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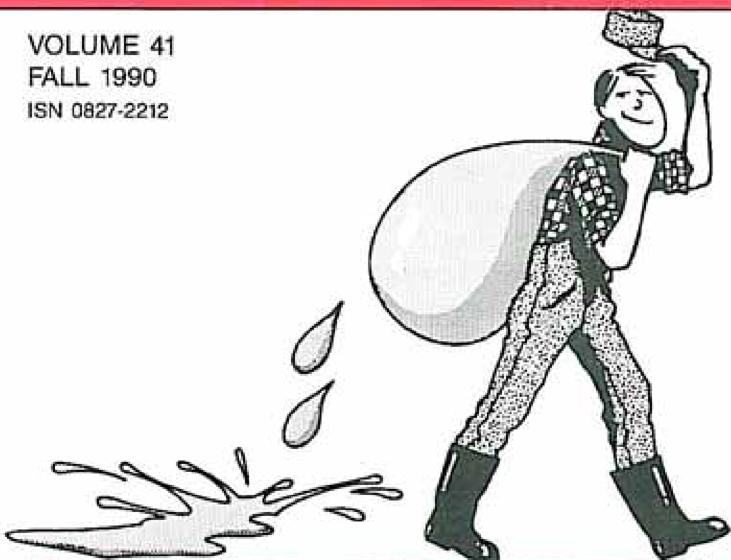

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DRILL YOUR GRASS PROBLEMS AWAY

Talk to a district maintenance supervisor and he'll tell you the construction or rehabilitation of an earth canal is often the easy part. Getting grass to grow on the hard-packed slopes of a canal without water is the tough part. It's not that there aren't hardy varieties of grass. For over centuries many varieties of prairie grass have adapted themselves to the hostile arid environment found in the Palliser triangle.

Characteristics of prairie grass make it hard to seed with conventional equipment. Prairie grass seed is often chaffy, feather-like, or nearly as fine as grains of sand.

Lawrence McCune, an irrigation capital works construction inspector with the Lethbridge Northern Irrigation District (LNID) says, it's not that we haven't tried various methods and grass varieties. The district, over the years, has tried disking, broadcasting and conventional drilling at very heavy seeding rates (often over 45 kg/ha). Our gusty winds in combination with the lack of moisture has left little seed in place to germinate.

Traux Grass Drill seeding canal slopes (June 1990).

The district, left with a lot of canal bank and borrow area seeding in late spring, opted to contract the work to a company that has had great success in many parts of Alberta using a Traux drill expressly designed to seed grass under extreme conditions. Alberta Agri-Services Limited of Olds was hired to seed 40 ha of canal bank and borrow areas on the Monarch and Albion Ridge canals.

The Traux Grass Drill, says Ken Schaber of Alberta Agri-Services Limited, is a "money saver" in that where the LNID was using 45 kg of grass seed to produce a full stand, their drill will produce the same full stand with only 12 kg of seed. It doesn't matter whether we are planting debearded, fluffy, or slick seed he adds.

The secret in the design of the drill mechanism is in it's double disk furrow openers and unrestricted seed passageways says Schaber. "The double disk furrow openers ensure the seed is deposited at an even 2 cm depth in the hard compacted ground of a canal bank and is covered back uniformly. It is common for grass mixtures to bridge or clog in conventional drills but the oversize seed tubes in the Traux eliminates this problem," states Schaber.

Good catch of grass evident. Monarch Canal. October 12, 1990.

The LNID supplied two seed mixes, one for canal banks, the other for the borrow areas.

Canal bank mix (sown: 12 kg/ha):
- 26% fairway crested wheatgrass
- 37% creeping red fescue (boreal)
- 37% perennial ryegrass

Borrow areas mix:
- 18% sweet clover
- 18% beaver alfalfa
- 28% crested wheat
- 18% pubescent wheatgrass
- 18% chief intermediate wheatgrass

Optional was a fall rye, which was added into the mix to provide a "nursing crop". The fall rye is very inexpensive and was sown at 24 kg/ha, therefore, the entire pasture mix and fall rye was sown at 36 kg/ha.

The district has also gone one step further to ensure a good grass catch explains McCune. Our district is now trying to put some topsoil back on the canal backslopes to assist growth.

McCune concludes the Traux drill may become a very efficient and economical way to get grass growing back on the hard compacted canal banks.

For more information please contact Lawrence McCune at the Lethbridge Northern Irrigation District, 334 - 13 Street North, Lethbridge, Alberta T1H 2R8 at telephone (403) 327-3302 or Ken Schaber, Alberta Agri-Services Limited, Olds, Alberta T0M 1P0 at telephone (403) 556-3615. ■

FALL SOIL MOISTURE – ITS STATUS

Nineteen ninety was one of the few years in which irrigation farmers had sufficient time after harvesting of cereal crops to think about and possibly do some fall irrigating. With only 6.0 mm or 16.7% of normal precipitation recorded for the month of September in the Lethbridge area, many irrigation farmers decided this year to fall irrigate to rebuild soil moisture levels for the 1991 crop.

A fall soil moisture survey was undertaken by the irrigation branch of Alberta Agriculture to determine soil moisture conditions as of the end of September. This survey encompasses an area which uses Monarch as its most westerly, Magrath as its most southerly, Bow Island as its most easterly and Travers as its most northerly boundaries. Of the 58 fields sampled in this survey, only 18 fields (or 31%) were being irrigated or showed signs that fall irrigation had taken place.

The table below represents the results of an average soil moisture content for a 100 cm root zone.

% Of Available Soil Moisture	Number Of Fields	% Of Total
0 - 25	5	8.6
26 - 50	23	39.7
51 - 75	22	37.9
76 - 100	8	13.8

The table below represents the results of an average soil moisture content for the top 50 cm of the root zone.

% Of Available Soil Moisture	Number Of Fields	% Of Total
0 - 25	7	12.1
26 - 50	26	44.8
51 - 75	20	34.5
76 - 100	5	8.6

Of the 58 fields sampled, 30 fields (51.7%) had soil moisture contents greater than 50% of available moisture in the 0 - 100 cm range and 25 fields (43.1%) in the 0 - 50 cm range. Fifty percent is a desirable level to be at, at the end of the crop growing season.

With just under half of the fields moisture tested having soil moisture levels less than 50%, irrigation farmers may be looking at another year where early irrigation may be required. Under normal conditions, Lethbridge and area can expect to gain about 30 mm of soil moisture from over-winter precipitation. Data collected from this survey indicates that this additional 30 mm would increase the total number of fields above the 50% level to 39.

For more information please contact Bob Riewe, Irrigation Management Specialist, Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7. Telephone (403) 381-5868. ■

RETROFIT OF AN UNDERSHOT GATE TO AN OVERSHOT STRUCTURE

BRID Solves Problem

Lateral H in the Bow River Irrigation District (BRID) has been a big long constant headache for its ditchriders. The problem, which is common to many laterals in the district, is the lack of flow control. Lateral H experiences surges in flow and these surges were split between two overshot structures on HB wasteway and the lateral itself. Downstream water users on Lateral H get a nice even flow delivery one day and the next a surge may occur causing flooding problems.

Steve Topping, P. Eng., district engineer, solved the problem by retrofitting an undershot gate to Lateral H check structure to redirect surges down the overshot HB wasteway structure. The new undershot gate provides a constant flow rate for the downstream water users. Fluctuating water levels from surges in Lateral H are now easily handled by the flashboard structure in HB wasteway.

Topping feels the combination undershot-overshot (flow control - level control) structures are the ideal and desired scenario for all laterals, turnouts and wasteway flow structures on open channel conveyance systems.

The BRID enlisted the help of Armtec Inc. (a major gate and metal pipe manufacturer) to design and build a retrofit rectangular gate for the structure. The new gate was installed by BRID maintenance personnel and paid for out of its operations and maintenance budget.

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. ■

Armtec undershot slide gates.

FROM THE FARM PERSPECTIVE

Joint Reclamation Program

A new program has been initiated in an attempt to reclaim marginally irrigable land for reclassification to an irrigable rating. The parties involved in spearheading this prototype program are the Eastern Irrigation District (EID), its water users and Alberta Agriculture's irrigation branch office in Brooks.

The Irrigation Act, passed in 1968 by the Provincial legislature, specifies that land within irrigation districts must be classified as irrigable before irrigation water rights can be granted.

Land classification for irrigation says Greg Snaith (irrigation specialist, irrigation branch) is the systematic examination, description, appraisal and grouping of land on the basis of physical and chemical characteristics affecting its suitability for sustained production under irrigated agriculture. Land units are grouped into one of six interpretive classes: Classes 1 through 4 being irrigable with Classes 5 and 6 non-irrigable.

Land in Class 5 is considered not suitable for irrigation under existing conditions but has sufficient potential to warrant additional investigation or improvement. Canal lining, subsurface or surface drainage, deep plowing or the application of chemical amendments may be required to upgrade Class 5 land to an irrigable rating.

The EID is cooperating with the irrigation branch and their Alberta Irrigation Management (AIM) Program to extend the technical assistance and training within that program to irrigators with Class 5 land who are intent on reclamation for reclassification purposes. The irrigation branch has the responsibility to provide consultation to the specific water users, offering irrigation management recommendations and practices to attempt to maximize the reclamation response of soils that are presently considered non-irrigable. Guidance in irrigation management is provided on a one-to-one basis by both the irrigation specialist and the irrigation management technologist. This project is a five-year program, where the EID provides water under temporary agreement. During each irrigation season, the applicant (or designated irrigating fieldman) is obliged to attend mutually convenient field visits with the AIM technologists to determine irrigation requirements and practices conducive to encouraging reclamation.

AIM Technologist Joanne Bakker assisting irrigator James Miller of Tilley with soil analysis.

Each land unit is site specific in soil parameters, thus requiring extensive field investigation and monitoring to identify the problem source in order to make proper management recommendations. In the case of a nearby canal, for example, that was the source of a high water table but has since been lined, the solution might be to provide irrigations that will leach the salts down through the root zone once the water table has receded. In other situations, limiting irrigation applications may be required to relieve high groundwater table conditions. In these situations, on-farm irrigation management is one means of reclaiming land to regain long term agriculture sustainability. It may be determined that some form of subsurface drainage may also be required in conjunction with the leaching process or reduction in water table levels.

In any case, says Snaith, after the five-year period, the land unit will be re-examined to determine if the Reclamation Program has effected a positive land response and whether that land may not be classified as irrigable. Not all land is reclaimable, even under the best of irrigation management practices, but with good communication and a positive commitment on behalf of the parties involved, results in reclaiming and sustaining the irrigated land base should be maximized.

For further information please contact Greg Snaith, Irrigation Specialist, Alberta Agriculture, Box 1318, Provincial Building, Brooks, Alberta T0J 0J0. Telephone (403) 362-1212. ■

AQUATIC WEEDS IN IRRIGATION CANALS: CAUSES AND CORRECTIVES

This summer, Dr. Patricia Chambers from Environment Canada, National Hydrology Research Institute (NHRI), in Saskatoon undertook a research project in the Eastern Irrigation District (EID) to determine the environmental factors regulating the distribution and abundance of aquatic weeds in irrigation canals. The project, funded by the EID, Alberta Agriculture Irrigation Council and NHRI, forms part of a larger research program aimed at developing new management strategies for the long-term control of aquatic weed growth in prairie lakes, rivers and watercourses. Dr. Chambers' research is directed at establishing the critical environmental factors (such as light, nutrients, water flow, herbivores) controlling aquatic weed growth in any system, and then identifying which environmental factor(s) to target for control and when to intervene. This information will then be used to develop control strategies for long-term weed management.

Two studies were undertaken during the past summer on aquatic weeds in irrigation canals. The aim of the first was to determine the factors responsible for excessive aquatic weed growth. This study was undertaken in 25 EID canals representing a range in water types (water directly from the Bow River versus water from storage reservoirs, farm runoff or canal tailwaters), depths, flows, and aquatic weed growth. Water and sediment samples were collected and current velocity, underwater light penetration, temperature and water depth were measured midway across the canal every two weeks from May 15 to August 22. Water samples were analyzed for phosphorus (total and total dissolved) and nitrogen (total dissolved, ammonia and nitrate+nitrite), conductivity, pH and total dissolved solids. Sodium, potassium, calcium and magnesium concentrations in the water were also measured monthly. Sediment samples were analyzed for available phosphorus and nitrogen. Aquatic weeds were harvested from within test plots located midway across each canal in July and August. Plant samples were sorted by species, dried, weighed and the mass of weeds per square metre was calculated for each canal. Selected dried plant samples will also be analyzed for their phosphorus and nitrogen content to determine the nutritional status of the plants. The data collected from this study will be used to relate aquatic weed distribution, abundance and nutritional status to open-water and sediment

Ms. Jackie Kuetbach collecting weed samples for Dr. Pat Chambers' research on aquatic weeds in irrigation canals.

nutrient concentrations, underwater light levels and current velocity. Results from these analyses will identify which environmental factor(s) should be targeted when developing management techniques.

The aim of the second study was to test the feasibility of using lime for controlling aquatic weeds. Previous studies have shown that the addition of lime [$CaCO_3$ and $Ca(OH)_2$] to lakes and drinking-water dugouts causes a dramatic reduction in the growth of aquatic weeds. As a first step towards determining the usefulness of lime in controlling weeds in irrigation canals, a study was undertaken in which weeds were grown in pails containing natural sediments from a canal that supported abundant weeds. Several doses of $CaCO_3$ and $Ca(OH)_2$ were applied to these sediments and the pails were placed in an EID canal and the plants allowed to grow for several weeks. At the end of the experiment, the plants were harvested and weighed. This winter, the amount of phosphorus incorporated into the tissues will be measured. The impact of the various lime treatments and their doses will then be determined by comparing plant growth for the various lime treatments.

A final report on the results of these studies should be available next spring. Anyone who has information on environmental factors regulating aquatic weed growth in irrigation canals or who would like further information on this project should contact Dr. Chambers, National Hydrology Research Institute, 11 Innovation Boulevard, Saskatoon, Saskatchewan S7N 3H5. Telephone (306) 975-5592. ■

FABRIFORM CHUTE

10 Year Update

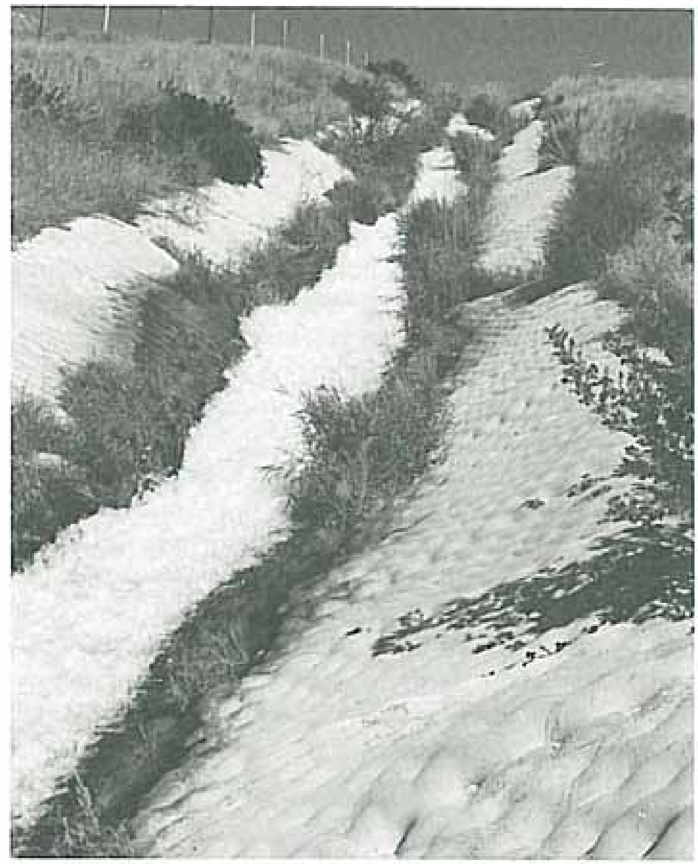
Introduced in 1980 on Imperial Spillway in Eastern Irrigation District (EID), Fabriform, though relatively expensive, is considered a reasonable solution for spillways on steep gradients. This open structure, unaffected by ice buildup caused by groundwater outflow or high velocities over its surface, appears to have met all the criteria. The Fabriform chutes have been installed on eight spillways. The irrigation branch has been monitoring them on an irregular basis to evaluate their effectiveness and durability. These have been reported in the Water Hauler's Bulletin in the Summer 1981 (Volume 4), Winter 1984 (Volume 14) and Spring 1987 (Volume 27). Incidentally, one chute located just south of Vauxhall has become obsolete because of some changes the district made to their distribution system.

There is no question about the effectiveness of the waffled surface in dissipating energy and handling ice buildup or freeze-thaw cycle, says Jack Ganesh, P. Eng. of the irrigation branch of Alberta Agricuture. The filter points between "bumps" allow for the dissipation of hydrostatic pressure below the chute and ensure little or no uplift. Ganesh questions whether the nylon mat will deteriorate or the concrete crack up and move down the slope with time.

There has been hardly any deterioration of the nylon mat, says Ganesh. The Imperial Spillway, our oldest, has been exposed to ten years of southern Alberta sun without showing any serious deterioration of the nylon fabric.

One of the earliest of these chutes, the Lethbridge Airport Spillway, has developed several cracks but they do not appear to have affected the stability or the durability of the structure in any way, says Ganesh. "We know that there are cracks because we can see the marks made by the strained nylon fabric along the apparent cracks. Perhaps, with time, when the fabric deteriorates and the cracks open up, water passing through the cracks could cause erosion of the subgrade. This, however, should happen only with the chutes that do not have a fabric filter below. Unfortunately, Lethbridge Airport Spillway is probably the only one without filter fabric or gravel bedding," he adds.

The Cairnhill Fabriform chute in the Western Irrigation District has a serious washout problem just upstream and under the chute. It appears that the opening of the precast headwall attached to the chute was blocked causing the water to find an alternative route down the slope. Since there is no object evident that caused the blockage, it was perhaps an ice jam. Water has cut a deep channel around the headwall and under the chute leaving a large cavity under the chute. The cavity at the upper part is so large it is surprising that the chute has not fallen in, says Ganesh. The water has established its route under the chute and outlets at the lower end and into the natural drain. Unless corrective measures are taken immediately, the chute will collapse. Should the chute fail no one should blame it on Fabriform. No chute can avoid collapse or washout if it is undermined as badly as this one, he adds.



Medicine Hat Airport Spillway constructed in 1981 (excellent condition).

The overall assessment of Fabriform as a material and technology for spillways, says Ganesh, is that it satisfies all the design parameters on relatively steep gradients of up to one in three; where there is the possibility of groundwater flow outletting into it throughout the winter months. Fabriform, after 10 years of use, has proven to be an acceptable choice for spillway construction.

For more information please contact Jack Ganesh, P. Eng., Irrigation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta, T1J 4C7. Telephone (403) 381-5869. ■

CLASS 5R – LAND THAT IS UNDERGOING RECLAMATION

On July 12, 1990, Irrigation Council adopted a change to the 1983 "Standards for the Classification of Irrigated Land in Alberta" that allows irrigation of salt-affected and/or waterlogged land that is undergoing reclamation. The minimum requirements for land to be suitable to receive water for irrigation has been changed from Class 4 to Class 5R. Class 5R is a subclass of Land Class 5 that applies to nonirrigable land that is temporarily irrigable while it is undergoing reclamation. This change to the Land Classification Standards applies to all irrigation districts in Alberta.

The specific motion passed by Irrigation Council reads as follows:

That Irrigation Council adopt a change to the Land Classification Standards and amend the motion passed on October 12, 1983 by adding the following:

"Further, the minimum requirement also includes Land Class 5R – land that is undergoing reclamation after the implementation of an appropriate improvement such as drainage or canal lining. Further, Class 5R land shall only be added to an assessment roll as "other acres" that are the subject of a terminable water agreement for the purpose of promoting reclamation. It is further understood that the classification of Class 5R land shall be reviewed after the land has undergone reclamation for five irrigation seasons, after which the land shall be upgraded to an irrigable class (Class 1, 2, 3 or 4) if it meets the requirements, or remain as Class 5R for an additional five years. If significant improvement has not been observed in the first five year period or if sufficient improvement has not been achieved within a 10 year period to upgrade the land to an irrigable class, then the land shall be rated Land Class 6, nonirrigable, and the terminable water agreement shall be discontinued."

Pivot irrigation of Class 5R land that is undergoing reclamation.

The new Class 5R has been adopted to permit irrigation of salt-affected and/or waterlogged land that might take significantly longer to reclaim with natural precipitation alone. Class 5R may only be assigned to land units after the implementation of an appropriate improvement such as drainage or canal lining.

Updated copies of the Land Classification Standards are presently being printed and will be available for distribution in the near future. Requests for reclassification of land that may be eligible for a Class 5R rating may be forwarded to the land evaluation and reclamation branch.

For more information concerning Class 5R please contact Rod Bennett, Head, Land Evaluation Section, Land Evaluation and Reclamation Branch, Alberta Agriculture, Agriculture Centre, Lethbridge, Alberta T1J 4C7 at telephone (403) 381-5894 or Gerhardt Hartman, Manager, Irrigation Secretariat, Alberta Agriculture, Provincial Building, Lethbridge, Alberta T1J 4C7 at telephone (403) 381-5176. ■

FACTS & IMPACTS

The three principal methods for applying irrigation water are: sprinkler, trickle and surface.

The sprinkler method of irrigation is by far the most popular:

80% of all irrigation district land
90% of all private irrigation land. ■

BAG FROST PROTECTION

Not Your Ordinary Shopping Bag

"Bag your air valves" might be the next slogan heard in the irrigation community if Steve Topping's, P. Eng., district engineer for Bow River Irrigation District (BRID), experiment works. Like the St. Mary River Irrigation District (SMRID), the BRID has also been experimenting with ways to protect their pipeline air-relief valves as temperatures dip below freezing toward the close of the irrigation season.

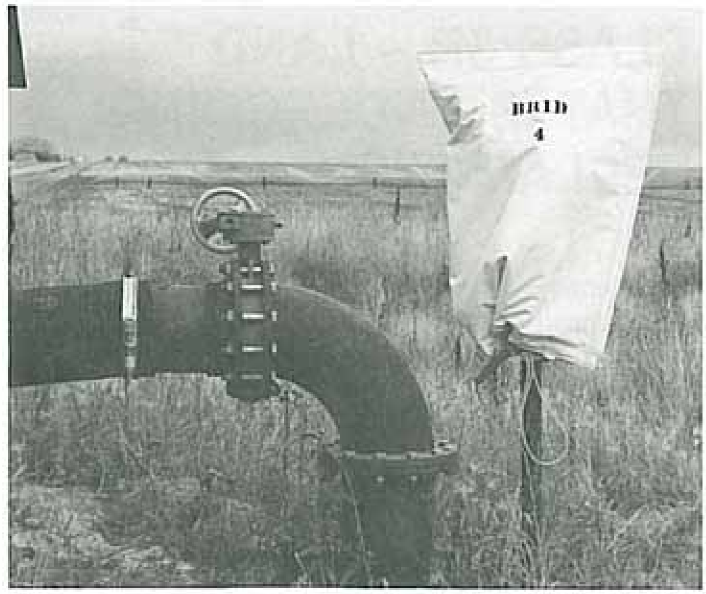
Readers may remember, in the fall 1989 issue of the Water Hauler's Bulletin in which the SMRID reported on their insulated metal canister. The canister is providing adequate frost protection but is not cheap to fabricate ($120.00 but certainly cheaper than replacing a broken air valve).

Topping has come up with a less expensive idea for frost protection on pipeline air valves which he feels may be the answer. He is using an insulated bag which is simply pulled over the air valve and drawn around the pipe below the valve by a draw string. The bags are put on in the fall when temperatures begin to drop and may be removed again after fall irrigation is complete in order to prevent UV degradation of the bag.

The insulated bags, approximately 600 mm x 900 mm in size, were made up for the BRID by Inland Plastics of Drumheller. They consist of a double layer of fabric with insulation in between. The outside shell is an 18 ounce polyvinyl fabric similar to that used in making roller tarps. The inner lining is an 11 mil poly. The insulation used between the layers of fabric is a polyester fibre fill known as "Kodel". The bag is sewn flat with one end left open. The open end has small metal rings attached to it for a 6 mm rope draw string. According to Inland Plastics, the bag has an approximate R value of 4 and the cost to fabricate one bag is approximately $38.00.

Although this is the first fall that BRID has tried using the insulated bags, Topping feels it's worth a try and could very well be the answer to the problem of frozen air valves. After all, the cost to replace one broken air valve would pay for several insulated bags.

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. ■



Frost Protection Bag covering air-relief valve.

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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