THE Water Hauler's Bulletin

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East Arrowwood Syphon Replacement Project

The East Arrowwood syphon is a major flow conveyance structure in the Carseland-Bow River headworks system. This system provides a reliable water supply to approximately 225,000 irrigable acres within the Bow River Irrigation District and the Siksika Nation. The syphon is located approximately 25 km southeast of Carseland and 40 km north of Vulcan.

Wood stave syphon conveying water across East Arrowwod Creek

The headworks consists of 65 km of main canal with related structures and three storage reservoirs: Lake McGregor, Travers Reservoir and Little Bow Lake.

The existing headworks, including the syphon, was initially built by the Canada Land and Irrigation Company in 1906 and subsequently replaced between 1945 and 1954 by Prairie Farm Rehabilitation Administration.

The existing East Arrowwood syphon is the last remaining twin wood stave syphon in southern Alberta. At one time, wood stave syphons were commonly used instead of building canals through high fill areas. All other of these wood syphons have now been replaced with large diameter concrete pipe or with the construction of earth canals through high fill areas.

After nearly five decades of service, the existing East Arrowwood syphon has deteriorated and needs to be replaced to ensure that the operation of the headworks system continues to be safe and reliable. Alberta Public Works, Supply and Services initiated construction of the replacement structure in September 1998.

Leaks in wood stave syphon

The existing syphon was designed to handle a flow of 41 m³/s . The new syphon will be a buried 5 m diameter cast on site concrete pipe. The new capacity will be 51 m³/s to meet the future water supply needs of the Bow River Irrigation District and Siksika Nation.

UMA Engineering Ltd. designed the new syphon and the related works in association with Thurber Engineering Ltd. and SLG Stanley Consultants Inc., of Calgary. The general contractor for the project is Kiewit Management Ltd. of Edmonton. The new syphon is scheduled for operation in the spring of year 2000.

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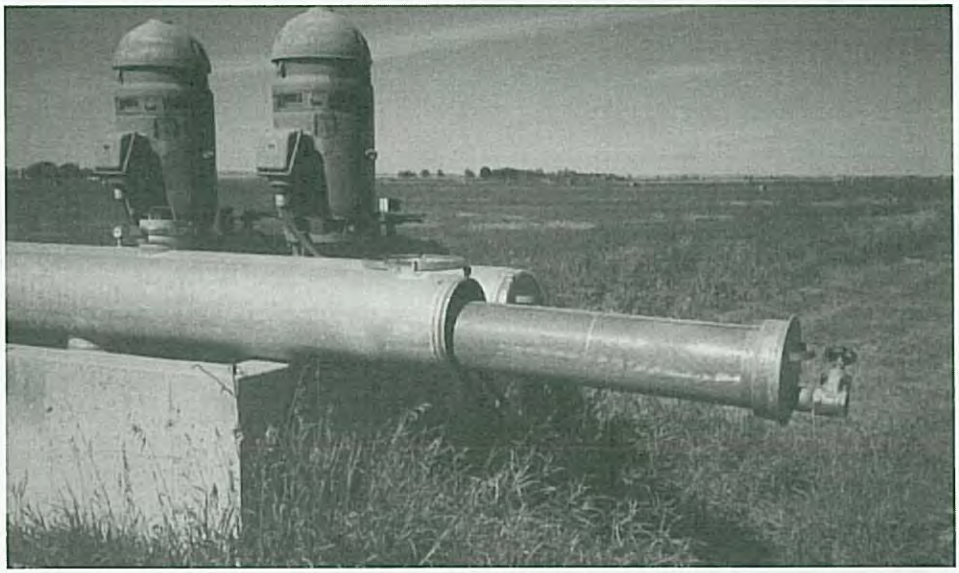
Pressure Filter for Pressurized Pipelines



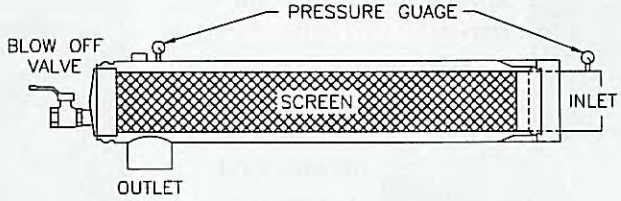
Pressure filler inside barrel

Southern Alberta has relatively clean water, but nevertheless a considerable amount of vegetation matter and trash is generated within the irrigation distribution system itself. This vegetation matter can easily be eliminated by the use of trash racks, whereas, smaller particles of vegetation matter and as well as low levels of sand will pass this primary screening, and plug up sprinkler heads.

"To remove this debris a pressure filter can be installed on the discharge side of your pump," says Paul Maloff, irrigation technologist with the irrigation branch. The pressure filter is encased in a galvanized barrel. Water from the pump passes through the round stainless steel screen into the pressurized pipeline. The round stainless steel screen openings range in size from .05" to .09". Two pressure gauges are installed on the unit. One gauge reads pump pressure and the other gauge reads the pressure in the barrel. Any significant drop in pressure indicates it's time to clean the screen. The unit is equipped with a self cleaning blow off valve. When this valve is opened, the pump pressure will dislodge the particles of debris and thus clean the screen. With the pump turned off the screen can also be taken out and cleaned manually.

"Filtering out minute particles of debris will help prevent plugging up sprinkler heads," states Maloff. With the trend being towards the installation of low pressure pivots, the sprinkler heads on these units are more susceptible to plugging up. Plugged sprinkler heads will cause uneven water distribution to a crop, which in turn adds up to poor crop yields.

For more information please contact Paul Maloff, Irrigation Technologist, Irrigation Branch, Alberta Agriculture, Food and Rural



Schmatic drawing of pressure filter

BRID Installs 42" dia. Pipe

The Bow River Irrigation District has installed approximately 1100 metres of 42" dia. DR51 PVC pipe on its Lateral A-1 rehabilitation project during January, 1999. This is the first installation of the new 42" dia. PVC pipe, supplied by IPEX. This pipeline has a maximum design capacity of 1.74 m^3/s.

The general contactor was Top Line Construction of Lethbridge, with the pipe installation completed by their subcontactor, Car-Men Enterprises of Stirling. The 42" dia. PVC pipe required more assembly effort by using an excavator bucket pushing the pipe together, instead of the conventional electric pipe puller method which is typically used on smaller diameter pipe. Despite this, the installation went well and the contractor was able to install approximately 140 metres of pipe per day.

Revision of the Land Classification Standards To Allow Irrigation of Some Solonetzic Soils

On November 12, 1998, Irrigation Council approved a change to the standards for the classification of land for the irrigation in Alberta to allow irrigation of Solonetzic soils low in sodium salts. This change is in effect immediately. Prior to this change in the standards, all Solonetzic soils were rated nonirrigable. Solonetzic soils are most prevalent in the Special Areas, the Eastern and Bow River Irrigation Districts, and in the eastern portion of St. Mary River Irrigation District. The change in the standards is based on past and recent research and monitoring studies of irrigation on Solonetzic soils.

A 4-year research study in the Berry Creek Basin of east-central Alberta was recently finalized. The objectives of the study were to assess changes in salinity and sodicity, to determine forage production capability, and to evaluate the irrigation suitability of Solonetzic soils. Four treatments, representing three levels of irrigation (low, medium, and high) and a dryland control, were replicated randomly three times at two solonetzic and two chernozemic sites. Alfalfa was chosen because of its forage production capability and moderate tolerance to salinity.

The two-cut, third-year mean alfalfa yield, ranged from 4.2 to 5.8 tons per acre at the chernozemic sites and 3.7 to 4.2 tons per acre at the solonetzic sites. There were no significant changes in salinity, except for a small increase in the topsoil at one solonetzic and one chernozemic site; and within 60 cm of the surface at the second chernozemic site. Sodium salts also did not increase significantly, except in the topsoil at one solonetzic site, and within 60 cm of the surface at both chernozemic sites. Increases in salinity and sodicity were small and were attributed to the quality of the irrigation water applied.

It was concluded that sodic to highly sodic Solonetzic soils are not recommended for irrigation development, but non-sodic to sodic Solonetzic soils, in the absence of a shallow water table, may respond favorably to irrigation.

A 3-year monitoring study on Chernozemic and Solonetzic soils under pivot irrigation in east-central Alberta was also completed recently. The objectives of this study were to determine crop production capability, to assess changes in salinity and sodicity, and to evaluate the irrigation suitability of Solonetzic soils. Barley was the crop of choice for the landowner. Soil and crop samples were taken in the fall of each year from the three solonetzic and three chernozemic plots under the pivot.

Irrigated barley on a solonetzic landscape.

Grain yield ranged from 54 to 71 bushels per acre, and total dry matter yield ranged from 3.4 to 6.9 tons per acre over the study period for both soil types. Yields were not significantly different between soil types, implying that other factors had a greater impact on crop yield than soil type. Lodging and weed growth were some of the factors believed to have contributed to lower than potential yields. Salinity increased significantly within 60 cm of the surface on both soil types. Sodicity also increased significantly within 60 cm of the surface at the chernozemic sites, but decreased significantly between 15 and 30 cm at the solonetzic sites.

It was concluded that changes in soil salinity and sodicity were attributed to the chemistry of the irrigation water applied and precipitation received. Increases in salinity and sodicity, although statistically significant, were small and not large enough to affect crop yield. Solonetzic soils that are non-sodic to sodic, in the absence of a shallow water table, are expected to respond favorably to irrigation. The long-term and off-site impacts of irrigation on Solonetzic soils were not investigated.

For additional information contact: Frank Hecker, Alberta Agriculture (telephone: 403-381-5890; fax: 403-381-5765; e-mail: frank.hecker@ agric.gov.ab.ca).

A Third Crop From Irrigation Water

Irrigation water in Alberta has long been recognized for its traditional agricultural benefits. Commercial fishermen and anglers also understand that this water contributes to a viable fishery, a valuable second crop. With the expansion of the aquaculture industry, a third crop is now being realized.

John and Sandra Bjornson, owners of Alberta Trout Growers in Tofield, have recently expanded their rainbow trout fish farm to a new facility located on the shoreline of Snake Lake, an irrigation reservoir managed by the Eastern Irrigation District. "When in full production, the facility is designed to raise 270,000 kilograms of trout annually,"states Bjornson. If all goes as planned, Alberta Trout Growers hope to start shipping table-size fish in June, 1999.

This unique operation provides stakeholders an opportunity to monitor the impact of aquaculture effluents on the reservoir environment. In the summer of 1998, a three-year study began measuring the impacts of organic (fish feeds, fecal wastes) and inorganic nutrients on the water quality of the reservoir. The same study will also document effluent impacts on reservoir algae growth, invertebrate life and overall native fish production levels.

The project further demonstrates the diverse benefits of irrigation water. The study is being conducted with the cooperation and assistance of Alberta Agriculture, Food and Rural Development (AAFRD), Alberta Trout Growers Ltd., Alberta Environmental Protection, Prairie Farm Rehabilitation Administration, and the Eastern Irrigation District. An interim report on the first year results of the study and additional information is available from the Aquaculture Section, AAFRD.

Event

Sept. 29 to Oct. 1, 1999

The Canadian National Committee on Irrigation and Drainage (CANCID), in cooperation with Alberta's 13 Irrigation Districts and Alberta Agriculture, Food and Rural Development, are presenting an Irrigation Conference from September 29 to October 1, 1999. The conference theme is "Irrigation Beyond 2000 - Putting Technology to Work" and will focus on the future of irrigation development in Western Canada. The conference is being held at the Lethbridge Lodge Hotel in Lethbridge, Alberta. For more information on the conference please call Brent Paterson, the conference chair at 403-381-5140.

Approximately 65% of all irrigation in Canada is in the province of Alberta

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Notes

This bulletin is intended to provide Alberta's irrigation industry with items of interest in irrigation. If you would like to submit articles or provide us with input, feel free to contact Brian Taylor by phone in Lethbridge at (403) 381-5542 or **E-mail *brian.taylor@agric.gov.ab.ca***
Copies can be obtained on the internet from the Department of Agriculture's home page at ***http://www.agric.gov.ab.ca/irrigate/hauler/index.html.***

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