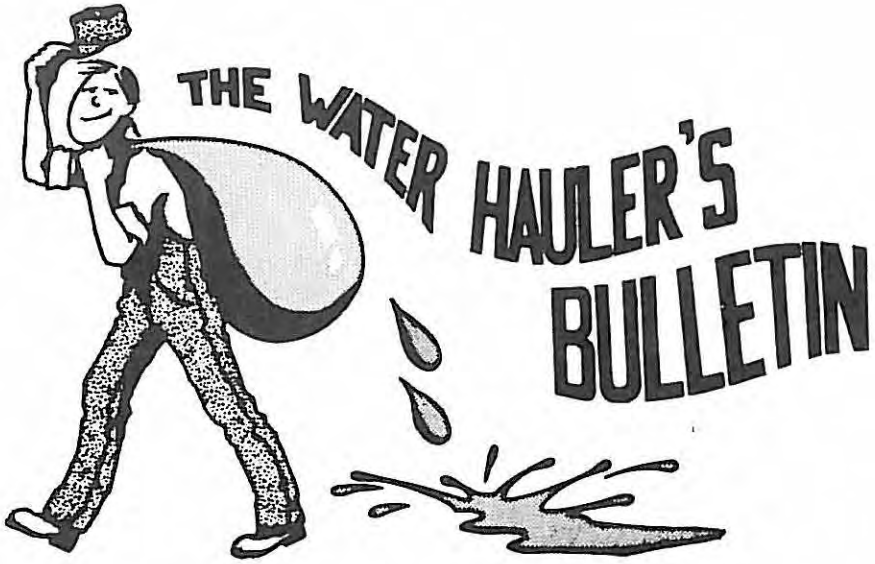


VOLUME 11, SPRING 1983

Salinity Mapping	*p.1-2*	*Shallow Till Soils*	*p.6-8*
General Rehabilitation Plan	*p.2-3*	*Concrete Inventory*	*p.8*
Precon Manufacturing	*p.3*	*The Mosquito Problem*	*P.8-10*
AWAPLAN Liner	*p.4*	*Hyprotec Pipe*	*p.10-11*
Points of Clarification	*p.5*	*Schlegel Lining*	*P.11*
Windmills	*p.6*	*Organization Chart*	*p.12*

Insert - Irrigation Scheduling

SALINITY MAPPING

There is need for an accurate inventory to identify the location, extent, severity and rate of change of saline/waterlogged lands within irrigated Alberta. In the past, some work with air photos has been done to this end but due to high time and manpower requirements, inventories have been sporadic or restricted in detail and quality.

The Irrigation and Conservation Division is currently involved in a Salinity Mapping Project to obtain an up-to-date inventory of saline/ waterlogged lands as part of its overall objective towards the General Rehabilitation Plan. The project is being carried out at two levels of accuracy. Where time and manpower permits, the staff of the Land Classification Branch are identifying and mapping affected areas in conjunction with Level III land classification mapping. On remaining irrigated lands a much

Saline/Waterlogged Sugar Beet Land

faster but less accurate method of mapping is being performed as a service to the Irrigation and Conservation Division. PFRA staff are conducting a "visual only" mapping inventory of these remaining lands.

Once the initial inventory is completed, there will still be an urgent need to regularly monitor the rate of change in both severity and location of saline/waterlogged areas. For this purpose Landsat satellite data holds promise. This possibility is currently being evaluated by the Salinity Control Section, and others.

Once every 16-18 days a Landsat series satellite passes over Alberta recording electromagnetic light values from parcels of land greater than 1 acre in size. These individual values can later be used to create a "composite picture" of existing conditions. But this information can also be analyzed by computer and as such holds great promise as a means of rapidly and repetitively monitoring changes in salinity/waterlogging.

The Salinity Control Section recently completed a pilot project to evaluate the potential of Landsat digital data to detect, map and monitor salinity/ waterlogging. Results to date have been promising but much development work remains. Satellites detect only limited information and computers have yet to be trained to recognize many of the patterns and features essential to salinity monitoring. However, newer satellites are collecting improved data and better methods of analyzing Landsat information are being developed.

The Irrigation and Conservation Division's current Salinity Mapping Project is the first requirement necessary to effectively map and monitor saline/waterlogged lands. As this data base is being collected, the Salinity Control Section is working toward the development of a practical method to utilize Landsat satellite data for future monitoring. Those interested in the current Salinity Mapping Project or Landsat salinity mapping can contact Brook Harker, Head, Salinity Control Section at 329-5159.

* * *

UPDATE: GENERAL REHABILITATION PLAN

The purpose and format for the General Rehabilitation Plan (GRP) was originally reported on in the January 1982 Bulletin. Since that time some changes in the plan have taken place.

Early in 1983, Irrigation Council requested that preliminary reports and cost estimates be provided in advance of the detailed plan. These preliminary cost estimates and reports are now nearing completion for each of the thirteen Irrigation Districts and will be submitted to Irrigation Council in the very near future.

Because of the need for a preliminary report only four basic types of systems have been proposed: (1) Earth Channel; (2) Buried Membrane Lined Canals; (3) Hard Surface Exposed Linings; and (4) Buried Pipeline Systems.

After completion of this preliminary report, it is expected the overall plan will be continued to completion with a target date of December 1984. The following is a breakdown of the status of the overall GRP.

Orthophoto base maps	100% complete
Conceptual design & cost estimates	50% complete
Layout & sizing	40% complete
Land Classification	50% complete
System inventory	75% complete

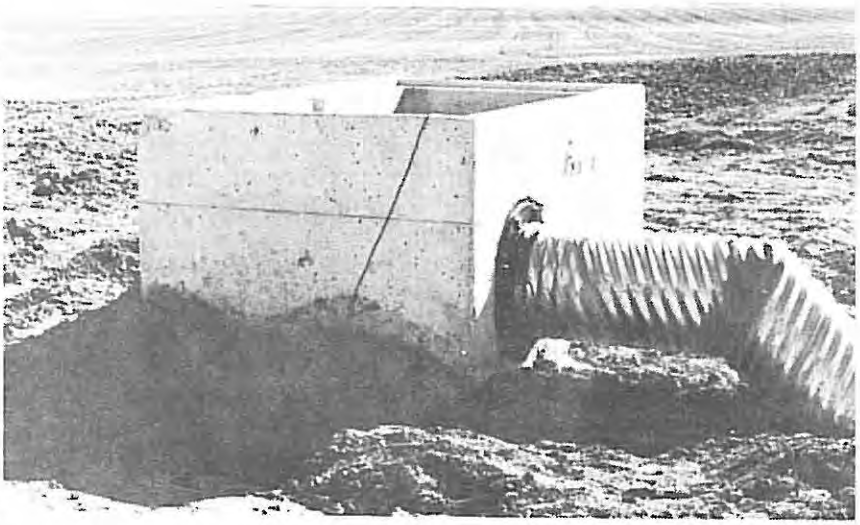
The Project Planning Branch wish to thank the many District staff and Board members who have devoted their time and effort to the preparation of these plans and cost estimates.

* * *

PRECON MANUFACTURING CATERS TO IRRIGATION WORKS

It has been brought to our attention that Precon Manufacturing, a precast concrete firm situated in Lethbridge, is presently involved in the production of precast concrete structures for irrigation works. Precon Manufacturing was established in 1980 and has been manufacturing square and rectangular concrete vault chambers mainly for irrigation farm turnouts.

The sizes of structures presently available include 1220 x 1220 mm, 1550 x 1550 mm, 1830 x 1830 mm, 1220 x 2440 mm and 1830 x 2440 mm. The heights of precast sections may be made to any requested specification. The section joints are tongue and groove type and may be sealed with Kent seal or other mastic. Sizes of structures are not limited to the above as the firm will precast to a client's design and specification. The strength of the sections may vary depending on the type of concrete and schedule of rebar called for by a client. Divider walls may also be cast into the structure if so desired. Holes are left in the structure to any size and location as required by a client. If preferred, Precon will install pipe stubs, flanged or otherwise; cast in Lethiron gates, etc., into the structure at their plant. Several of these structures have been used by the SMRID.



Typical Precon Precast Turnout Structure with Overflow

Precon Manufacturing is, at present, investigating the possibility of precasting main canal turnout structures in panel form and also square or rectangular drainage pipe (box culvert).

Should you require further information, contact J. Cunningham, Precon Manufacturing, 3110 - 2 Avenue North, Lethbridge, Alberta, phone 327-2711.

* * *

AWAPLAN - THE NEW LINER

A product which has been used conventionally as a roofing membrane can now be found lying in the ditches of the Western Irrigation District as an exposed canal liner. This product known as AWAPLAN was developed in Germany to meet the changes in roofing design practices and has been in use since 1972. AWAPLAN is a reinforced elastomeric membrane with outstanding physical characteristics which make it suitable for application in our Canadian climate.

AWAPLAN features a Trevis spun-bond polyester reinforced mat which can accommodate stress. This is a continuous strand product utilizing a patented needle punch process which randomly rearranges and crisscrosses fibres in all directions. The mat is fully saturated with a special elastomeric asphalt which is ideally suited to the polyester mat. A layer of lightweight mineral granules are deeply embedded into the top coating. With this unique combination of materials AWAPLAN has the following characteristics:

- unique multi-directional strength properties
- elongation capability exceeds 70%
- will withstand extreme cold without cracking
- excellent tear strength and a high tensile strength
- exceptional puncture resistance
- resists flow at high temperatures on sloped surfaces
- resistance to ultraviolet deterioration

The WID installed a test section of AWAPLAN in the fall of 1982. The site conditions were adverse with severe seepage downslope, saturated canal banks and a poorly shaped cross section. AWAPLAN was prepared for installation on a platform which advanced longitudinally along the canal as the membrane was lowered into the canal. The membrane easily conformed to the irregular shaped canal. Although the WID has not operated a season with the asphalt membrane in place, they expect that seepage from the canal will virutally be eliminated as AWAPLAN has a permeability of less than 10^{-8} cm per second.

Compared to buried membrane liners AWAPLAN is superior in that damaged areas can easily be detected and simply repaired by heat welding the appropriate size patch over the damaged area. Compacted backfill is not required to protect the liner nor to hold the liner in place. AWAPLAN has a weight of 5.3 kg/m^2 (1.1 lb/ft^2) which is sufficiently heavy to hold the liner down, except in very high wind situations where a trench may be required to key the liner.

In comparison with other exposed liners, such as slip-form concrete, AWAPLAN has definite benefits. Far less site preparation is required prior to the installation of AWAPLAN and less sophisticated equipment is required to install AWAPLAN. Differential settlement is a serious problem with concrete lining but not so with AWAPLAN since it possesses superior flexibility characteristics.

The WID will be installing another section of AWAPLAN sometime in April. Those interested in attending this installation should contact Alan Winter at 934-3542. Those interested in more inforamtion about this product may contact Leo Boychuk at 279-8399 in Calgary.

* * *

AWAPLAN Liner Sections Being Joined by Torching

* * *

POINTS OF CLARIFICATION

We would like to provide an explanation for a couple of points which were questioned by our readers concerning the article about Video Inspection of Irrigation Pipelines in the Water Hauler's Bulletin, Volume 10, Winter 1982. First of all, the research on the inspection of pipelines is far from complete. In 1983, we hope to obtain much more data and therefore improve our statistics. Results published were not the final conclusions. Also, the Pipeline Deflection Classes were set deliberately after review of the sources listed below. We do not have any intention of challenging ASTM specifications which limit allowable deflection to a maximum of 5%. The deflections of 0-15%, 15-25%, 25-50% and over, were set on the basis of possible material failure over a long period of time. However, after additional research work and discussion of the results with noted authorities on pipe installation and bedding requirements, the classes may be revised.

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(1) Janson, L. (DSc) and Molin, J. (DSc). Design and Installation of Underground Plastic Sewer Pipes. Paper presented at the ASCE International Conference on Underground Plastic Pipe in New Orleans, Lousiana in 1981.

(2) Janson, L. (DSc). Plastic Gravity Sewer Pipes Subjected to Constant Strain by Deflection. Paper presented at the ASCE International Conference on Underground Plastic Pipe in New Orleans, Lousiana in 1981.

(3) Gaube, E. (Dr) and Mueller, W. (Dr). 12 Years of Deformation Measurements on Sewer Pipes from Hostalen GM 5010. Paper presented at the ASCE International Conference on Underground Plastic Pipe in New Orleans, Lousiana in 1981.

* * *

RETURN OF THE WINDMILL

As most of us are aware wind is one of southern Alberta's more noticeable (and important) renewable energy resources. Prior to the development of hydro-electric power most rural Albertan's utilized this energy to pump water through the use of the familiar multi-bladed wind turbine (windmill). After an absence of some 40 to 50 years we may once again see these old-style wind turbines plus a new generation of turbines being used to pump drainage water from subsurface drainage systems where gravity outlets are unavailable and traditional power sources are located too far away.

To evaluate the potential of wind turbines for pumping water a cooperative study is being carried out by the Drainage Branch (Irrigation and Conservation Division), Alberta Research Council and Jensen Engineering to evaluate six different types of turbines currently being manufactured. These turbines are presently being set up along the SMRID main canal immediately north of the Research Station on Mr. Mike Bitango's property. Each turbine will have its own sump and water supply and will be monitored continuously throughout the irrigation season to evaluate pumping rates, etc. related to existing wind conditions.

Installation of all turbines is expected to be completed by June 1983 with monitoring to continue through to the summer of 1984.

Once the site is completed we will be happy to organize tours for anyone interested in seeing the various types of turbines currently available and operating under actual field conditions. For more information contact Wayne Ulmer (329-5514) or Brent Paterson (329-5515).

Bowjon Wind Turbine Already Installed and Working on Site

* * *

IRRIGATION AND DRAINAGE OF SHALLOW TILL SOILS

The permanency of irrigation in southern Alberta has been questioned for many years due to the presence of glacial till at shallow depth throughout most of the irrigated area. Maierhofer (1956) stated that many of the irrigated lands and those being developed for irrigation in Alberta are experiencing, or will experience, serious subsurface drainage problems. Stanley/SLN Consulting Limited (1978) concluded that subsurface drainage is the only method available that will allow sufficient water to flow through the soil profile to maintain a

favorable root zone salinity level in most irrigated areas of the Oldman River Basin. Several studies provide evidence, however, that natural internal drainage is adequate to accomodate precipitation and current irrigation practices in southern Alberta.

Studies related to the behavior of the water table under normal irrigation practices were initiated in the Vauxhall District, Bow River Project, wherein 45 percent of the irrigable land has till within 90 cm of the surface. Rapp and van Schaik (1971) concluded that the duration and frequency of occurrence of water tables shallower than 122 cm was insignificant, even under the most intensive irrigation schedule. They attributed rapid recession of the water table after an irrigation mainly to consumptive use but also to natural downward movement. A 15 year water table study (Rapp and van Schaik 1972) indicated that the seasonal mean water table depth was 169 cm (±10 cm) and no serious drainage problem was considered to exist in the Vauxhall District.

Salinization of soils underlain by slowly permeable till was also studied in the Bow River Irrigation District (B.R.I.D.) near Vauxhall, Alberta. Maximum crop yields and an adequately low level of salinity were maintained in a Brown Chernozemic (Chin loam) with till at 100 to 200 cm (Krogman and Hobbs 1972). Sommerfeldt and Oosterveld (1977) concluded that continued irrigation under present management appears favorable if till is at depths of 150 cm or more and the soil above it is moderately or well drained. Continued irrigation under present management was considered questionable where till is within 60 cm of the surface. However, a study (Sommerfeldt and Chang 1980) of water and salt movement in a saline-sodic loam having till at 51 cm indicated that internal drainage of this soil is sufficient to accomodate infiltrated water under normal conditions. This soil had become salinized primarily from seepage or possibly irrigation mismanagement. Oosterveld et al. (1978) concluded that the long term salinity status of soils in two drainage basins in the B.R.I.D. appears to be quite stable. Slow downward movement of water appears to be adequate to maintain the soil-salt balance under the climatic and water management conditions in the area.

Chang and Oosterveld (1981) studied changes in soil salinity after long term irrigation at 13 sites within four major irrigation districts. These soils were underlain by relatively slowly permeable tills. The soils and substrata at these sites have sufficient internal drainage to prevent waterlogging and soil salinization from becoming problems under normal irrigation. Sufficient water had been applied from irrigation and precipitation to leach salts from the root zone and maintain productivity for 60 years (10 sites) and 25 years (3 sites). Further study of soils in the Tilley area indicated that a leaching fraction of 0.16 was sufficient to reduce the total soluble salt content of two soils (a Brown Chernozemic and a Brown Solodized Solonetz) and thereby improve the suitability of the sites for crop production (Chang et al. 1982).

Natural leaching from winter and spring precipitation, snow and ice melt, coupled with a low evapotranspiration rate and a relatively short season (2 months) of high evapotranspiration, have been noted as factors reducing the danger of widespread salinization in southern Alberta (Sommerfeldt and Oosterveld 1977). The hydrogeological characteristics of glacial till may also account for successful long term irrigation. Nielsen (1971) reported a net outflow of water during the winter months through the slowly permeable substrata. Grisak et al. (1976) and Nielsen (1971) observed visible vertical

cleaveage lines in the glacial tills studied. These fractures are typically coated with secondary mineral precipitates. The bulk hydraulic conductivities of the fractured tills are generally one to three orders of magnitude greater than the intergranular conductivities determined in laboratory tests. Groundwater velocities in the fracture networks may be many orders of magnitude larger than in the unfractured till mass (Grisak et al. 1976). A hydrogeological study of a shallow till area in the B.R.I.D. (Hendry 1980) indicated the presence of large scale fractures in the weathered till which were sufficiently permeable to permit movement of irrigation water to the groundwater flow system and to prevent development of a perched water table above the till.

In southern Alberta, fine textured soils, and soils underlain by glacial till at shallow depth, have been irrigated successfully under careful water management without development of a high water table and associated salinization of the root zone.

FROM: "Manual for Land Irrigability Classification in Alberta 1983" by Staff of the Land Classification Branch.

* * *

CONCRETE INVENTORY TIME

Like the return of the robin a sure sign that Spring is once again upon us is the 265 kilometres of biogradable string which is left behind as a reuslt of our concrete slip-form lined canal crack study. Results of the inventory will be published in our summer issue. Sure hope the robins don't try and build their nests with it.

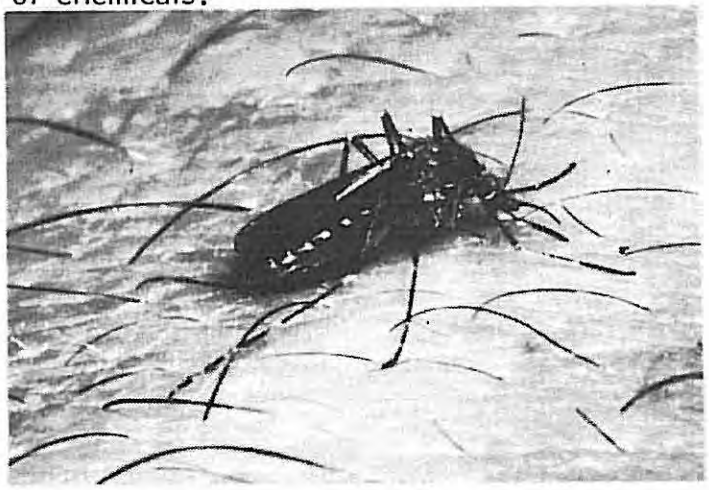
* * *

THE MOSQUITO PROBLEM

One of the more painful problems associated with irrigation is that it often creates mosquito habitats. It seems ironic that even though this problem demonstrates its presence by annoying and persistent biting, very little has been done to solve it without the use of chemicals.

This year while operating or managing irrigation systems, give some thought as to why there are so many mosquitoes around. Instead of just flattening them -- there are always many more to take their place -- think of more effective ways and methods of control.

Neglected roadside ditches can be said to account for the majority of mosquitoes produced each year. The irrigation of pasture and the careless random flooding of land to fill stock ponds is the next greatest producer. Canal seepage is another



One of the 16 Species of Mosquitoes Found in Southern Alberta

annual cause of standing water, but this problem cannot easily be rectified; although new systems of lining canals are helping.

The use of pesticides to control mosquitoes requires, under Regulation 214/80, Section 3 (1:K) of the Agricultural Chemicals Act, that the applicator be in possession of a valid Class "L" licence. In addition Regulation 213/80, Section 3 states that to apply a pesticide to any open body of water requires a permit from the Minister.

The use of chemicals in irrigated areas would not be a logical and long-term solution. Firstly, it would mean the use of large amounts of chemical at great cost and detriment to the environment, and secondly, pesticides used on or in irrigation water could be subject to dispersal throughout the irrigation system. This could affect wildlife and domestic livestock. (Regulation 213/80, Section 3 would apply here.) For these reasons it is not recommended that pesticides be used for grand-scale mosquito control. Rather look towards physical control methods.

Water Ponding in Borrow Pit Provides Excellent Mosquito Habitat

However, there are a number of commercial and domestic chemicals available for control of mosquitoes. Larval control may be achieved by using the more common larvicides such as abate, dursban or malathion. Adult control is not recommended, except where a health hazard exists. Baygon, malathion or methoxychlor may then be used.

Any temporary or semipermanent body of water is subject to invasion by the mosquito, especially if that body of water is produced annually. The larvae that become mosquitoes live in stagnant water. Physical control is an obvious and permanent solution and is quite simply the removal of mosquito habitats (sometimes referred to as "breeding sites"). Any action that results in the elimination of standing water will reduce the number of mosquitoes produced annually. This would be the preferred method of control. However, elimination of habitats would be dependent on whether wildlife habitats or refuges would be affected.

Examples of physical control would be cleaning debris from farm ditches so they can drain properly, filling in lowlying areas or draining them, channelling water to fill stock ponds, etc.

Mosquito control programs in Alberta operate on the integrated principle. That is, using all methods of control in a logical manner. A successful integrated program meets two basic requirements: (1) it enhances natural control; and (2) it utilizes all suitable methods of control (natural, biological, physical and chemical) in a compatible manner. The main message in this article, which is part of a mosquito awareness program in operation through Alberta Environment, Pesticide Chemicals Branch, Pollution Control Division, is to bring your attention to the mosquito problem.

You may encounter many causes of standing water during the course of your duties. Make a note of them and, if possible, see if they can be eliminated. Let's see if we can take the "BITE" out of farming, and make outdoor work and recreation more pleasant.

For more information on mosquito control contact your Agricultural Fieldman, District Agriculturist or Alberta Environment, Pesticide Chemicals Branch, Pollution Control Division: Calgary 261-8271, Edmonton 427-5855.

* * *

HYPROTEC PIPE & FITTINGS FOR WATER TRANSMISSION IN CORROSIVE SOILS

Canron, using the many years of experience in the manufacture of concrete cylinder pipe (Hyprescon) and state of the art technology, has developed a special fibre reinforced polymer concrete coating for its ductile iron pipe in corrosive soils called "Hyprotec", meeting or exceeding all AWWA standards.

Hyprotec's core, ductile iron, has been a standard in the waterworks industry for many years. It has all the mechanical properties necessary for durable, long life, maintenance free system.

(1) Ductility: ductile iron has mechanical properties similar to mild steel. It has the ability to stretch or deform without cracking when over-stressed (10-15% elongation capability as compared to 22% for mild steel).

(2) Strength: superior tensile strength of 414 MPa (60,000 psi) and ability to withstand high beam loads generated by unstable or expansive soils and deep frost penetration, is combined with high working pressures up to 2.4 MPa (350 psi).

(3) Toughness: excellent resistance at all temperatures to shock or impact due to improper handling, water hammer 690 KPa (100 psi allowance) and live loads induced by heavy equipment.

(4) Flexibility: manufactured with a reliable high compression "Tyton" bell and spigot joint for ease of laying, with up to 5 degree joint deflection available.

Hyprotec Being Installed in Highly Corrosive Soils

Hyprotec was developed to enhance the performance of ductile iron pipe in corrosive environments. The special fibre reinforced sulphate concrete resistant coating provides high resistance to salts, sulphates, stray current, impact and deflection. Hyprotec pipe is lined with a high density sulphate resistant concrete to AWWA standards.

According to Bob Brick of Canron, "valuable installation dollars can be saved as Hyprotec pipe does not require any special handling, bedding or backfill requirements; a flat bottom trench with loose backfill is all that is required."

For further information on Hyprotec pipe contact Bob Brick at 235-1331 or Gerry Weber at 471-3055.

* * *

SCHLEGEL LINING INSTALLATION

The first week of May has been tentatively scheduled by the United Irrigation District to install in Lateral A1 the new exposed 80 mil Schlegel lining.

The District welcomes you on the construction site, however, they would like you to make arrangements (ahead of time) with their Manager, Kurt Woolf, by contacting him at 626-3255.

Schlegel lining will be featured in an article in our summer edition.

* * *

Alberta Agriculture has announced a reorganization and consolidation of its water and soil resources sectors. The new Organization Chart is shown on the back page.

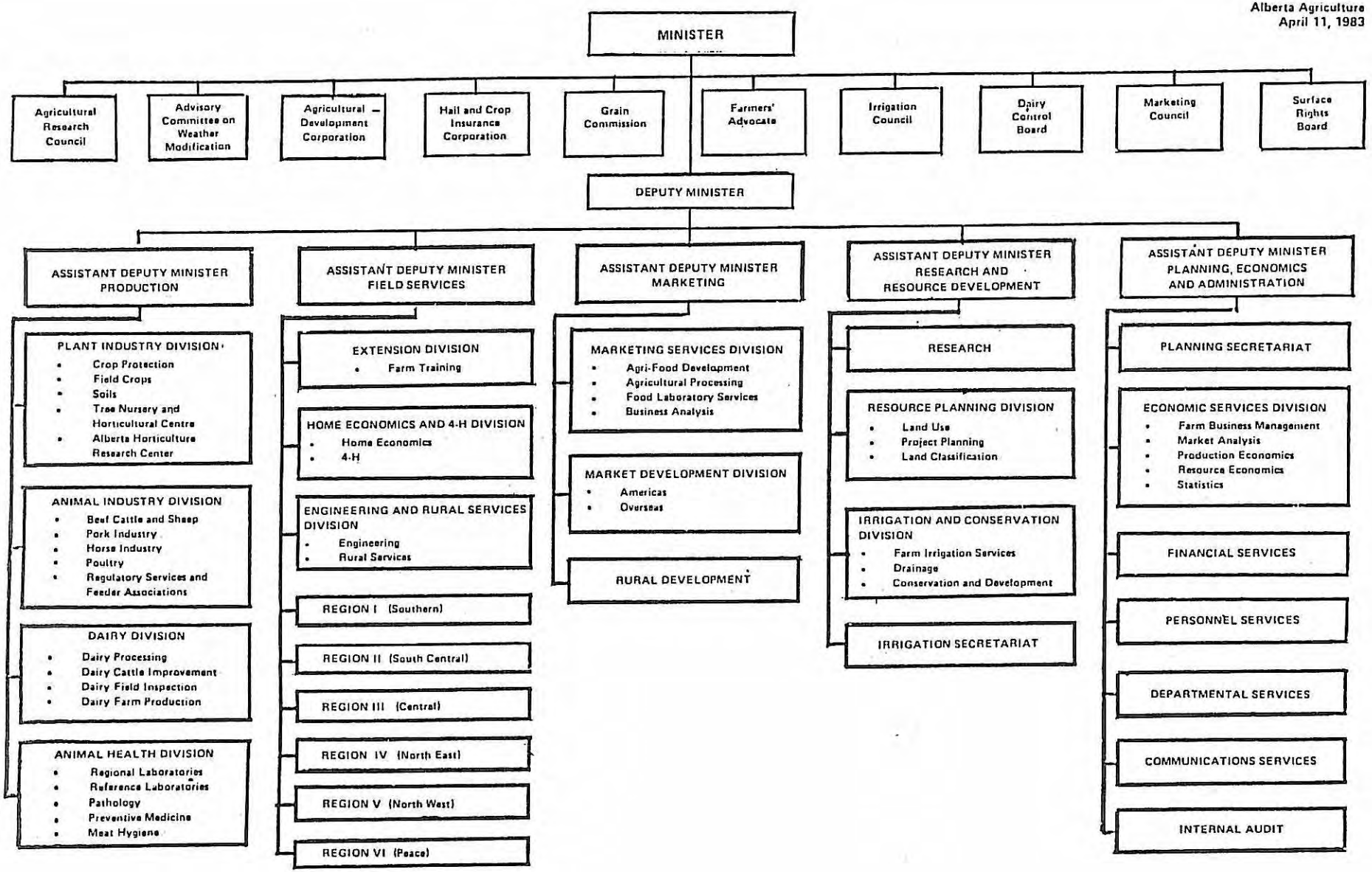
* * *

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 E. D. Lloyd at 329-5164, Lethbridge.

Published quarterly by the Evaluation and Management Section, Project Planning Branch, Alberta Agriculture, Agriculture Center, Lethbridge, Alberta T1J 4C7.

Alberta Agriculture
April 11, 1983



IRRIGATION SCHEDULING SIMPLE - "WASH TUB METHOD"

The objective of irrigation water management is to insure that water does not limit production, while at the same time prevents the waste of water and nutrients.

In irrigation, scheduling the application of proper amounts of water at the correct time is essential for obtaining optimum yield and quality.

Past observations indicate that some irrigators fail to recognize the importance of "when" and "how much", and to accept the fact that water requirement varies with the crop, growth stage, soil type and conditions, and local climate.

Various soil moisture measurement techniques are used for irrigation scheduling, ranging from simple to very complex ones. For an irrigation farmer, scheduling is a decision making process and the technique used needs to be reliable but at the same time reasonably simple. One of the simplest scheduling techniques is the "wash tub" method. Considerable research and field testing of the "wash tub" method has been carried out by Montana State University of Bozeman, Montana, USA, with a great deal of success.

The tub technique offers an acceptable degree of accuracy with less effort than many other methods requiring special tools, equipment and knowledge. The skills to use the tub technique and to interpret obtained results, as well as the cost of scheduling are kept to a minimum. Just by observing how much water has evaporated from the tub and by doing simple calculations the "how much" and "when" of applying water can be determined.

In order to irrigate effectively without causing water waste and prevent the leaching of nutrients, it is important to know "your" soil's water holding capacity and how much is available for crop use. In most cases 50 to 60% of the available water can be removed from the soil by plants without causing any stress and little reduction of yield.

For "wash tub" scheduling method it is necessary to have a galvanized steel tub about 20 inches in diameter and 10 inches in height. Locate the tub within or near each field to be irrigated (location of tub depends mainly on irrigation method).* Tubs are to be placed on wooden blocks, depending on crop height, leveled, and anchored to stakes driven into the ground. One inch mesh chicken wire could be placed over the tub to prevent animals from drinking the water, especially if the tub is located outside irrigated field with no protection. Place a ruler in the center or along the side of the tub so that accurate observation can be made of the changes in the water depth caused by evaporation, irrigation or rainfall. It is important to have a rain gauge near the tub to measure precipitation so that actual evaporation from the pan can be determined. Rainfall readings should be taken right after it occurs, unless oil is added to the gauge to prevent evaporation. For accuracy a rain gauge should have an opening of about 6 square inches. Location of tub and rain gauge is important to insure reliable evaporation estimates. Do not place them near buildings or trees, nor allow any plants to shade the tub.

Prior to first irrigation place a mark on the inside of the tub which will represent the allowable depletion level. The top of tub always will be as the field capacity level. Placement of the allowable depletion mark will depend on the type of crop and its rooting habits, type of soil and its water holding capacity.

At the beginning of the first irrigation fill the tub with water to the allowable depletion mark. If the sprinkler irrigation method is used and the tub is located within the irrigated field then the amount of water caught in the tub represents the actual amount of water applied; if a surface irrigation is being practiced or the tub is located outside irrigated field, then add to the tub the amount of water that has been applied to the soil per irrigation set.* It is important to remember that during the active crop growth period water level in the tub should not be allowed to drop below allowable depletion point, otherwise crops will suffer from the moisture stress. For added safety, it is recommended to make occasional field soil moisture spot checks to verify tub evaporation data against actual moisture use by the crop.

It is recommended to keep records for future reference of the amount of water evaporated during the period between field visits (at least once a week) and irrigations, the amount of rainfall occurring, as well as new water depth after each irrigation and dates of visits and irrigations.

Cooperative Extension service of Montana, USA, notes that evaporation from the tub, for practical purposes and simplicity, is equal to crop moisture use, especially when complete ground cover by the plants is reached. However, use of a crop coefficient** over the entire crop growing season unchanged may result in over-irrigation and waste of water, since the moisture use increases from crop emergence time to late mid-season and declines with crop maturity.

For better overall management results the following crop coefficients may be used.

(1) Cereals and Oilseed Crops
    0.5 - for about 4 weeks after crop emergence
    1.0 - for the active growth period (9 weeks more or less depending on type of crop)
    0.75 - for about 4 weeks prior to harvest
(2) Alfalfa
    0.75 - for about 4 weeks at the beginning of the growing season
    1.0 - for the active growth period (14 weeks more or less). Use zero coefficient for the harvest period.
    0.75 - after second cutting (harvest)

For example: Crop - wheat; during the first week of August, 30 mm of water may be evaporated from the tub. The crop water use equals tub evaporation times the crop coefficient. Crop moisture use = pan evaporation x crop coefficients = 30 mm x 0.75 = 23 mm.

Even though additional research is necessary to refine this method, the current accuracy makes the "wash tub" scheduling technique a practical tool for achieving resource conservation and better economic returns.

For further information on any aspects of the above procedure contact S. Noreika, Alberta Irrigation Management Services Coordinator, at 329-5140 in Lethbridge.

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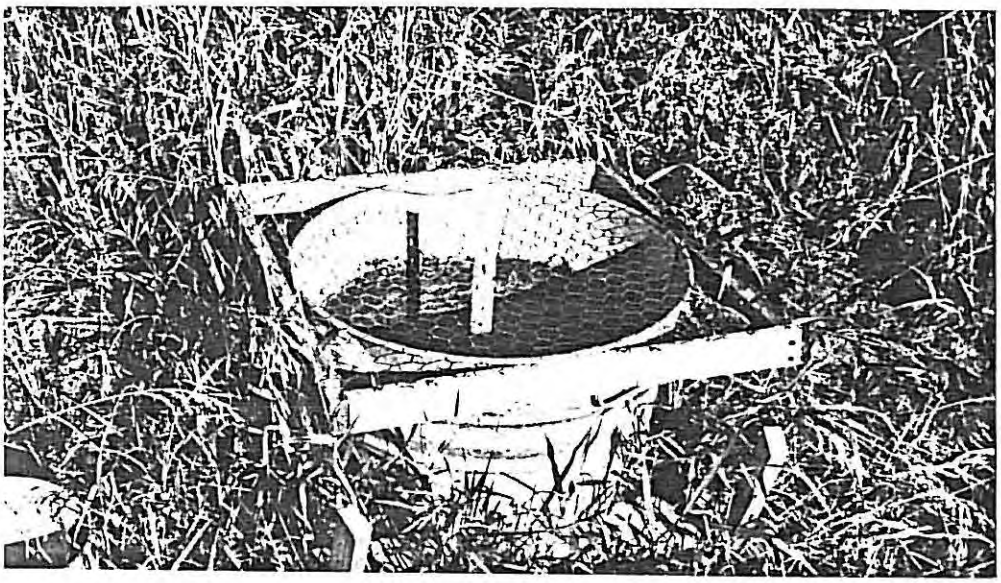
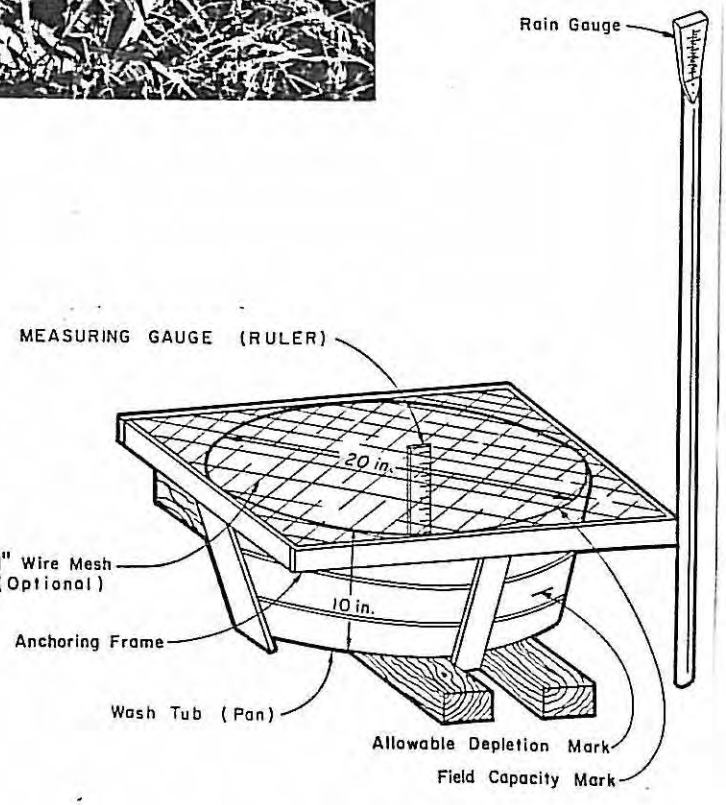
*For technical assistance contact your nearest Alberta Agriculture, Irrigation Specialist office.
**The ratio of water use to tub evaporation is the crop coefficient.





"WASH TUB" METHOD