the
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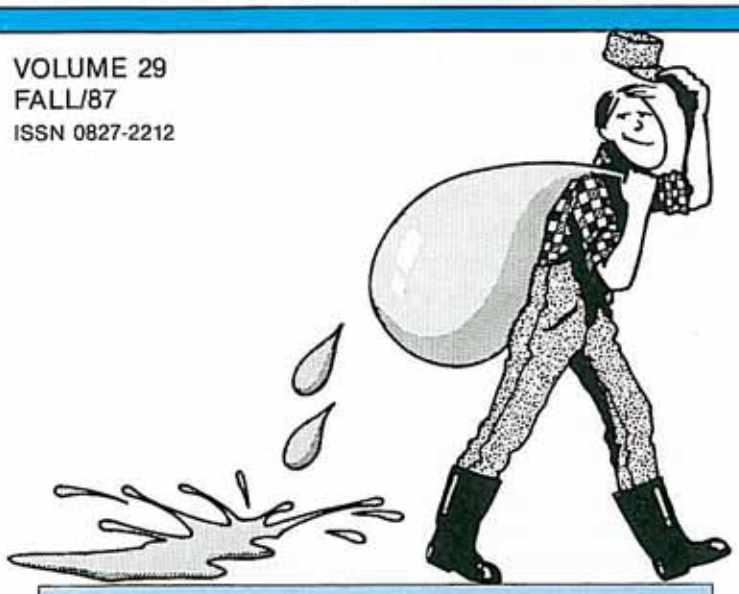


IN THIS ISSUE:

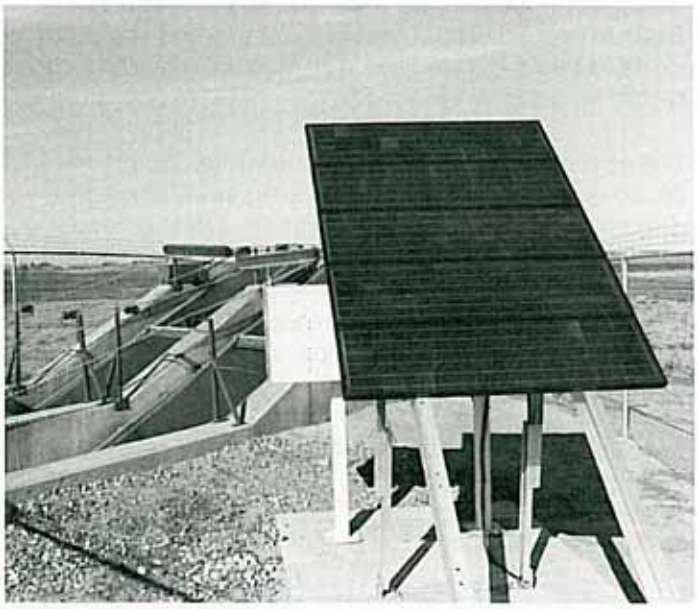
LNID HARNESSING NATURE'S ENERGY

Looking at Alternative Power Sources to Operate Rotating Screens.

In this past irrigation season, the Lethbridge Northern Irrigation District has developed and monitored two types of small energy systems to operate their self-cleaning screening devices on pipeline inlet structures. On one site they have installed a wind generator, while at the other, they are tapping the sun's energy by using solar panels. These sites are located on the District's B-4 pipeline system approximately 5 km northwest of the Village of Monarch.

Energy is required to power any type of self-cleaning mechanical devices and obtaining that energy can sometimes be a problem. When the usual Transalta power is not available, or when it is too far and too expensive to run a powerline into a site, then alternate sources need to be found.

It is here that the Lethbridge Northern Irrigation District is trying to overcome the problem by using the wind and the sun as alternate energy sources. Basically, these energy sources are used to recharge two wet cell storage batteries which power small electric motors that rotate cleaning brushes on the screening sys-



Only 5 solar units are required because of Southern Alberta's abundance of sunshine.

tem. Instrumentation on the system consists of 2 time clocks, one to start and stop the cleaning mechanism at regular intervals and a second time clock to run it for a programmed length of time.

Installation of the systems was done on a contract basis by Nick Zaychuk. He is also responsible for the operation and maintenance of the systems over a 2 year period. The two types of systems have only been in operation for the 1987 irrigation season and, in discussion with the district staff and Zaychuk, the systems have not been completely without their faults. Like anything new, some bugs had to be ironed out.

Are there any problems?

Problems occurred with the regulator on the wind generator and, as a result, the storage batteries were not always fully charged. On the solar system, the District experienced some problems with instrumentation whereby solenoids were overheating. These have since been replaced and the solar system is once again working satisfactorily. The District tends to favor the solar system over the wind generator because of less mechanical problems, and the solar panels are more reliable in keeping the batteries charged up. However, vandalism is certainly not out of the question when using solar panels, as they are very susceptible. The District has taken precautions by fencing the installations, however, this does not protect them from rock throwing people.

The cost of the solar energy generating equipment was $8600.00 while the wind generating equipment was approximately $6800.00. Solar panels are the "Arco" solar type capable of producing 3 amps each and obtained from O.P.S.C.O. Industries Ltd. of Calgary. The wind generator is a "Windstream" 12 volt model capable of producing 2 to 6 amps and may also be purchased in Calgary.

For more information please contact: Boris Horvath, P. Eng., Lethbridge Northern Irrigation District, 334 - 13 Street North, Lethbridge, Alberta, T1H 2R8. Telephone (403) 327-3302.■

CONTROLLING SEEPAGE AND LAND RECLAMATION

SMRID Assists Their Farmers With Small Drainage Problems.

Subsurface drainage to control canal seepage in small areas adjacent to district canals is an investment that both the St. Mary River Irrigation District and local farmers are often willing to cost share in. This cost sharing arrangement for the installation of buried corrugated plastic drainage tubing to control canal seepage is very successful. With a minimum amount of drainage tubing along a toe of a canal or in the associated affected area, seepage and soil degradation are being controlled.

A primary motivator for these projects is the district's willingness to share the costs involved. The district accepts responsibility to control seepage and the farmer pays for the benefit of reclaiming his farmland. In the majority of cases, capital costs are shared 50-50 under the District's 50-50 Program.

The operation & maintenance of the projects is totally the landowners responsibility.

Many of the areas that are now being controlled and reclaimed by subsurface drainage have been a concern to the district and farmers for many years. Attempts to correct these smaller problems have not succeeded for several reasons; one being the high cost of other alternatives.

The Irrigation Branch has been involved in over 11 cost sharing projects that have reached the construction

stage. The average project costs approximately $6,700.00 and includes the installation of 1650 lineal metres of drainage tubing. The majority of these projects are in the Bow Island area.

To initiate a drainage system, the farmer contacts the local office of the Irrigation Branch. They begin their investigation by looking for possible seepage and recharge areas. Soil and water conditions along the canal and in the affected area are also investigated. Upon completion of field investigations, a design and cost estimate are prepared. The completed proposal is submitted to the Irrigation District for approval. The Board of Directors reviews each proposal to decide if they will cost share, and by what amount. If approved, the farmer contacts a drainage contractor to complete the installation. In severe cases, an area may require grid drainage or a combination of a shallow interceptor and grid tubing.

The filtered drainage tubing being installed will quickly reclaim this affected area.

Drainage is an investment that usually must produce sufficiently increased returns in a relatively short period of time in order to justify the expenditure. However, with many of these small problem areas, a landowner is often willing to pay a higher price to get his land back into production and prevent further damage. Results from the drainage projects already in place are very encouraging. After the tubing is installed, irrigation water begins leaching the salts from the soil into the drains. Most areas are successfully reclaimed and produce a crop in the first growing season following the installation of the drainage works.

For more information please contact Mr. Leigh Morrison, Irrigation Specialist, Irrigation Branch, Alberta Agriculture, Provincial Building, Medicine Hat, Alberta, T1A 4J6. Telephone (403) 529-3616.■

HIGHWAY SIGNAGE

A Few Signs In Each District May Go A Long Way.

One cannot travel through many of the irrigated areas of the United States without realizing he or she is entering an irrigation district. They advertise the fact by posting large signs on their numbered highways. These signs often show district boundaries, number of irrigated acres and list some of the more specialty crops grown in their area.

As you move along through the district, you cannot help but take notice of the fact that signs indicating the name of each major canal crossing their highways are also posted. Here in Alberta, the only district having any signage on canal crossings on major highways is the Eastern Irrigation District.

With the many thousands of tourists, plus our large urban population travelling our southern highways throughout the year, it would be a relatively inexpensive way of letting people know the extent of irrigation in Alberta. It helps to make us "Better Informed Albertans".■

The Eastern Irrigation District has installed these green and white signs at every major canal crossing a numbered highway.

MULTIPURPOSE USE OF WATER

Agriculture & Recreation Working Together.

Twenty years ago it would have been unheard of - an agreement between agriculture and wildlife for the multipurpose use of water. Today, however, it is fast becoming the norm where a board of directors of an irrigation district, under a cooperative agreement with Alberta Fish & Wildlife and Ducks Unlimited, enters into an arrangement for sharing water.

One such comprehensive agreement between the Bow River Irrigation District and Ducks Unlimited culminated in the approval of a contract that is significant to both sides.

The BRID gains included financial assistance for development of major irrigation projects such as Prouty Lake, Enchant Drain and Lateral A Drain Complex (Vauxhall), and many other small projects which would normally be funded entirely out of the District's own coffers. In addition, they received an outright grant of $900,000.00 for purposes the Board deems proper. This money has been deposited in the BRID's Irrigation Works Reserve Fund, and the annual interest earned will be used to help offset the cost of operating the BRID. At current interest rates, this is providing a revenue to the district of approximately $0.50 per acre.

In return, D.U. achieved: habitat enhancement rights and secured water supplies for 3440 ha (8500 acres) of wetlands controlled by the BRID, rehabilitation rights and assured water supplies from irrigation spill for 14 existing D.U. projects totaling 750 ha (1849 acres), and the prospect of securing water for future D.U. projects. In total, D.U. will be spending in excess of 5 million dollars with most of the money going to "locals" who will construct the dikes, ditches and other water related structures.

The Eastern Irrigation District is another district that supports multipurpose use development of its works, and is a very active participant in plans to extend and improve upon the recreational opportunities that irrigation can provide. They have entered into 62 multipurpose projects with D.U. alone. The large Crawling Valley Reservoir Project gladdened the hearts of irrigationists and recreationists alike in that a 159,531 dam^3 (129,380 ac-ft) irrigation storage reservoir development also gave rise to additional waterfowl habitat and a municipal park.

Other districts likewise have seen fit to have other agencies cooperate in joint projects. The Western Irrigation District has enhanced grazing and livestock watering in 45 D.U. assisted projects. The Raymond Irrigation District has participated with D.U. in 7, the St. Mary River Irrigation District in 5, and one each for the Lethbridge Northern and Taber Irrigation Districts.

Yet another unique shared irrigation project in the BRID is the "Lost Lake Water Reuse Project". The BRID Board of Directors, recognizing the need for increased water use efficiencies, agreed to implement this multipurpose use project. Along with providing water for more hectares of irrigated farmland, this 2 million dollar water reuse project will enhance wildlife and waterfowl habitat.

At the official opening of the project,

Alberta Agriculture's Deputy Minister, Ben McEwen, had this to say: "This project is witness to the coexistence of agriculture and wildlife. It is an innovative example of engineering and habitat management. I am very impressed with the project and the cooperation between the agencies involved."

McEwen said the Lost Lake project promotes the effective use of both water and land. He said that the good use of our primary natural resources creates opportunities for development of secondary resources such as recreation and industry.

Photo: B. L. Joynt

D.U. project not only enhances grazing for livestock but also Canada geese.

The deputy minister said since 1969 about 500 million provincial dollars have been spent through Agriculture and Environment programs on irrigation rehabilitation and expansion projects. "And it is paying off, contributing not only to the economy in this part of the country, but provincially and nationally. I am very supportive of more projects such as Lost Lake" he said.

Farmers are traditionally conservationists by nature, but recognize the sport hunting industry for what it has grown into today and means to small businesses - with its estimated value of over $100 million annually for southern Alberta alone. Sport fishing on irrigation reservoirs has an estimated value in excess of $17 million annually. What this translates to the irrigation farmer is that once irrigation water has done its work, others may wish to use it, and are willing to contribute financially for doing so.

Buddha's profound quotation made over 2500 years ago, "Let no drop of water reach the sea without first growing a grain of rice", should be modified for us in Alberta to read "Let no drop of water reach the Saskatchewan border without first irrigating a crop or being utilized by another natural resource."■

DUCKS HAVE BILLS TO FILL, FARMERS HAVE BILLS TO PAY

Of upmost importance to a board of directors of an irrigation district has been the question of crop damage from waterfowl. New wetlands built in conjunction with irrigation rehabilitation increase the chance of a crop depredation problem.

It doesn't happen every year, but when the weather turns sour in the fall, and the crops are still out, we have all heard or experienced the horror stories where Mr. & Mrs. Mallard descend by the thousands to eat, trample, and foul Farmer Brown's swathed grain.

An agreement between the Bow River Irrigation District and Ducks Unlimited addresses this problem. D.U. purchased on behalf of the BRID: 200 propane scare cannons at a cost of $200,000.00, secured land for 97 ha (240 acres) of lure crops, and constructed four bait stations. The Provincial Government, through the Fish & Wildlife Division, has agreed to fund the operation of the feeding stations and lure crops for 30 years.

D.U. Photo

Bait station on Lake San Diego North of Enchant.

Does the program work? Duane Radford, Lethbridge Regional Director of the Fish & Wildlife Division, is very happy with the success the stations have experienced in their first two years of operation. At peak migration times, he estimates they are feeding 75,000 ducks daily. Leo Dubé, also of the same Division, stated "the ducks clean the lure crops up better than a combine".

The bait station program commences generally about the time swathing of grain crops in the surrounding area commences. Feeding is initiated by spreading 20 - 30 bushels on the feeding pad near the shoreline with lines of feed spread towards and into shallow water. Very important to the success of the station is that the birds are not left without food (according to Dubé one bushel of barley will feed about 125 ducks). Local farmers are contracted to supply the grain and maintain the operation of the station. When 80% of the grain harvest is complete in the area, the bait station is closed.

The planting and raising of the lure crops is, again, contracted to local farmers. As with bait stations "No Hunting" is allowed within 0.5 of a kilometre of the crop. The lure crop area is protected from hunting until 80% of the barley and wheat crops are combined in the area.

"The bait stations and lure crops do work as evidenced by only two crop depredation claims in 1986", says BRID manager, Jake Friesen. "It wouldn't be fair to ask the farmer to compromise his position any more than it already is by creating new marshlands without providing him with almost complete protection from further income loss by ducks and geese." With district boards, organizations like D.U. and government working together at this priority, it may soon be realized.■

FALL IRRIGATE TO LEACH SALTS FROM SOIL

Fall Irrigation Will Give a Crop a Chance Next Spring.

Irrigating fields when there is no crop in the ground may not seem reasonable at first glance, but the fall season is an ideal time for irrigating saline land, says an Alberta Agriculture specialist.

"Freeing the seedbed and underlying soil of salts now by washing these salts downward will improve germination and subsequent yields next year," says Ron McMullin, soil and water specialist with the Department in Lethbridge.

"Leaching salts further down in the soil by a fall irrigation can be a management tool for improving yields on both subsurface-drained land and undrained land. In areas of North America with long growing seasons, leaching is done in the spring before seeding. But because Alberta's shorter growing season reduces the opportunity for a pre-plant irrigation, fall irrigation is a good alternative."

Soil salts tend to be drawn into the upper part of the root zone by crop water use and evaporation. This process is much like the movement of a liquid to the top of a wick by capillary action.

Crops can use fairly salty groundwater which is drawn up into the root zone, but when the salts accumulate, soil salinity problems develop, says McMullin. This salt accumulation results in poor germination, death of tillers or stunted growth, and poor yields. To increase germination percentage and subsequent yields, the salts must be moved out of the seedbed and preferably out of the root zone.

The only way to do this is to leach the salts downward with extra water. When fall rainfall is minimal, that means a fall irrigation is in order.

"The farmer who has seen a crop die out of a salty patch soon after irrigation, knows that irrigating salty land can be a challenge," says McMullin. "Usually a shallow water table is found under the saline area and irrigating the salty spot will raise the water table substantially.

"The crop often yellows then dies out in this waterlogged situation or is stunted by the increased salt that the summer heat sucks to the surface. In the fall when no crop is grown, worries are fewer. No crop will die out due to rising water tables and cooler temperatures means the salts will not be pulled back up by wick action. The closer the time of irrigation to freeze-up, the less salt will migrate upward before spring."

White spots in soil indicate high salt content. Fall irrigation pushes these salts down improving crop growth.

The specialist says with a five to six month drain-out period in winter, the water table will recede in most situations. Where water tables will not recede over winter to depths greater than 1.2 m, subsurface drainage will be necessary for any significant leaching to occur.

As a rule, a given depth of water will remove 60 to 80 percent of the salt in an equivalent depth of soil. The sandier the land, the greater the salt removal.

For example, a 150 mm fall irrigation will leach about 80% of the salts out of the top 150 mm of sandy soil or 60% of the salt out of 150 mm of silty-clay soil. A portion of the salt below this depth will also be pushed downward.

"With a seedbed low in salt, crops will be off to a good start before salts again are brought to the surface," he says. "Cereals, which are particularly sensitive to salts after germination and through the fourth leaf stage, can become well established before upward salt migration occurs."

"Once established, most crops can withstand much higher salt levels. Fall irrigation can give a crop that chance next spring."

For more information please contact Ron McMullin, Soil & Water Specialist, Conservation & Development Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta, T1J 4C7. Telephone (403) 381-5154.■

MAG METERING

One Step Towards Better Water Management.

How much "mileage" are you getting from your irrigation water? Unless you can accurately determine water demands and usage its pretty difficult to say. The Bow River Irrigation District and St. Mary River Irrigation District, in conjunction with Neptune Meters Ltd., have taken a step towards improving water management for their closed pipeline systems.

In this past summer the BRID installed a mag meter into their Lateral D-4-a pipeline. Since a source of electrical power was not readily available to this remote site, solar power provides the necessary energy.

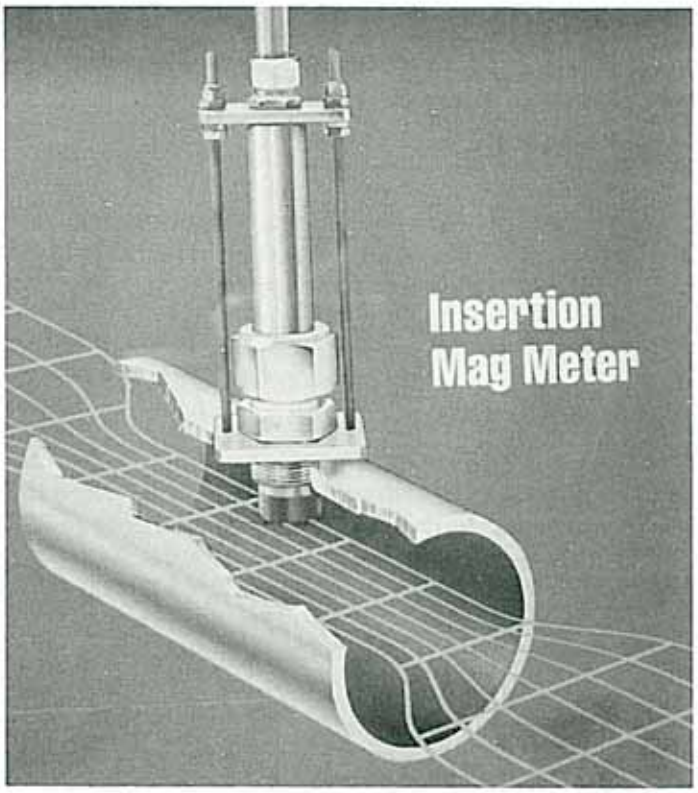
The SMRID, in turn, has installed an above ground meter in a 300 mm diameter farm delivery pipe. This installation receives electrical energy from Trans-alta Utilities Corporation. The meter will provide district operating staff with a total flow figure plus the rate of flow.

How is the mag meter installed?

The probe of the Neptune Mag Meter is inserted into the pipeline by drilling and tapping. There is no need to cut the pipe or install bypass valving. An added advantage of this type of meter is that the probe only needs to be installed to 1/8th of the diameter of the pipe. This reduces the chance of weeds or other vegetation from getting caught and entangling around the meter. If a line must remain in operation the meter can be installed while in service.

The meter measures the volume of water by generating a precise magnetic field. As the liquid moves through the field, it acts like a generator to create a voltage which corresponds to the water flow velocity. The voltage is picked up by the probe's electrodes and processed by a solid state circuit to provide output signals proportional to the flow.

There are basically two general classes of flow measuring devices on the market today. Those that are designed to measure flows in open channels such as canals and those meters made to measure water flow in pipelines. The new mag meter will measure only in pipelines running full.



The meter has no moving parts to wear or holes to plug, thus, maintenance should be minimal.

The development of this new relatively inexpensive mag meter will more than contribute to the efficient delivery and use of irrigation water. Besides the benefits to the water manager, this new meter will also assist the scientific community in crop-water use studies.

For more information, please contact Mr. Steve Topping, BRID District Engineer at telephone (403) 654-2111, Mr. Ron Renwick, SMRID District Engineer at telephone (403) 328-4401, or Mr. Donn Lovett of Neptune Meters Ltd. at telephone (403) 243-2434.■

SMRID's Crystal Lake Lateral Pipeline. Each mag meter is calibrated for the size of pipe and again field calibrated to match flow conditions.

REVISED CHANNEL SYSTEMS DESIGN MANUAL

The Project Planning Branch, Resource Planning Division, Alberta Agriculture has recently (September, 1987) completed a review and update of the Channel Systems Design Manual originally prepared in 1979. This update was necessary to accommodate the on-farm technological changes and some shortcomings in the design capacity curve.

The first most significant revisions are related to the allowable rate of delivery at the farm gate, which has been increased from 3.96 x 10^{-4} m^3/s per acre to 4.33 x 10^{-4} m^3/s per acre (0.014 to 0.0153 cfs per acre). This resulted in raising the lower portion of the capacity curve for smaller blocks. The upper portion of this capacity curve, the increase in unit demand and revised reduction in the irrigation factor (combined effect of land use factor and rotation factor) had a compensating effect, thus, no significant change in this portion of the curve was necessary.

The second revision was made in the reduction factor which has been used in the past to reflect climatic differences. In the future, two zones will apply. One zone with a reduction factor of 0.80 will be used for the foothills and the far northwestern areas, while a factor of 1.0 (no reduction) will apply to the remainder of Irrigation Districts.

The third revision was the Manning's coefficient (n) for concrete channel design. The new "n" value of 0.016 is used as compared to 0.014 (old "n" value) to generate the new concrete channel design tables.

We would strongly encourage the use of this manual by irrigation district staff and engineering consultants alike, in order to continue the high degree of uniformity and standard practice in the design and sizing of our irrigation district systems in Southern Alberta. This manual supersedes all earlier editions on Channel Systems Design prepared by the Project Planning Branch.

Your comments or suggestions to further improve this manual will be greatly appreciated.

For more information or interpretation of this manual, please contact Zafar Iqbal, P. Eng., Project Planning Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta, T1J 4C7. Telephone (403) 381-5170.■

WATER HAULER'S BULLETIN SUCCESS

Communicate your resourcefulness by having an article published in the Bulletin. Its success depends upon your help in obtaining and submitting new and useful ideas.

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) 381-5164, Lethbridge.

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