THE Water Hauler's Bulletin

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Alternative Pipe Connection to Headwalls

Pipe connections to headwalls can now be a simple one-man job, using a modular mechanical seal called LINK-SEAL. The modular mechanical seal is made up, as a belt of interconnected rubber links. This belt is wrapped around the pipe and slid into the space between the pipe and the wall. When the bolts are tightened, the seal expands and creates a watertight seal, effective up to pressures of 20 psi. The seal will also allow angular pipe movement or misalignment of up to 10°, depending upon the size of the seal used. LINK-SEAL is available in a range of sizes, for sealing pipe from 300 mm diameter to over 2700 mm diameter.

Seal assembly into space between pipe and wall.

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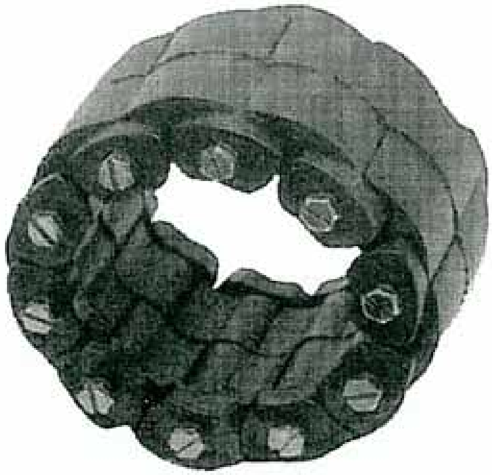
The United Irrigation District has recently used LINK- SEAL in the installation of a number of manholes. "Compared to the standard flange connectors to headwalls," says Kirt Woolf, manager of the United Irrigation District, "this modular seal is simpler, quicker, better and cheaper. My normal material cost for a 800 mm diameter connection to a headwall would be approximately $2,400, but with LINK-SEAL my cost is $700."



Modular mechanical seal is made up of interconnected rubber links.

Another project that has used LINK-SEAL is the Glenmore Reservoir in Calgary, which has used a 1300 mm diameter seal and has future plans to use a 2600 mm diameter seal. The City of Medicine Hat uses the LINK-SEAL in their water transmission lines and the City of Calgary has specified LINK-SEAL for their water and sewage lines.

For more information, contact Ed Yantz of E.D. Marketing Enterprises Ltd., 405 - 33rd Street North, Lethbridge, Alberta, Canada, T1K 1J7, telephone (403) 327-8284. ■

El Niño and Southern Alberta

by Rod MacLean

Unless you have been sleeping through most of this winter, you may have noticed that due to El Niño, temperatures have been very mild in southern Alberta this winter.

The most confusing or fascinating aspect of El Niños is that very few people believed in its effects, or that it was in fact an unpredictably recurring event. In the past 30 years, El Niños of various severity in North America occurred in the winters of 1969, 1972, 1976, 1982, 1986, 1991, 1994 and now 1997.

But what affects do these natural occurrences have on the operations of irrigation districts, and more particularly farming in southern Alberta?

What can be done within the irrigation industry to minimize the impacts of El Niños?

One thing for certain, an El Niño can change weather patterns on a seasonal level as a chinook can affect a -40°C day in Calgary or Lethbridge, affecting the depth of snowpack in the mountains or the amount of spring runoff available to fill the reservoirs.

The latest research claims that an El Niño is actually a shift in weather patterns. Normally, circulating airflow carries warm dry air from South America to Indonesia along the equator. This air gathers moisture and normally rains in the tropical regions north of Australia.

A deep layer of warm water resides in this region providing stability to this weather pattern.

Every 3 to 8 years however, an air mass shift from areas within the Indian Ocean causes a break in the circulation, actually reversing the direction of circulating airflow. This starts the "wave" of deep warm water to "shift" its way across the ocean in a big bulge, actually raising the sea level a metre or two. As this apparent "wave" approaches Peru, tropical conditions prevail on the usually desert-like climate, usually around Christmas time. There are several stories explaining the name: this one makes sense. In the late 1500's, a starving Spanish army reached the normally desert-like Pacific shores in Peru, yet found the area to be unusually tropical and lush with plant life. This was nothing new to the local natives but the Spaniards assumed that this was a blessing, called the event El Niño, or The Child, referring to the time of year and their good fortunes.

From this point, there are varying opinions on what happens next. To summarize a long story, the "wave" hits the shores of South America. The amount of warm water flow flowing northward then depends on what angle it hits the coastlines of Peru.

Water temperatures around Vancouver Island average 2- 3°C above normal for several months

during these events. Now in sea-water temperature, a 2-3°C shift in water temperature is enormous, as the heat capacity is over a thousand times that of air. Warmer air temperatures throughout the mountain regions tend to push the jet-stream further north, causing warmer conditions in Western Canada and shifting the Arctic cold to the east.

The Irrigation Districts of southern Alberta, as part of the Year 2000 review of irrigation district expansion acres, will be developing and eventually operating the Irrigation Districts Model. This planning and operations tool will be used to manage the flows within the district, based on the "expected" flow in the river in any year.

Weather files will be available from as far back as 1928. So in the event of an El Niño year, your district should be able to use this information to determine the optimal operations required to deliver water, even under the worst of scenarios. ■

Exposing Gas Lines

Locating and exposing gas lines, prior to the installation of a pipeline, can be a very dangerous job if not done properly. This job can now be done safely, by using a process called hydrovacing. This process, which is used extensively in the oil and gas field, has been around for approximately 10 years and has recently been used by a number of irrigation districts in southern Alberta.

Hot pressurized water being sprayed through brush block as vacuum sucks out the slurry.

Exposed gas line.

After the gas line has been located by the gas company the delicate job of exposing the buried gas line begins. Hot pressurized water, flowing through a hand-held wand at 1800 psi is sprayed onto the location. A brush box is first laid down on the location to prevent hot water and mud from spraying on the operator. As the pressurized water cuts the soil, a vacuum unit connected to the truck sucks out the slurry, exposing the buried gas line. It takes approximately 15 to 20 minutes to expose a gas line buried approximately one metre deep.

For more information contact Miles Krowicki, Marketing Manager of Badger Daylighting Inc., Telephone (403) 816-0570.

"Irrigation Expansion" - A Complexity of Opportunities

When the South Saskatchewan River Basin Allocation Regulation was implemented in 1991, acreage maximums for irrigation development within the basin were established. The regulation also contained an opportunity clause that would allow districts to develop beyond their set limits if and when it could be appropriately demonstrated, that there had been a quantifiable improvement in the respective district's efficient use of water.

"This opportunity could then be realized from a wide range of irrigation water use parameters and associated efficiencies," says Wally Chinn, section head for farm irrigation management with Alberta Agriculture, Food & Rural Development (AAFRD). "This is a subject area which is quite complex in nature but sometimes over-simplified when the whole discussion of 'efficiencies' takes place," Chinn emphasizes.

"For example," explains Chinn, "if you look at on-farm irrigation water use alone, there are multiple water use factors that come into play which can vary significantly in impact depending on such things as crop mix, agro-climatic region, irrigation management level and irrigation methodology." The following lists the majority of factors affecting water use and water loss parameters:

On-farm:
- Crop water demand
- Application evaporation
- Application run-off
- Application deep percolation

Conveyance:
- Seepage
- Evaporation

Storage:
- Evaporation

Return Flow:
- Operational flow-through
- On-farm system down-time
- Re-captured on-farm run-off losses

"Most people normally expect that on-farm losses are simply related to evaporation losses during applications such as sprinkling," Chinn adds. "However," he emphasizes, "depending upon the type of system and its suitability for local application, there can still be a notable component of the consumed water lost to run-off and/or movement to below the root zone. For example, our field monitoring of surface irrigation systems has shown that there is not that much of a run-off component from those gravity irrigated fields, at least as compared to the water percolating to below the root zone."

"One of the other components which is sometimes overlooked," Chinn points out, "is the opportunity for some irrigation districts to re-capture some of the potential farm water run-off/tailwater and re-use it within their delivery works. In this way too, that component of water would not then be included twice in summing-up 'water losses.'"

In order to examine the possibilities for irrigation expansion, a comparative analysis of effects from improving water use efficiency parameters has been carried out. The results are indi-

SCENARIO	CROP USE	ON-FARM EFFIC-IENCY	CANAL LOSSES	RESER-VOIR LOSSES	RETURN FLOW (System)	RETURN FLOW (Farm)	ACREAGE EXPANSION	
							(Acres)	(%)
Base Case	508 mm	66%	6.0%	2.9%	13.7%	0.0%	0	0.0%
A	508 mm	66%	6.0%	2.9%	13.7%	4.8%	8,001	6.4%
B	508 mm	66%	6.0%	2.9%	11.7%	4.8%	15,418	12.3%
C	508 mm	66%	2.9%	2.9%	11.7%	4.8%	21,060	16.8%
D	508 mm	66%	2.9%	2.9%	11.7%	0.0%	12,042	9.6%
E	488 mm	66%	6.0%	2.9%	11.7%	4.4%	24,143	19.3%
F	508 mm	66%	6.0%	2.9%	9.0%	4.8%	25,969	20.8%
G	508 mm	66%	6.0%	2.9%	9.0%	0.0%	16,311	13.0%
H	508 mm	70%	6.0%	2.9%	11.7%	0.0%	14,276	11.4%
I	508 mm	70%	5.0%	2.9%	11.7%	0.0%	16,081	12.9%
J	508 mm	70%	6.0%	1.9%	11.7%	0.0%	16,081	12.9%
K	508 mm	70%	6.0%	2.9%	10.7%	0.0%	18,043	14.4%
L	508 mm	71%	6.0%	2.9%	11.7%	0.0%	16,175	12.9%
M	508 mm	73%	3.0%	2.0%	9.0%	0.0%	37,238	29.8%

Table I: Comparison of irrigated acreage expansion opportunities as affected by variable operational demands and losses. (Shading indicates relative changes.)

cated in Table I. A hypothetical irrigation district of average size (125,000 acres) has been assumed. Water demands and accumulated primary losses are indicated within Table I under each scenario, including the base case which is considered to represent the 1990 conditions. Within the various scenarios presented, various loss components were reduced assuming either improvements to conveyance works, to on-farm systems or to delivery operations. The other variable was to adjust the crop water demand based on a change in cropping patterns (eg. more barley silage and less alfalfa forage). Under each scenario, the relative component change is highlighted and the opportunity for expansion projected.

When comparing Scenarios C and D, note the difference it makes when re-captured farm tailwater comes into play. It is also interesting to note, as in Scenario E, that as the crop water demand decreases, there is a related decrease in on-farm return flow contribution. "Certainly a significant overall 'freeing-up' of water," states Chinn. Scenarios I, J and L all indicate that, a single percentage point shift in either the canal, reservoir or on-farm efficiency factors, the net result is the same. A single percentage point decrease in canal or reservoir losses represents a 17% and 35% improvement respectively. A single percentage point shift in the on-farm loss component is only a 3% improvement. "Therefore," says Chinn, "the greatest opportunity for making water use gains will still likely be at the farm level as newer technologies can be adopted."

For further information, please contact Wally Chinn, P. Eng. with the Irrigation Branch of AAFRD in Lethbridge at (403) 381-5867 (tel.) or (403) 381-5765 (fax) or
by e-mail at wally.chinn@agric.gov.ab.ca ■

Waterfowl Deterrent System

The Waterfowl Deterrent System, created by HKD Developments Inc., is designed to prevent waterfowl from landing on water reservoirs or dugouts.The systems was initially developed for application on potable water sites where bird excrement caused significant pollution to the water. The system can also be applied to fish ponds where significant losses may occur from bird predation.

The town of Coaldale was the first commercial user of the system and applied it to one of their 200 metre by 300 metre drinking water reservoirs.

The idea for the deterrent system actually started when the town started using scare guns to try to frighten the birds off their reservoirs. The scare guns weren't working and were raising havoc with area dogs. HKD Developments began designing a system which would be environmentally and ecologically friendly, requiring little maintenance and virtually be invisible to the general public.

This simple but effective system consists of stringing special high tensile wire at 4-metre intervals across the water. The wire creates an ultrasonic sound, inaudible to humans, which acts as a deterrent to waterfowl. It also acts as a deterrent to waterfowl when attempting to land. For longer spans of wire over 30 metres, a compression spring is used on each wire to compensate for thermal contraction/expansion, which can be as much as 160 mm on a span of 244 metres in southern Alberta climatic conditions.

High tensile wire at 4-metre intervals across water.

"When you watch waterfowl and other birds coming in to land, you see that they need a certain amount of distance for their approach, and this wire prevents them from landing," says Herman Kastner, the company founder. "It really works. Even pelicans and great blue herons stay off."

"The prototype system," says Kastner, "was installed on a reservoir which was adjacent to a similar unprotected reservoir. The reservoir with the Waterfowl Deterrent System was completely free of waterfowl while the unprotected reservoir was covered with birds."

"This system would be ideal for application in the fish farming industry," says Svat Jonas, aquaculture engineer with Alberta Agriculture, Food and Rural Development. "Open fish ponds are very vulnerable to predation, especially ponds stocked with fish fry." We have experienced a total loss of fish stock in a dugout stocked with 75 mm Triploid Grass Carp," explained Jonas. Cormorants and blue herons were responsible for the loss. Several other means to protect dugouts against aerial predators have been tried with very little success. Bird scaring devices may work for short periods of time but birds get used to them very quickly. Nets used against predators are costly, difficult to install and also difficult to work around. The Waterfowl Deterrent System is simple, effective and relatively inexpensive. "It seems to be a solution to this problem," states Jonas.

For more information, contact Darryl Kastner telephone (403) 257-0124, Herman Kastner telephone (403) 345-4371 or Svat Jonas, Aquaculture Engineer, Animal Industry Division, Alberta Agriculture, Food and Rural Development, Lethbridge, Alberta, T1J 4C7, telephone (403) 381-5870. ■

Technical Conference

The Annual Technical Conference for irrigation district management, engineering and technical staff will be held on Friday, June 5, 1998 at Ericksen's Family Restaurant. There is no theme as of yet, but keep the date in mind. Please phone Jack Ganesh at (403) 381-5869 for more information. ■

Editor's Notes

This bulletin is designed to provide the operation and management personnel of Irrigation Districts with items of interest in their line of work. If you would like to submit articles or provide us with input, feel free to contact Brian Taylor, the editor, by phone in Lethbridge at (403) 381-5542 or e-mail brian.taylor@agric.gov.ab.ca.

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