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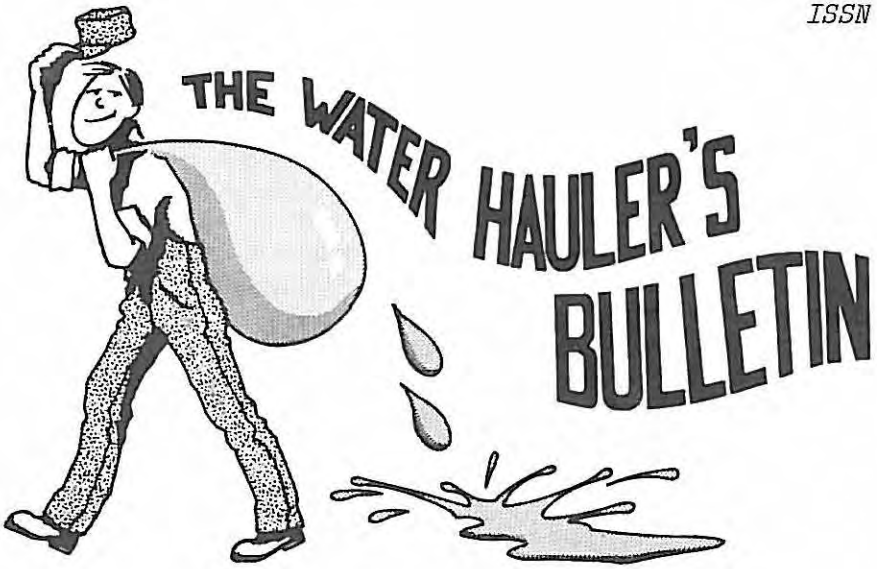

VOLUME 19, SPRING 1985

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A BIOLOGICAL ALTERNATIVE?

The use of herbivorous fish for controlling aquatic weeds is relatively new in North America. However, the Soviet Union, Israel and Egypt are using fish successfully in irrigation systems to control aquatic weeds.

Herbicides and the mechanical cleaning of canals have proven to be only partially successful in ridding irrigation systems of aquatic weeds. Heavy growths of these plants in the canals are well established by the time our water temperature is warm enough for chemicals such as acrolein to be effective.

Fish weighing 9 to 14 kg have been reported. They can eat several times their weight in weeds a day.

Since 1980, the Bureau of Reclamation in cooperation with U.S. irrigation districts, has been studying the use of herbivorous fish to control aquatic weeds in their canals. The study includes five major areas of research: verifying the fish's sterility, collecting data on physical, biological and chemical characteristics of the study area, developing methods of handling fish and preventing their escape from the study area, determining environmental impact of the fish, and finally evaluating their effectiveness as weed control agents. Dr. Paul Beaty, Director of Aquatic Research, Coachella Valley Water District states "the initial study is now complete and the preliminary report will be published in the near future".

Dennis Breitzman, who is Chairman of the U.S. Hybrid Grass Carp Steering Committee, states that they are currently studying a triploid of the white amur carp which has an extra set of chromosomes which makes it sterile. Thus, there is no danger of introducing a fish capable of reproduction, and spreading at the expense of a native species.

Proposed for 1985 with permission of the Fish & Game Commission is an "Operations Study" whereby up to one half million of these sterile white amur carp will be released in the irrigation canals. At the conclusion of this "Operations Study", decisions will then be made as to whether the sterile white amur is a possible answer to controlling aquatic weeds. We'll keep readers posted as more information from Dr. Beaty is made available.

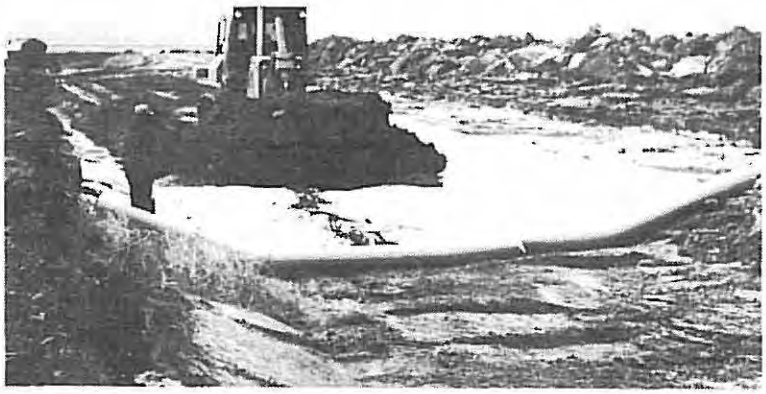
* * *

USE OF GEOTEXTILES IN IRRIGATION INDUSTRY

What are Geotextiles? Geotextiles are a generic name given to support and filter fabrics that are placed in contact with the soil during construction. The purpose of the fabric is to help stabilize poor soil conditions. This is only one of several methods used in the construction industry where a reinforcing material such as a geotextile is used for strengthening soils. It has been widely used in road building and is now being tried by some of the Irrigation Districts in areas where high water tables exist under irrigation canals and structures. Generally speaking in areas where there are poor soil conditions on which to build on.

Geotextiles are manufactured from synthetic fibres such as polymides, polyester or polypropylene. Fabrics are not subject to biological degradation and are resistant to chemical attack. When placed in the soil, geotextiles basically perform three essential functions. First, they provide a separation for dissimilar materials or soils where if they were allowed to be mixed would possibly weaken a structure. Secondly, they provide inherent tensile strength to hold a structure together. Thirdly, they restrain soils from movement and still allow free passage of water through and along the plane of the fabric.

The Lethbridge Northern Irrigation District (L.N.I.D.) has used geotextiles in their construction work and according to Allan Herbig, District Engineer, "the results have been good". The District placed a geotextile called "Bidim U19" under a stretch of proposed concrete lined canal near Monarch where soil conditions were poor because of a high water table. The fabric was placed approximately 600 mm below the bed of the concrete lining and spanned it for the full canal section. At still another site the L.N.I.D. installed the same fabric under a large diameter concrete pipeline to stabilize the trench bottom prior to laying pipe. The District felt that it was less costly to use the geotextile rather than over-excavation and bringing the grade back with gravel. Cost of the fabric only on the above project ran at $1.12 per square metre.



Geotextile being used for stabilization of earth pad for concrete lining.

The Western Irrigation District (W.I.D.) and Eastern Irrigation District (E.I.D.) are two other Districts which have used geotextiles. The fabric was placed directly under rock riprap on a W.I.D. project. To avoid sloughing of the riprap on sandy soil, geotextiles were used instead of a graded gravel bedding. In this case it was a cost saving to use a geotextile instead of a gravel bedding to solve the problem. In the E.I.D. the fabric was used under precast chute drop structures to help stabilize soil, prevent soil movement, and provide drainage under the structure.

Geotextiles are available in various thicknesses ranging from 1.38 mm to 2.8 mm which are designed for various applications. Various widths are also available depending on the manufacturer selected. It is suggested that Districts should refer to manufacturer's recommendations as to the use of and installation of geotextiles.

* * *

REMINDER OF CANADIAN WATER RESOURCES ASSOCIATION CONFERENCE

The Canadian Water Resources Association will hold its 38th Annual Conference in Lethbridge, Alberta on June 26-28, 1985. This year's Conference will focus on the "Management of Water Resources to enhance, expand and intensify agricultural productivity in Canada".

Contact: Mr. R. Bruce MacLock, Conference Chairman, Alberta Environment, 9th Floor Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, T5K 2J6 (Phone 427-8985).

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USE OF MAGNACIDE H FOR AQUATIC WEED CONTROL

Earth irrigation canals provide an excellent home for aquatic weeds. Every year, operators must deal with canal reaches that have lost some, if not most, of their carrying capacity as a result of aquatic weed growth. When this occurs, canals can be pushed to the brink of overflowing in order to meet water demand downstream. Controlling aquatic weed growth can involve the use of herbicides, mechanical ditch cleaning or installation of canal linings.

Magnacide H (acrolein) is a herbicide used routinely by irrigation districts to control aquatic weed growth in canals during the summer months. The product is injected under pressure into flowing water from a stationary shore position. Applications normally last three hours, with the herbicide travelling downstream as a wave; much like a piston in a cylinder. Residues do not remain after the end of the wave has passed any particular point. Aquatic weeds contacted by Magnacide H, are affected almost immediately. Plant cells are destroyed, the weeds turn brown and eventually disintegrate. The activity of Magnacide H is contact in nature, so only exposed vegetation is affected - underground portions such as roots, tubers, or rhizomes remain viable. The chemical acts much like a mower, removing only topgrowth and leaving underground portions of the plant to regrow. Retreatments are necessary as weed growth returns.

Magnacide H does not remain in irrigation water for a long time. Concentrations can drop to zero anywhere from eight hours, to about 27 hours after application, depending on where or when the application takes place. The persistence, or lifespan of Magnacide H, will differ from canal to canal, being influenced by a number of environmental factors including pH, water temperature, weed density and size, intensity of sunlight, and amount of suspended and dissolved material in the water. The lifespan of Magnacide H in a given canal is independent of the initial concentration used, therefore, an increase in application rate will not result in an increase in downstream travel before complete dissipation occurs.

As the lifespan of Magnacide H will differ in each canal, so will its effectiveness in controlling aquatic weed growth. Sago pondweed, for example, may be controlled at 0.75 ppm in one canal but may only be slightly affected by 0.85 ppm in another. The same environmental factors that influence lifespan, also come into effect here. Also, aquatic weed species will vary in their susceptibility to Magnacide H. Richardson pondweed is more resistant than Sago pondweed while Water plantain is more resistant than Richardson pondweed.

To optimize Magnacide H effectiveness, an applicator should be able to predict how the herbicide will behave in a given canal, and make each application accordingly. This involves an awareness of expected Magnacide H lifespan, the aquatic weed species present, and what Magnacide H concentration will affect each weed species. The applicator should also be sure that application equipment is operating properly to provide the desired concentration in the water. Obtaining the desired Magnacide H concentration depends on correct judgement of canal flow,

maintenance of clear lines and orifices, and having regulators, valves and gauges in working order. Losses in desired concentration by as much as 60% could occur if poor calibration and inoperative equipment are used.

The producers of Magnacide H have recently made available a monitoring kit that can be used to measure Magancide H concentration in irrigation water. The instrument is indispensable both as a check on application accuracy and in determining Magnacide H lifespans and weed sensitivities to the chemical.

Magnacide H is a product that can be safely used to control aquatic weed growth in canals while an irrigation system is operating. Caution should be taken during the lifespan of the chemical to prevent release of treated water into potable water dugouts, stock ponds, fish ponds or natural water courses.

For assistance in dealing with aquatic weed problems, please contact Rob Burland in Lethbridge at 329-5511.

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WINTER'S AFTERMATH

Who has seen the wind? We don't know, but what we do know is that the St. Mary River Irrigation District has developed a very effective method of clearing their ditches of the wind's aftermath. Drifted snow and topsoil after a good old "blow" often fill their canals and drains completely as can be seen in the accompanying picture.

To open these, with conventional hydraulic hoes, is both slow and costly. Not so, with their Baker V-plough mounted on a case crawler. Simply run the "cat" into the middle of the snow packed canal, lower the plough, and proceed. If the going gets tough, they provide additional power with cats on each driving bank. Bob Baird, SMRID's plough operator, estimates he can plough out a 1 km section in about one hour. This provides enough of a channel to get water running.

* * *

SURETY BONDS

The function of the Surety Bonds is not often understood by many in the construction industry. Yet, they have been an integral part in the industry for decades. Bonds are not an insurance policy. Insurance is an agreement whereby the Insurer, for an agreed premium, agrees to indemnify the Insured for a loss arising from a peril.

On the other side, a Surety Bond is a three party agreement between the Owner (Obligee), Contractor (Principal) and Surety Company (Surety). The Surety Company agrees to indemnify the Owner against suffering a loss arising from the Contractor failing to perform his obligation under the agreement. However, the Surety Company will look to the Contractor for reimbursement of any loss.

There are three main types of Surety Bonds in use today: Bid Bond, Performance Bond, and Labor & Material Payment Bond. In this article let's look at the bid bond and performance bonds.

The Bid Bond

The Bid Bond guarantees that a Contractor whose tender is accepted will within a specified time period enter into a contract. If the Contractor should decline, then he is legally bound to pay the Owner the difference between his tender price and the next tender price that the Owner accepts. The Surety Company will not pay this difference if the Contractor is financially able to do so on his own. In any case, where the Surety Company becomes involved, they will look to the Contractor for repayment.

The dollar value of a bid bond should not exceed 10% of the tendered price. The Contractor should not be penalized anymore if for some reason he cannot enter into a contract. The usual reason a Contractor is not inclined to enter into an agreement is that a mistake was made in his tender preparation. Bid securities of unsuccessful bidders are, of course, returned to them.

The Bid Bond does not guarantee that the Surety Company will provide a Performance or Labor & Material Payment Bond. In order to get this guarantee the Owner in his tender call must stipulate that a "Consent of Surety" must accompany the Bid Bond. This form from the Surety Company states that if the Contractor's bid is accepted they will issue a Performance Bond and if required a Labor & Material Payment Bond.

The Surety Company charges an annual service fee of between $250.00 and $500.00 per year to provide the Contractor with bid bonds and Consent of Surety.

Performance Bond

The basic function of the Performance Bond is to provide protection to the Owner up to the specified percentage amount of the bond if the

Contractor should default. Performance bonds cover the cost of completion of the works for which the Surety Company is liable, the total amount of such completion is limited to the amount of the bond.

The cost of a Performance Bond (50% guarantee) is $3.50 per thousand of the total Contract Price. A 100% bond is $5.25 per thousand. This price usually includes a "Maintenance Period" in which the Contractor guarantees this work against faulty workmanship appearing within a period of one year from the date of Substantial Performance of the work.

A performance bond is not intended to cover payment of labor and material claims. If this protection is needed, a District should insist on having a Labor & Material Payment Bond.

To be enforceable like all bonds, a bond must be in writing and be given under seal or be given in return for valuable consideration. If the bond is under seal, it is not necessary to show consideration for the Owner to take the benefit of the bond. Thus, the seal is of upmost importance, because most bonds are paid for by the Contractor, and he likely was not given valuable consideration.

Once the performance bond has been executed, one is inclined to place it away and not worry about it. This is a mistake. The fact the bond is in place does not necessarily lead to the conclusion that upon abandonment or default in fulfilling the terms of the project by the Contractor the Owner will be protected. Any claim suites by the Owner have to be instituted within the two years from the date in which the final payment falls due.

In case of default the Owner should:

1. Declare in writing immediately to the Surety Company any failure or default by the Contractor.
2. Discuss with the Surety Company what options are available - for accepting another bidder or where cost of the work is deemed to be greater than the amount of the bond the Surety Company may elect to pay the amount of the bond.
3. Keep the Surety informed in writing - avoid unilateral action.
4. Keep good records of extra costs and time incurred because of the default, the Surety Company may be liable for these extra costs.

The Owner must recognize one more problem that of variation or alteration of the Contract Documents. It is of the upmost importance of any Owner in terms of building contracts to clear all variations or alterations of substantial effect with the Surety Company prior to their commencement. Failure to do so may release the Surety of any obligations thereunder.

The Project Planning Branch is endeavoring to organize an Alberta Construction Law Seminar to better familiarize Managers and Engineers with bonds, disputes, litigation, etc. We'll keep readers posted as to when and where.

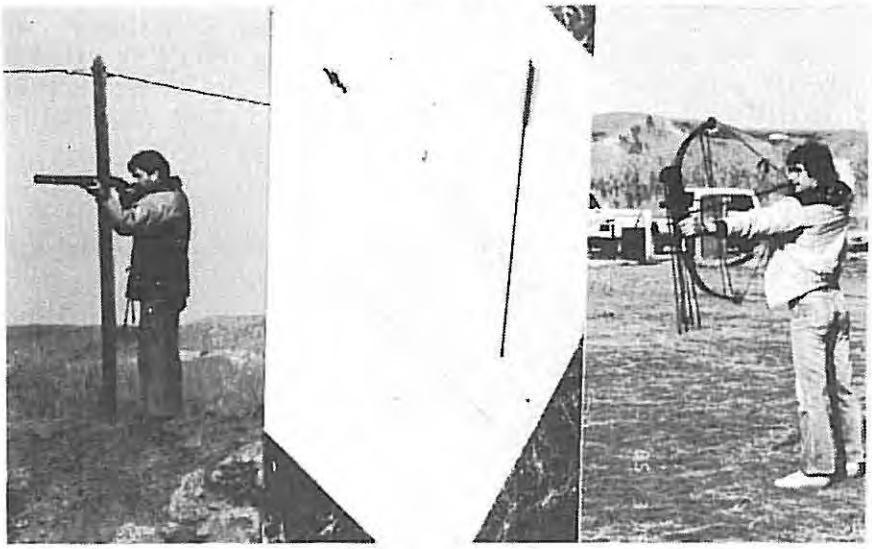
* * *

EXPOSED LINER/VANDALISM

Out of sight out of mind. Not so with the exposed canal liners, for they are not covered with any backfill material. Vandalism, everyone's headache may pose a threat to this type of liner. Although we know of no instances involving vandalism, the question remains what damage could be easily inflicted to them?

Recent testing by the Research Section of the Project Planning Branch, found that indeed high density polyethylene, fibreglass and elastomeric asphalt material were easily penetrated and damaged with #4 pellets from a shotgun, rifle bullets, and arrows tipped with target and broadhead points. The liners were held in place by spikes against an earth side slope, and then subjected to blasts and shots ranging in distances between five and fifty metres. All three liners were also penetrated by stabbing with a hunting type knife. It was also found that the high density polyethylene and asphalt liners could be cut with a jack-knife.

From the tests it can be assumed that vandalism by any of the above means could result in "washout of the liner" and shutdown to the entire system. For complete test results please contact Svat Jonas at 329-5164.



Fibreglass liner penetrated by both #4 shot & arrow at fifty metres.

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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 at 329-5164, Lethbridge.

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