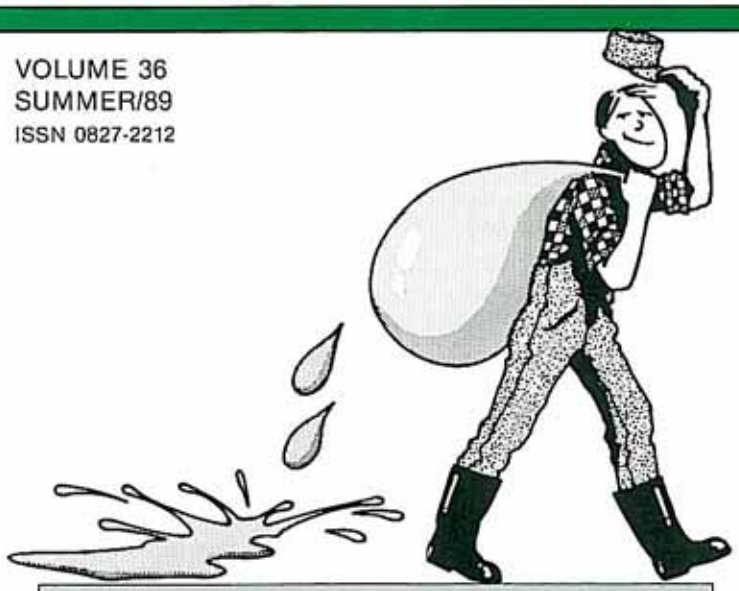
the
WATER HAULER'S BULLETIN

VOLUME 36
SUMMER/89
ISSN 0827-2212



IN THIS ISSUE:

PIPELINE SETTLING PONDS

Necessity or Accessory?

Are settling ponds a luxury or should they become a standard on pipeline inlets? The St. Mary River Irrigation District (SMRID) feels that by using a settling pond at the head of their pipeline systems, they have found a solution to the problem of sand and silt entering their lines. A settling pond, as the name implies, is a pond of water which allows the sand and silt particles to settle out prior to entering the pipeline system.

Their ponds are constructed approximately 40 m long by 5 m wide at the bottom with 2.5:1 side slopes and range from 2 m to 4.5 m deep. They consist of inlet and outlet structures with an inlet trash rack having 25 mm clear openings. A precast concrete baffle is usually placed near the downstream end of the pipe entering the pond to slow down the velocity of the water flowing through the pond. The ponds are usually plastic lined and gravel armoured on their interior slopes.

The settling pond constructed in 1989 on the S.M.R.I.D.'s Coaldale Lateral is lined and gravel armoured.

The SMRID uses two design aids in determining what size to construct a settling pond. One is the Van Hjulstrom diagram which plots particle size versus velocity in the pond and predicts whether a particular sized particle will settle out, be transported, or cause erosion. The other aid is Stokes Law which is used to determine the downward velocity of a certain sized particle.

The Board of Directors of the SMRID, on the recommendation of their "Screening Committee", passed a motion that states "settling ponds should be installed on pipelines where feasible". This motion was incorporated as policy in their district.

The question of feasibility must be addressed for each proposed pipeline settling pond. For example, it may not be economical to provide a settling pond for a short pipeline or municipal regulations may also make settling ponds not feasible. One such municipal regulation states that the outside edge of the pond must be 38 m from the centreline of the county road. Because of this regulation, it is often difficult to obtain the necessary right of way from the landowner. Not all landowners want a settling pond constructed 28 m inside their property line.

Ron Hadden, former assistant district engineer for SMRID says that he had a problem last fall at a water users' meeting where all of the farmers wanted a settling pond built at the head of a proposed pipeline except for one. The one "holdout" was the landowner where the proposed settling pond was to be located.

Another problem which may not make a settling pond feasible is a high bank elevation. In some cases, the pond may have to be self levelling with the supply canal, resulting in very high banks to contain the water. This may not be aesthetically acceptable to the landowner.

Cost factors can prohibit the building of a settling pond. Excavation, liner materials, and gravel armour all mount up, but the one cost that can make construction prohibitive, if the haul distance is great, is the cost of obtaining earth borrow material. Ron Renwick, district engineer, says in many instances the cost of construction of a settling pond is no more than the purchase and installation cost of the equivalent amount of large diameter pipe that would be required to replace the in-line settling pond.

At this point one may ask why bother with a settling pond at all. Fortunately there are benefits that the SMRID feels outweigh the problems associated with the construction of a settling pond. These can be broken down into two categories, namely farmer benefits and district benefits.

The farmer benefits by "direct hookup" to the pipeline to utilize any available pressure which, depending on the location, may be substantial. Gone is the need for his own little on-farm settling pond which requires land being taken out of production, not only for the pond itself but also for any seepage or wet areas that may result. The large in-line pond at the head of the pipeline is more efficient in removing sand and silt, thus the farmer has less wear and tear on his sprinkler heads. Also lessened, is the chance of the sprinkler mainline plugging up with silt and sand that may be still suspended. Hadden feels that a direct hookup gives the farmer the added benefits of cleaner water, a neater pumping setup and none of the operational problems associated with the small individually owned settling pond.

Districts' benefits are no small piece of the pie either. Monty Flexhaug, operation's manager for the SMRID says an in-line settling pond means once a day cleaning of a trash rack compared to four times without one. The overall design life of a PVC or polyethylene pipe has to be greatly extended by not being exposed to constant abrasion by sand particles.

The SMRID has installed several settling ponds on their pipeline systems in the past few years and has found them working satisfactorily. Hadden feels that the maintenance required, on occasion, to remove sand and silt buildup in the ponds by draglines is not a problem.

In conclusion, both Renwick and Hadden feel that the Board's decision to use settling ponds where feasible, at the head of pipeline systems, is a good one and that the pond is a benefit to both the farmer and the district.

For more information contact Ron Renwick, District Engineer, St. Mary River Irrigation District, P.O. Box 278, Lethbridge, Alberta T1J 3Y7. Telephone (403) 328-4401.■

DOLLARS FOR WILDLIFE

A Review of Habitat Incentives for Irrigation Districts

At a recent Irrigation Technical Conference, information was provided on programs, initiatives, groups, agencies and funding sources that are, or could be, useful for fish and wildlife habitat work within irrigation districts. These funding sources are international, national and provincial in scope. Some currently exist, others are in the conceptual or planning stages; most are complementary. The 21 sources of funding are as follows:

INTERNATIONAL:

1. North American Waterfowl Management Plan.
2. Special Pintail Recovery International Group (SPRIG).

NATIONAL:

3. Canada/Alberta Soil Conservation Initiative.
4. National Soil Conservation Program.
5. Canada/Alberta Soil Conservation Agreement.
6. Wildlife Habitat Canada.
7. Nature Conservancy of Canada.
8. Ducks Unlimited.
9. Canadian Wildlife Service.
10. Environmental Partners Fund.
11. Western Diversification Initiative.

PROVINCIAL:

12. Wetlands for Tomorrow.
13. Buck for Wildlife.
14. Landowner Habitat Program.
15. Land Acquisition Program.
16. Prairie for Tomorrow (World Wildlife Fund).
17. Canada/Alberta Waterfowl Crop Damage Compensation Program.
18. Recreation, Parks and Wildlife Foundation.
19. Community Tourism Action Program.
20. Alberta Fish and Game Association.
21. Federation of Alberta Naturalists.

A conclusion one can draw from a review of the list is that a significant amount of money could be available for fish and wildlife habitat work within irrigation districts. However, funding likely will not materialize until a habitat program is in place that can demonstrate the benefits of additional funding, says Lorne Fitch of the fish & wildlife division in Lethbridge. For most of the funding sources, a cooperative agreement between the irrigation district and the fish and wildlife division is

Swen Bayer Peninsula. Buck For Wildlife Project in cooperation with EID, DU, and Pan Canadian Petroleum.

the key to securing outside dollars. These cooperative agreements form the template to mesh the initiatives and programs of other groups and agencies within an existing, working program.

Irrigation Districts without a cooperative program for fish and wildlife habitat might be wise to contemplate one, not only because it demonstrates a multi-use philosophy for water, important in these troubled times, but also to take advantage of funding opportunities to assist in district operations. With the current negative trend in habitat, especially wetland habitat, the longer an irrigation district waits to get involved, the less opportunities are left within a district to interest outside agencies and groups with habitat funding.

For more information please contact Lorne Fitch, Section Head, Regional Habitat Management, Alberta Forestry, Lands & Wildlife, 530 - 8 Street South, Lethbridge, Alberta T1J 2J8. Telephone (403) 381-5281.■

IRRIGATION IN ALBERTA

Facts & Impacts

Technological advances are enabling the irrigation farmer to be more efficient. In the 1950's, irrigation use was 6.8 million cubic metres per 1000 hectares, compared with 4.7 million cubic metres per 1000 hectares in 1976. This is an improvement of 31%.■

A NEW VALVE ON THE HORIZON

Field Testing Underway in EID

The water wheel of progress keeps right on turning in the Eastern Irrigation District (EID). Better ways of controlling irrigation flows from turnout gates is one of their latest quests in installing and testing the "Reg-U-Flow Vortex Valve (TM). "Irrigators who are experienced with flowing water are well aware that as canal levels increase, any turnout gate will increase its flow," says Doug Clark, an engineer with the district. "This is true for farm deliveries, as well as major canal and spillway "undershot" structures. It is one of the laws of fluid flow and cannot be changed," he adds.

H.I.L. Technologies Inc. of Scarborough, Maine was contacted by the Eastern Irrigation District for possible use of their "Reg-U-Flow Vortex Valves (TM)" in an irrigation system. The purpose of the stormwater valve has been to limit stormwater flows to the design criteria of storm sewer pipes thereby averting the basement flooding that is common during a larger-than-normal rainstorm. The valve operates on the principal of directing flow tangentially in the valve body to form a vortex. The flow pattern produced results in high peripheral velocities which generate an air filled core. The core occupies the majority of the outlet orifice creating back pressure that opposes the applied pressure due to increased head.

The valves are available in a number of different shapes to meet specific uses. The shape most suited to irrigation applications is the Type 'C' - conical shape. In addition to the basic unit, a vortex suppression pipe, variable intake gate and pivoting bypass gate are available. The vortex suppression pipe introduces water in the air core thereby suppressing the vortex and increasing flows by up to 50 percent with little increase in head. The variable intake gate allows for adjustment of intake area and flow. The bypass gate allows water to flow straight through without the vortex being induced. All three accessories have their purpose.

While the function of the valve would be exactly the same, to limit the flow through the valve the application does present a number of questions. A decision to field test the valve was made by the district, adds Clark.

The valves are currently constructed from stainless steel to meet the urban sewer environment criteria,

The Reg-U-Flow valve pictured above is installed on a 500 mm diameter turnout.

however, other materials are being considered for irrigation applications. The valves can be manufactured for applications from 0.014 m^3/s to 2.8 m^3/s and larger.

The vortex valve can be flange mounted and bolted to a flanged CSP pipe commonly used for turnouts. A 10-20C gate is reverse mounted on the end of the CSP pipe to turn the service off.

The EID selected a site in SE 27-20-14-W4 on the tailout to 02-16 SH canal which is located 16 km north and 5 km east of Brooks, Alberta. On June 6, 1989 the district installed the turnout and replaced the corrugated steel pipe crossing the roadway. A 20-10C 500 mm gate was installed on the downstream end of the turnout pipe. In addition, a monitoring well was installed on the canal bank adjacent to the turnout and a "cut-throat" flume was placed in the head ditch leading from the turnout. Svat Jonas, P. Eng., of the irrigation branch is providing monitoring equipment and is assisting in the testing of the valves throughout the 1989 irrigation season, says Clark.

It is anticipated by Clark that the vortex valve will regulate delivery flow to the head ditch within the range of 0 to 0.045 m^3/s. It is expected that canal flows will vary from 0.085 to 0.425 m^3/s. Larger ranges will be induced under direct supervision of the ditchrider to test the limits of the valve. Weed buildup may become a problem and silting will be checked periodically. Results of this research will be made available in a later edition of the Water Hauler's Bulletin.

For more information please contact Doug Clark, P. Eng., Eastern Irrigation District, P.O. Box 8, Brooks, Alberta T0J 0J0. Telephone (403) 362-3161.■

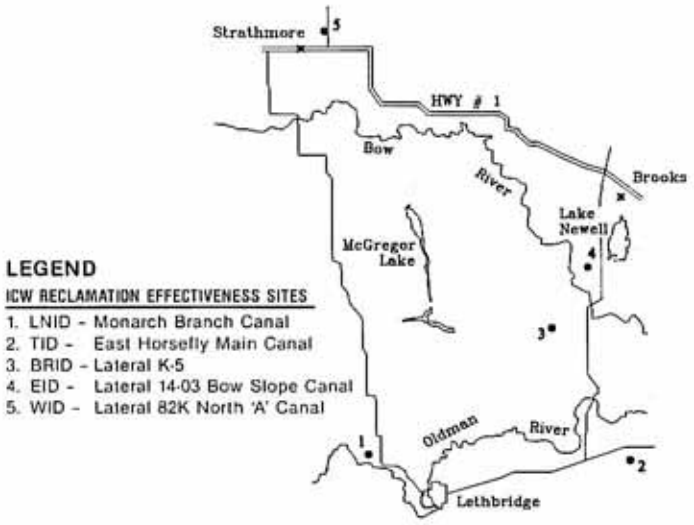
ICW RECLAMATION EFFECTIVENESS PROGRAM

The ICW reclamation Effectiveness Program represents a continuation of research by the land evaluation and reclamation branch of Alberta Agriculture into the effectiveness of various seepage-control measures on saline soil reclamation. The program is responding to a need to document reductions in seepage-affected land through canal rehabilitation and is based on previous research into reclamation of saline soils adjacent to rehabilitated irrigation canals.

Fieldwork commenced in the spring of 1989 when experimental plots were established along five canals scheduled for rehabilitation in the fall of 1989. Monitoring of pre-construction water table and salinity conditions began in early May and will continue until canal rehabilitation starts in the fall. Post-rehabilitation monitoring of water table and salinity levels will continue over an anticipated period of four to six years. Changes in soil salinity will be monitored using standard sampling techniques and automated surveys. Water-table wells are being monitored weekly and dataloggers have been installed at each site to continuously monitor water-table fluctuations in response to irrigation and precipitation events.

A brief summary of each of the five monitoring sites is presented in the table below.

Site #	Irrigation District District	Canal	Rehabilitation Method	Type of Irrigation System
1	LNID	Monarch Branch	Grid Drainage	Sprinkler (wheels)
2	TID	East Horsefly Main	Canal Relocation	Sprinkler (wheels & pivot)
3	BRID	Lateral K-5	Reshaping Polylining	Flood
4	EID	Lateral 14-03 Bow	Buried membrane liner with cover & gravel armour	Sprinkler (pivot) & Flood
5	WID	Lateral 82-K North 'A'	Impervious Till-Low Side	Flood



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

IS IT A BRIDGE OR A BOX CULVERT?

A District Engineer & Manufacturer Team Up To Build A Unique Structure

Traditional definitions found in the Bridge Inspector's Training Manual may not suit this rather unique box structure. To the untrained eye one may think that this new irrigation structure looks more like a concrete bridge structure rather than a box conduit. The brain child of Bow River Irrigation District (BRID) engineer Steve Topping, the structure incorporates some new and innovative designs for the wing panels.

The BRID engineering department, faced with the replacement of three existing 1.1 m x 1.8 m corrugated steel pipe arch culverts on Lateral C Vauxhall, decided to opt for a new design. The existing CSP arch culverts had to be replaced due to crushing from inadequate cover. The new structure was designed with a MSU load carrying capacity and a peak design flow rate of 10 m^3/s, says Topping. Alberta Transportation reviewed the design and provided most of the capital funding.

Note: Tranquil flow through the newly constructed box culvert (10 M^3/s).

Precon Precast Products of Lethbridge cast the precast concrete panels and sections and has since become the manufacturer. The heavy panels were set in place by crane. The wingwalls or erosion panels as some may call them are supported at the base by the cutoff wall and are held together by post tensioned cables. The angled wingwalls improve access to canal banks and the flared inlet and outlet sections allow smooth and tranquil flow, says Topping. All joints are sealed with Ramnek. The main advantage of this system, says Topping is that "minimum road cover can be achieved, allowing more freeboard for passage of debris within the structure. Inadequate cover is a common problem with contour canals. Raising the road grade to provide cover increases earthwork costs for road building and reduces approach distances."

The existing road crossing was removed, and a new conduit assembled and backfilled within five days at a cost of $80,000. Besides the ease of installation and relatively low cost, it is anticipated that this precast conduit will have a longer life span than corrugated steel pipe systems.

For more information please contact Steve Topping, P. Eng., District Engineer, Bow River Irrigation District, P.O. Box 140, Vauxhall, Alberta T0K 2K0. Telephone (403) 654-2111.■

IRRIGATION BRANCH

Bulletin Board Coming Soon . . .

The irrigation branch, irrigation and resource management division, Alberta Agriculture will be implementing a microcomputer remote bulletin board system (RBBS) with a projected start up date of Monday, October 2, 1989. The bulletin board will be targeted for the general irrigation community with Alberta Agriculture staff, farmers, irrigation district staff, agribusiness, and consulting firms as potential users.

Requirements for the use of the RBBS are an IBM PC, XT, AT, PS/2 or compatible with one floppy disk drive, a 300/1200 BAUD modem connected to standard telephone line, and a PC communications software package.

The bulletin board consists of four main areas (proposed):

A. Events Calendar
   - Conferences, Seminars, Demonstrations, and Field Days
   - Meetings (government and irrigation district)
   - Training Courses (computers, etc.)
   - New Government Programs
   - Farewell, Retirement, Seasonal, and Sports Events

B. Water Supply Outlook and Climatic Information
   - River Flows
   - Reservoir Storage (lake levels)
   - Monthly/Annual Climate Data (for Lethbridge, Vauxhall, and Brooks)
   - Crop-Use Data (for crop water management)

C. Information Package
   - Water Hauler's Bulletin Article Index
   - Irrigation Related Research Projects Index
   - List of Available Plans/Maps/Photographs/Topography Irrigation Districts
   - Data on Assessed Acreages, Actual Irrigated Acres, etc.
   - Crop Summaries (crops grown in southern Alberta)

D. Other Miscellaneous Information
   - List of names, phone numbers, and contact persons of commonly used services.

If you have any questions, comments, or suggestions, please contact Pat McIlhargey, Information Systems Analyst, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta, T1J 4C7. Telephone (403) 381-5855.■

TRIPLOID GRASS CARP ARRIVE IN SOUTHERN ALBERTA

Nineteen eighty-eight may not only be remembered for the free trade deal between the United States and Canada but also for the first licensed introduction of sterile triploid grass carp into Canada for research purposes from the United States. Although it may not be as memorable or earth-shattering, the latter may be of as long lasting good for our irrigation districts and their farmers.

As many of our readers may recall, the fish is herbivorous and is stocked in irrigation canals and dugouts throughout many countries of the world to control aquatic vegetation. In the first year of the five-year study, the imported fish from Florida were raised in quarantine in the Environmental Centre in Vegreville, Alberta. There the fish have been subjected to a multitude of pathological tests for bacteria, viruses and parasites.

Now in the second year of the study, which is funded by the Irrigation Council of Alberta through the Alberta Heritage Savings Trust Fund – Irrigation Rehabilitation and Expansion Research Program, approximately 1000 of the fish are being raised this summer in five shallow, warm, and weed infested dugouts in the Raymond area.

The fish are being kept in the dugouts to grow to a length of approximately 450 mm when they can be safely stocked in a flowing canal in the third year of the study and not be predatorized by the northern pike known to lurk in irrigation canals. Temperature greatly affects the amount of food consumed by triploid grass carp. At temperatures under 10°C food intake is curtailed but above 15°C feeding greatly increases. As winter approaches, the fish will be transferred to deep oxygen rich winter dugouts.

As in year one, the component tasks of the study are continuing: plant biomass studies, growth measurements and feeding trials, pathology services, aquatic weed problem survey, water quality studies, predator study, over-winter monitoring, and the design and construction of prototypical fish barriers.

If the results and conclusions remain positive after year two of the study, the Committee on Biological Control of Aquatic Vegetation proposes to carry out further research activities in a flowing irrigation canal tailout

The 1st stocking of sterile triploid grass carp in Alberta.

in the Raymond Irrigation District. The Raymond Irrigation District is a preferred location because if there was an accidental movement of the sterile fish away from the controlled stocking site, they would likely end up in landlocked Pakowki Lake and not in a river system.

The triploid grass carp is a proven effective biological control agent for aquatic weeds in many parts of the world and specific states in the United States. However, here in Canada, little or no research has been done using the triploid grass carp. The committee feels that their cautious five-year pilot research plan, using only small stockings of certified sterile fish away from any river system, is an environmentally safe approach. This research will provide many answers as to whether this herbivorous fish should ever be considered for introduction into Alberta.

For more information please contact Duncan Lloyd, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5539. ■

The area on the right side of the barrior in the dugout is stocked with triploid grass carp. Note: The school of triploids at bottom of picture and heavy vegetation growth on left side in control area.

PURPLE LOOSESTRIFE

A Plant With a Good & Ugly Side

Purple loosestrife (Lythrum salicaria) is a tall, erect perennial plant that can only be described as having two sides – one beautiful, the other very ugly. When it is growing in someone's garden, it radiates beauty but the ugly side can be seen when it spreads in a drainage ditch or along some small lateral. Once purple loosestrife is established, it is very hard to eradicate. Clumps of this plant have been identified growing in a moist section of a borrow pit along Highway #3 east of Lethbridge.

It is a very hardy species and well suited to our northern hemisphere. Pockets of it can be found spreading across North America. This brilliant purple flowering plant, often growing to a height of two metres, is a prolific seed producer. Each new plant can produce more than 100,000 seeds in its first year. Seeds are spread by wind or water. Purple loosestrife will also reproduce from stem fragments or cuttings. It sprouts very easily in moist soil and outgrows native vegetation such as cat-tails and bulrush.

This purple beauty can be found growing in backyards here in southern Alberta. Known as lythrum by home gardeners, this ornamental is offered for sale in many garden seed catalogues and nurseries. Other popular names it goes by are: rainbow weed, willow weed, spiked loosestrife, and red sally.

Barbara Mullin of the Montana Department of Agriculture states that "control of purple loosestrife depends on early detection and eradication. Young plants should be grubbed or hand pulled and the entire plant removed. Once the plant becomes established in a wet area or an impoundment flood-plain, control costs become prohibitive. No good chemical methods are available for control in wetland sites."

This naturally pleasing looking plant is causing a biologist's nightmare in Ontario and the midwestern United States. Dense stands of this plant have completely taken over some wetland marshes. Ducks are unable to swim or nest in amongst the densely packed stocks.

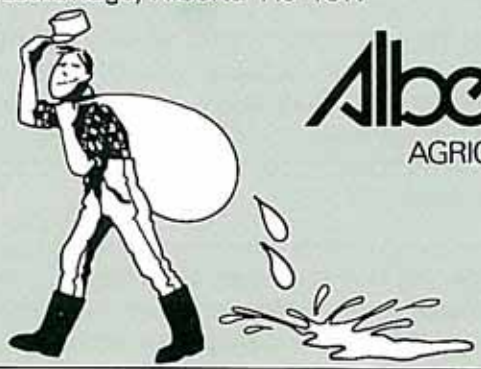
Purple loosestrife is not listed or labelled as a noxious weed although many people wish it were. Now that it has been seen growing wild in southern Alberta, ditchriders should be on the lookout for this silent marcher, and dig and dispose of any infestations that they may come upon in their drains or along laterals. ■

Purple Loosestrife in full bloom along Highway #3.

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.

Published quarterly by the Irrigation Branch, Irrigation and Resource Management Division, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7.



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