Sound-deadening box partially uncovered.

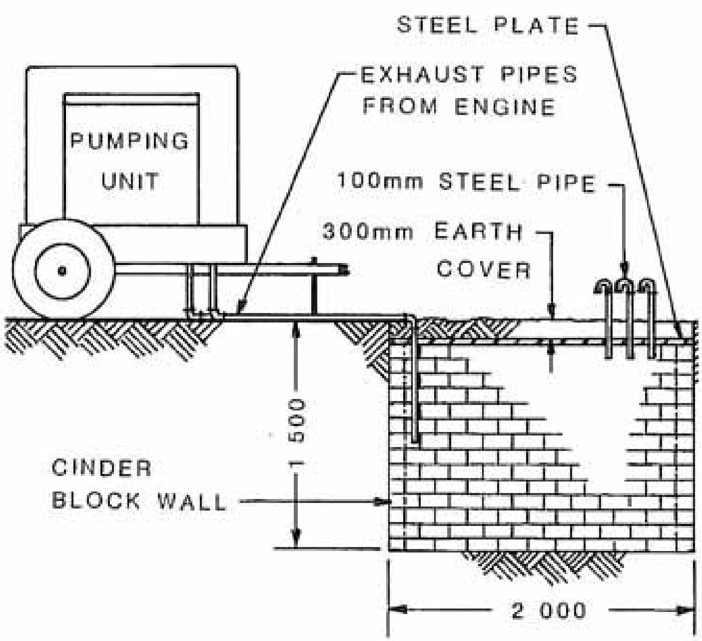
The buried sound-deadening box is simple to build says Schlenker. "I had a hole (2 m x 1 m x 1.5 m deep) excavated and lined on the sides *only* with concrete cinder blocks. The blocks were not grouted in place so cross bracing was necessary to prevent the walls from collapsing. Next, I covered the box with a metal sheet and then backfilled over with 300 mm of soil. The engine exhaust pipes enter the box at one end and three 400 mm curved vent pipes protrude at the other end," he adds.

INCREDIBLE is the only word one can use when standing beside a fully operational pumping unit and the only sound is the whirl of the fan blades, says Schlenker. "I would never have believed it possible" he adds.

Kenn Blom, senior health inspector with the Barons-Eureka Warner Health Unit, sees no problem from a health perspective, with the buried sound-deadening box. It certainly would alleviate a number of noise problems.

The material cost to build Schlenker's buried sound box was $225. His labor was not included nor was the cost of the backhoe which a neighbor donated.

For more information please contact SMRID Board Member, Wayne Schlenker, 13 Rice Drive S. E., Medicine Hat, Alberta T1A 8G8. Telephone (403) 526-3215. ■



SUBSURFACE DRAINAGE OUTLET MONITORING PROGRAM

Subsurface drainage has proven to be an effective method to control salinity and waterlogging problems associated with irrigation development in Alberta. Since 1977, several thousand acres of irrigated land have been successfully reclaimed using subsurface drainage systems.

All subsurface drainage systems require an outlet for the drainage effluent. An ongoing concern is the quality of this drain effluent and the potential impact on receiving water. The land evaluation and reclamation branch monitored representative subsurface drains within a number of irrigation districts from 1977 to 1984 to keep track of drain effluent quality and flows. The result of this monitoring showed that while the drain effluent was generally high in salts, the flows were very low. The impact on receiving waters (canals and rivers) was negligible.

In 1990, the land evaluation and reclamation branch updated its database on the quantity and quality of water being discharged from subsurface drain outlets in order to determine if changes have occurred with time. During the 1990 field season, information on the flow and salinity, nitrate and trace element concentrations in the drain effluent was collected on a monthly basis at forty-three outlet locations. The sites investigated had all been previously sampled on a monthly basis, for varying lengths of time between 1978 and 1984.

Information collected from the 1990 sampling program was compared to drain effluent quality and quantity information collected between 1978 and 1984. Comparison of mean drain flows and drain effluent salinity levels in 1990 to historic data (1978-1982) reveals little or no change in salinity levels and a slight decrease in flow during 1990 (Table 1). Salinity and flow levels at individual subsurface drainage sites have not changed significantly over the past 10-15 years (Figure 1). Data on nitrates and trace element concentrations in the drainage effluent is currently being analyzed and will appear in future editions of the Water Hauler's Bulletin.

This year's monitoring, says Murray Riddell, P. Ag., salinity reclamation specialist with the land evaluation and reclamation branch, also showed that the percentage of drain outlets flowing during the summer of 1990 was considerably lower than during the 1977-1983 period

Table 1. Average flow (l/s) and salinity levels (ds/m) for recent (1990) and historic (1978-1984) drain effluent data.

	Flow (l/s)			Salinity (dS/m)		
	Average	Range	Standard Deviation	Average	Range	Standard Deviation
1990	0.54	.0006 - 4.7 n = 86	0.80	6.9	0.6 - 19.8 n = 98	5.7
1978-1984	0.88	.003 - 22.7 n = 330	2.31	6.2	0.4 - 27.2 n = 341	5.6

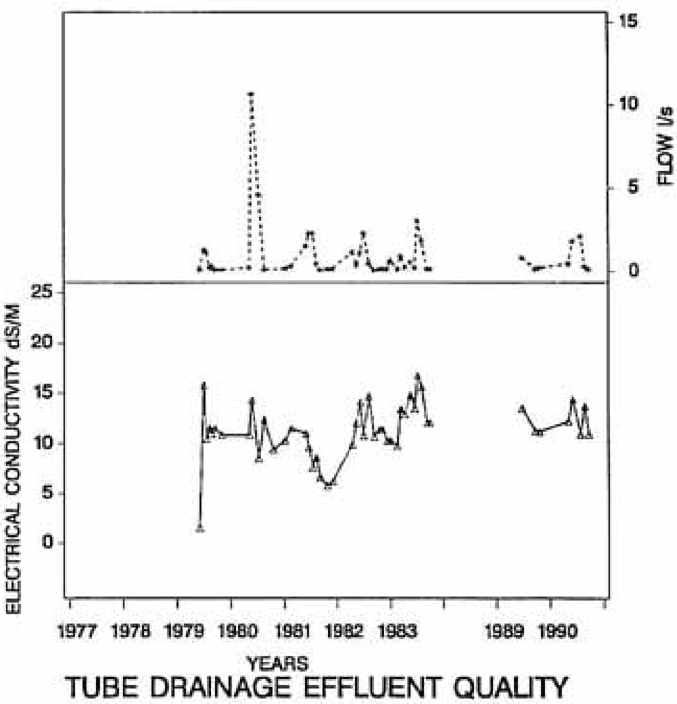


Figure 1. Monthly flow and salinity levels versus time for a representative subsurface drainage site.

(Figure 2). The main reason for this is likely related to the low summer (May to September) precipitation encountered in 1990. May to September precipitation at the Lethbridge Research Station in 1990 was 187.4 mm, whereas average May to September precipitation for the period between 1978 and 1982 was 293 mm.

A number of problems have been observed, says Riddell, at several drainage outlets. These include ground sloughing (which covers the outlets), lack of a working rodent guard, damaged outlets, and excessive vegetation growth. All of these problems could be corrected with

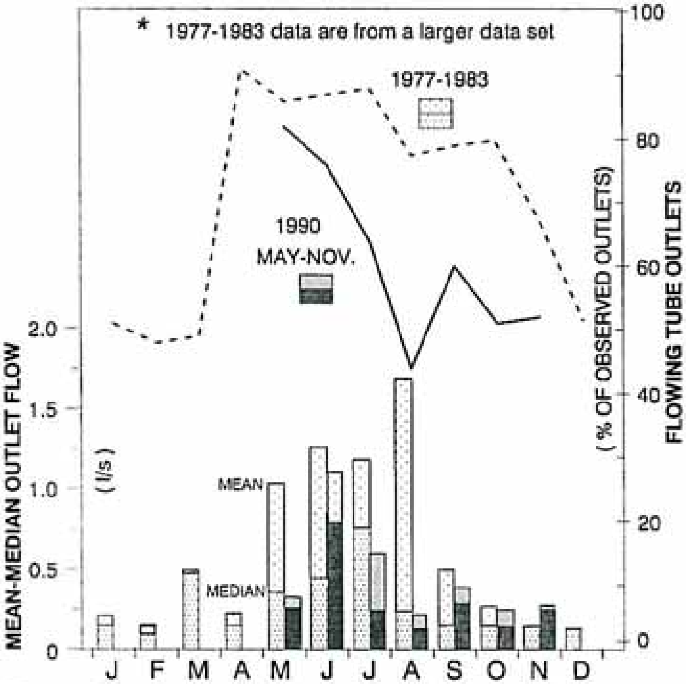


Figure 2. Mean and median outlet flow and percent of flowing outlets for 1990 and 1977-1983 monitoring periods.

regular spring maintenance programs. Improved marking and protection of outlets will prevent damage during canal/drain cleaning, pipeline installation, and other earth moving operations. Another problem frequently encountered during the 1990 monitoring program was submerged outlets. Twelve percent of the 273 total outlets observed were submerged at various times during the period from May to November. Several outlets draining into dugouts were submerged the entire time. Outlets located below the full supply level in canals and surface drains used to deliver irrigation water were submerged during peak irrigation periods.

With the current downturn in the agricultural economy, the amount of subsurface drainage being installed is expected to remain low, says Riddell. However, even if subsurface drainage installations were to increase dramatically throughout the irrigation districts, the impact on river water quality is not expected to be significant. Ongoing monitoring of subsurface drainage systems will be carried out by the land evaluation and reclamation branch in future years to ensure water quality in river systems is not adversely affected, he adds.

For further information please contact Murray Riddell, P. Ag., Salinity Reclamation Specialist, Land Evaluation and Reclamation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5884. ■

FROM THE FARM PERSPECTIVE

Irrigation Water Management Requires Cooperation And Continuity

Cooperative ventures in managing ongoing irrigation development in Alberta appear to be the most plausible and effectual approach to achieving the goals of the variety of interests in the industry, says Wally Chinn, section head with Alberta Agriculture's irrigation branch.

"Likely, at no other time in Alberta's irrigation history have there been such a variety of issues impacting on irrigation's future. The realities of increasing constraints on available water supplies and fiscal support are certainly not the least of these two issues," he adds.

Whether it be irrigation district, government sector or private industry, the respective autonomies enjoyed in the past may have to be compromised somewhat in a cooperative spirit now and in the future for greatest effectiveness and financial efficiency.

For example, says Chinn, Alberta Agriculture's irrigation branch district offices have provided many field support services to the irrigation districts, particularly where "farmer-initiated" projects were concerned. The demands for greater emphasis on water management concerns and the constraints of reduced manpower and fiscal resources means some curtailment in those "simple service" activities. However, there are related opportunities where cooperative efforts can meet the goal and attach more topical water management issues. For example, as presented in the last issue of the Water Hauler's Bulletin, a joint program working with an irrigation district on Class 5R land can lead to: investigations into problem areas, improving the irrigation management skills of the water user, intensifying the irrigable land base *within* the districts and maximizing the efficient use of the available water supplies.

An early forerunner to this cooperative project attitude has been with the aerial photography program and its ongoing updating and data banking. This joint development of an inventory tool has unquestionably been an asset to a multitude of users.

Technology itself poses new and innovative challenges for cooperative work. The whole area of Computer Automated Drafting and Design (CADD) means multitudes of information can be exchanged between users on small pieces of magnetic media and then manipulated by the end-user in quick fashion to meet their needs. For example, the Land Development (L1) reports generated by irrigation branch offices representing current land development projects, forwarded to the districts in paper plan format, can now be forwarded in digital form for quick overlay onto land classification/assessment sheets.

One of the "buzz" technologies in the computer world these days is G.I.S. (Geographic Information Systems), which is finding its way in increasing rates in the management of irrigation districts and water planners. Some cooperative projects between the irrigation and resource management division and a few of the irrigation districts have illustrated the power and mutual benefit of sharing in this technology. A few of the districts have or are setting up their own in-house facilities to work in this area.

Chinn feels the key to developing water management strategies and policy development is having a good grasp of what is (or potentially may be) happening on the irrigated farms. Here, interaction between irrigation equipment suppliers, irrigation districts and the irrigation branch can help to maintain and enhance present inventory databases for mutual benefit by users in all groups in planning for the future.

The key emphasis in all of the above is cooperation and continuity. For example, states Chinn, as more and more irrigation districts independently establish or expand their computer systems to include CADD and GIS, they would be wise to conform to the accepted packages tried and tested and now in use by other districts or common agencies. AutoCAD and associated G.I.S. software are dominant examples of local and international standards.

It is now, more than ever, difficult to justify where independence in thought and action will be to the benefit of any of us involved in the development and management of Alberta's irrigation, Chinn states.

For further information/discussion, contact Wally Chinn, Head, Irrigation Development Section, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5864. ■

EVALUATION OF SINGLE DELIVERY FLOW MEASUREMENT DEVICES

A Farming For The Future Project

This research project, jointly undertaken by Alberta Agriculture and MPE Engineering, involves the review, selection, and implementation of flow measurement devices suitable for use on farm turnouts. The project parameters, says Joe Prozniak, P. Eng., president of MPE Engineering Ltd., include fabrication of prototypes and installation of these devices at locations within an irrigation district. This project was started in the spring of 1988 and undertaken in three stages: preliminary investigations, flow meter selection and fabrication, and installation and testing.

Preliminary investigations consisted of evaluation of turnouts in selected areas and compiling information from a literature search of flow measurement devices. Between December 1988 and May 1989, three larger scale investigations on two blocks in the St. Mary River Irrigation District (SMRID) and one block in the Lethbridge Northern Irrigation District were completed and turn-out data compiled on all turnouts in these blocks. In addition, Alberta Agriculture had previously compiled data on a portion of the Eastern Irrigation District which was reviewed and relevant data was extracted. This information was used to determine the preferred method of flow measurement for each delivery type. A Cipolletti weir with a datalogger was installed in May 1988 to quantify spill flows at the tailout of the Sublateral 10 system. The information gathered through the summer has provided some background into the characteristics of spill flows and the potential for reducing spillage through turnout flow measurement.

In the second stage, says Prozniak, suitability of flow measurement devices was determined and specific devices were selected for testing. From the evaluation it was felt that two types of flow measurement devices were suitable for irrigation use. For pressurized systems, pipe flow meters are suitable and for open systems any of the open flow measurement weirs were felt to be suitable. In addition, a positive displacement flow meter (Dethridge Meter) appeared to be well suited for open system flow measurement. It was decided to fabricate a precast concrete broad-crested weir, cutthroat weir and three Dethridge meters, in addition, a Cipolletti weir was fabricated earlier. The SMRID was selected as the preferred locale for field investigations and flow meter testing. Four of the six devices were installed in the spring of 1989 for testing. Initial results were positive but it was found the sites selected did not allow for flow comparison.

Cutthroat Weir in foreground, Dethridge meter in background.

In the fall of 1989, one Dethridge meter, cutthroat weir and the broad-crested weir were installed at the Alberta Agriculture test site east of the Lethbridge Correctional Centre. This site was ideal in that we had full control of water through the devices and the devices were installed in parallel which allowed direct comparison of performance (see photograph). Stilling wells and an electronic datalogger were installed and flow at each device was recorded at 20 minute intervals. Manual staff gauge readings and manual flow measurements with a Pygmy Gurley meter were taken periodically throughout the summer. Flow at the Dethridge meter was determined with a "turns counter" says Prozniak.

In addition to the devices selected for field testing, a model of the floating weir gate was constructed and tested at the Lethbridge Community College's hydraulic laboratory, says Prozniak. It appears that this device has some potential for flow regulation which may eliminate the need for flow measurement since the device passes a fixed flow, he concludes.

The results obtained to date give a very good comparison of the relative performance of the selected flow measurement devices, says Prozniak. "Of the meters tested to date, it appears that the broad-crested weir and the insertion magmeter have the best potential for turnout flow measurement. In specific applications, the Dethridge meter has some potential application but will probably cost significantly more than the broad-crested weir. At present, the cost of insertion magmeters (including instantaneous flow and totalizer) is relatively high but the cost of the unit will likely decrease due to the falling prices of electronics," he states. This study will be continued through the 1991 irrigation season, he adds.

For further information please contact Svat Jonas, P. Eng., Research Engineer, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7 at telephone (403) 381-5870 or Jozef Prozniak, P. Eng., MPE Engineering Ltd., 261 - 31 Street North, Lethbridge, Alberta T1H 3Z4 at telephone (403) 329-3442. ■

CELLULAR PHONES

New Technology Provides Cost Effect Data Transfer

Recent developments in cellular telephone technology and equipment cost reductions may find this new high technology product in use in more irrigation applications. The applied research and irrigation management groups within the irrigation branch have been using and testing cellulars for some time.

Cellular telephones have now made data collecting even more automated for branch personnel. No longer is a field trip necessary to collect data from their electronic data-loggers, says Svat Jonas, P. Eng. a research engineer with the branch.

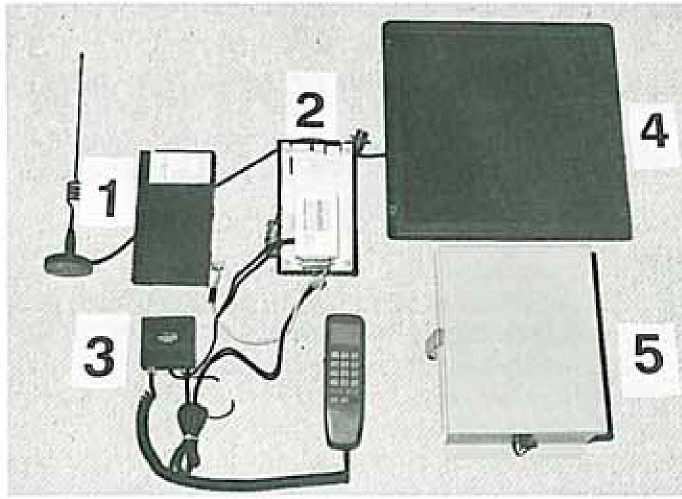
Jonas says, the branch uses mostly Lakewood System dataloggers. Our dataloggers are connected to various water-metering devices. It was necessary, on a regular weekly basis, to send a technologist out in the field to download the dataloggers. The datalogger, explains Brian Cook, an electronics technologist with the branch, is basically a small inexpensive computer without the normal screen and keyboard. It usually has a capacity of about 8000 data points but Lakewood's new Ultralogger comes with a 32K RAM memory capable of storing 32,000 data points, he adds.

All dataloggers are programmed for reading connected peripheral devices on a regular time interval. The frequency of reading these devices plus the number of enabled channels determines how quickly memory will fill up, says Cook. Research technicians were downloading the memory of our dataloggers once a week.

In the fall of 1990, Jonas added an additional device to the system — a cellular telephone. This single device has added a whole new dimension to data collecting and datalogger programming, he says. Cellular telephones speed up data transfers and are man-power savers for us, says Jonas. Cellular telephones we purchased cost $400 per unit. The cost for the electronic equipment package as shown in the picture is about $2000. Peripheral devices are extra says Jonas.

There is an unlimited number of applications for the simple setup described above. Our research group has been using this system for monitoring temperatures of air and water, dissolved oxygen levels in dugouts and water-level fluctuations in irrigation laterals. The irrigation management group under Robert Riewe, P. Ag. has a weather station hooked up in a similar way, says Jonas.

They have an anemometer, tipping-bucket rain gauge, solar pyrometer, humidity probe and temperature probe



1. Cellular phone and antenna, 2. Datalogger, 3. Data interface (allows data to be transmitted through the cellular phone), 4. Solar panel, 5. Weatherproof instrument case.

all reporting back through the cellular system. An ideal application, feels Jonas, is a system to monitor magmeters or other water-measuring devices. The SMRID has been using a similar system to monitor and collect data from an insertion magmeter. The difference being the district is not using a cellular telephone but a fixed AGT telephone line connected to it. Cellular telephones cost more money to operate than the ordinary telephone hookup but in many instances there are no nearby telephone lines, states Jonas.

"I see a great manpower saving advantage using a telephone hookup," says Jonas. The technician can simply dial the station, check the general status of the station, monitor current field conditions, retrieve stored data, or re-program the station at anytime, day or night. Nothing can be much faster than a data transfer via the telephone, he adds.

On the negative side, the remote station and equipment must be protected from vandalism or theft. This can become the most costly part of a station, adds Jonas.

It's all up to the individual user to decide which method of data retrieval is best for their situation. The user has to evaluate the inconvenience and costs connected with a field trip to download the dataloggers or use data transfer via the telephone, says Jonas.

For more information please contact S. Jonas, P. Eng., Research Engineer, or B. Cook, Electronics Technologist, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5870 or (403) 381-5878. ■

SAVING RESIDUE SAVES BOTH SOIL AND WATER

May be "Tougher" on Irrigated Lands

Despite the fact that the fall of 1990 gave farmers considerable time to fall irrigate, the extreme dry weather of the past summer and fall has given cause for concern about the surface moisture condition of the fields over the winter. Excessive soil blowing, and the need for an early irrigation next spring are the main problems that a fall such as this can create. For cereal crop producers, keeping crop residues on the surface and avoiding excess tillage during the fall are the most effective and practical ways to offset these problems. A good soil cover for the winter is the best way to control soil blowing and it also helps conserve soil moisture say Allan Howard, soil moisture specialist and John Timmermans, soil conservation specialist, both specialists with the conservation and development branch.

Keeping a good soil cover is sometimes not as easy to achieve on irrigated land as it is on dryland. Management of irrigated land can include controlling disease by burying residue. As a result, fields are worked with equipment that buries a high percentage of the crop residues, resulting in a bare soil surface. Fields that are worked bare are not protected from the drying and erosive effects of the wind, and therefore moisture loss and soil blowing become a significant hazard.

Yield loss due to erosion is often less obvious on irrigated fields than on dryland, says Timmermans. Water and fertilizer inputs mask the effects of reduced soil productivity, but the costs of soil erosion are real and significant. They show up on the farm as increased fertilizer, herbicide, and water costs, as well as reduced germination and seedling performance. They are also evident off the farm as plugged ditches and canals. Blowing or drifted soil may interrupt farming operations and create road hazards by reducing visibility. Soil losses appear to be small when examined during any one year, but over time the losses add up to a significant amount.

Irrigated cereal crop stubble can be a problem to manage when it becomes excessive, however efforts should be made to leave a minimum amount of 450 kg per acre on the surface to provide an effective cover. If stubble can be left standing, it can provide an even more effective cover. In addition to protection from wind erosion, standing stubble will increase the probability of getting a significant gain in soil moisture from snowmelt. It will keep snow from blowing off of the fields and into ditches and low areas and catch snow that has been blown from nearby bare fields. Overwinter soil moisture gains in standing stubble fields can be over 50 percent more than gains in bare fields.

Technologist Joe Michielsen samples field to assess provincial soil moisture status prior to seeding and freeze-up each year.

Effective use of standing stubble can result in as much as 50 mm of moisture gain over the winter, which may eliminate the need for an early irrigation in the spring. The snow will also provide a cover for the soil, reducing or preventing surface drying. Since the snow is retained more evenly across the field, low areas are not likely to be as wet in the spring. The result is a more uniform distribution of soil moisture at seeding. Even when the snow cover is lost during chinooks, the stubble helps protect the soil surface from the drying action of the wind. Since taller stubble can hold more snow it is best to cut your crop as tall as you can. In cases where managing tall stubble is difficult, trap strips of tall stubble aligned perpendicular to the prevailing wind in a field of shorter stubble, or in a worked field, can be an effective alternative, says Howard.

Keeping residue on the surface for an overwinter cover will help hold down input costs, and improve crop performance. In times of rising costs, adequate residue management may become a vital management decision in the near future. For more information please contact Allan Howard, Soil Moisture Specialist, Conservation & Development Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7 at telephone (403) 381-5861; or John Timmermans, Soil Conservation Specialist, Conservation & Development Branch, Alberta Agriculture, Airdrie, Alberta T4B 2C1 at telephone (403) 948-8539. ■

CONDITION EVALUATION OF REHABILITATED PROJECTS

At the request of the Irrigation Council of Alberta, staff of the irrigation branch, Alberta Agriculture, have started the field work to evaluate the present condition of all the rehabilitated projects built under the Irrigation Rehabilitation and Expansion Program (IREP) since 1969.

In the fall of 1990, the field work was completed for six irrigation districts (Aetna, Leavitt, Mountain View, Ross Creek, Magrath and Taber Irrigation Districts). Final reports for these irrigation districts will be completed by the summer of 1991 after tabulation and analysis of all the field data.

Generally, the maintenance on all rehabilitated projects within the above mentioned districts was "fair" to "very good" with a few isolated problems. Some of the problems encountered in this study, that may or may not be typical for any one irrigation district are: (a) poor or no vehicle access, (b) erosion, siltation and vegetative growth problems around irrigation structures and in canals, (c) where cattle are present, the lack of fencing along earth and polyethylene lined canals and (d) some reaches of concrete lining are in an advanced deteriorated stage in spite of district maintenance.

This program will continue for the remaining seven irrigation districts. The field inventory for the Lethbridge Northern, United and Raymond Irrigation Districts will commence in 1991 and will continue when the systems are out of operation for the season and weather permits.

Well-maintained system.

Although rehabilitated, this lateral shows damage caused by cattle.

For further information please contact Zafar Iqbal, Planning Engineer, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5173. ■

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 Duncan Lloyd, editor, at Area Code (403) 381-5539, Lethbridge.

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