The important points of construction are as follows:

1. The rear of the bucket is covered with rolled, expanded metal to give the water a chance to drain.

2. The cutter bar was purchased in 14-inch width so that there would not be any waste of material, taking advantage of universal mill practices.

3. 2- by 1/2-inch wear bars were welded to the cutter plate at 12-inch centers, and standard bucket wisdom teeth with weld-on shanks were welded at 6-inch centers to the cutter bar.

4. The completed bucket weighs approximately 1,800 pounds.

5. A skilled operator leaves the banks of the canal virtually free of any unwanted growth (fig. 178).

Dragline Bucket Modification

Used alone, a dragline tends to tear at a weed pack more than remove it. With some modification, however, this long-necked hoist can drag out tumbleweeds as easily as it drags out earth. The adaptation presented here uses a standard set of log jaws for a dragline as its basis.

The bite of the log jaws was increased by welding extensions made of 4-inch square steel tubing, 11 feet in length, and arranged so that they extend equally on both sides of the jaws, as shown in figure 179. The teeth in the new jaws are tines from a heavy-duty spring harrow positioned and bolted in place at approximately 1-foot intervals. Figure 180 gives some idea of this arrangement, and it shows how the harrow teeth are installed to curve inward to a better grip on the weeds.

Spring teeth were chosen for this particular job because of their durability and flexibility when clamping and tearing at the water-soaked weeds. Rigid teeth would have broken under the stresses. To prevent smaller weed fragments from escaping back into the water, the insides of the jaws were lined with small mesh wire tacked into place. Figure 180 also shows this wire mesh in place.

An added weight of steel plates was welded at the hinging of the jaws to make it easier for the teeth to penetrate the tightly packed weeds.

When a pack of floating weeds lodges on a check gate or pumping plant intake, maintenance crews send for the dragline and the big jaws.

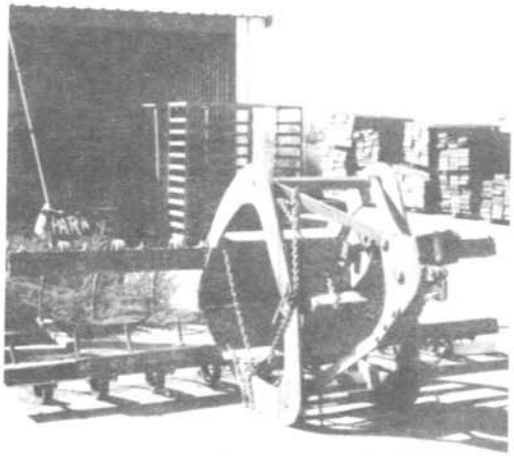


Figure 179

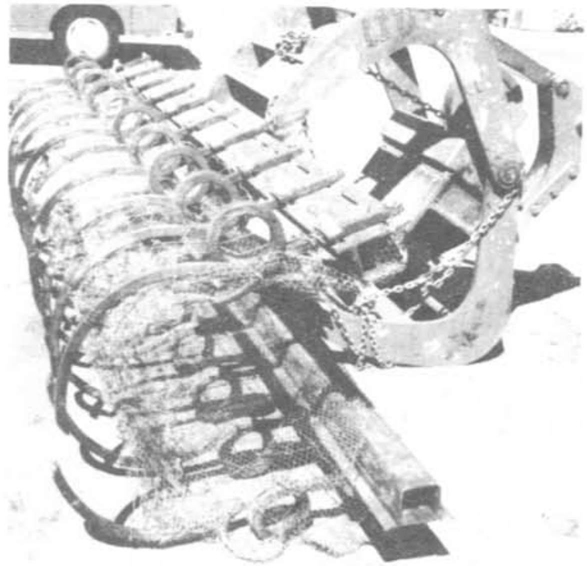


Figure 180

Rigged properly on the ropes of a dragline, the jaws can open to a spread of 8 feet. The boom is then swung out over the canal in position over the weeds and dropped into the water with jaws open for a bite. With the jaws full, the load is swung out over the bank and dumped into a pile or into a dump truck. Figure 181 shows the device being lowered into the water, and figure 182 shows the closed jaws swinging out of the water with a dripping load of wet weeds.

Weed Rake

This weed rake is a rather simple implement resembling a garden rake considerably oversized and used with a small dragline, replacing the regular bucket. It was built and first used to remove dense growths of pondweed from a canal. This pondweed restricted waterflow severely and allegedly raised water levels in Truckee-Carson Irrigation District's drains.

It has been used on several sections of the canal, and it is claimed that about 85 to 90 percent of the pondweed is removed. It required approximately 3 days to clear 1 mile of the canal. The best time for treatment is when the pondweed is nearing maturity. The rake is very effective in removing pondweed and can be used without dewatering the canal.

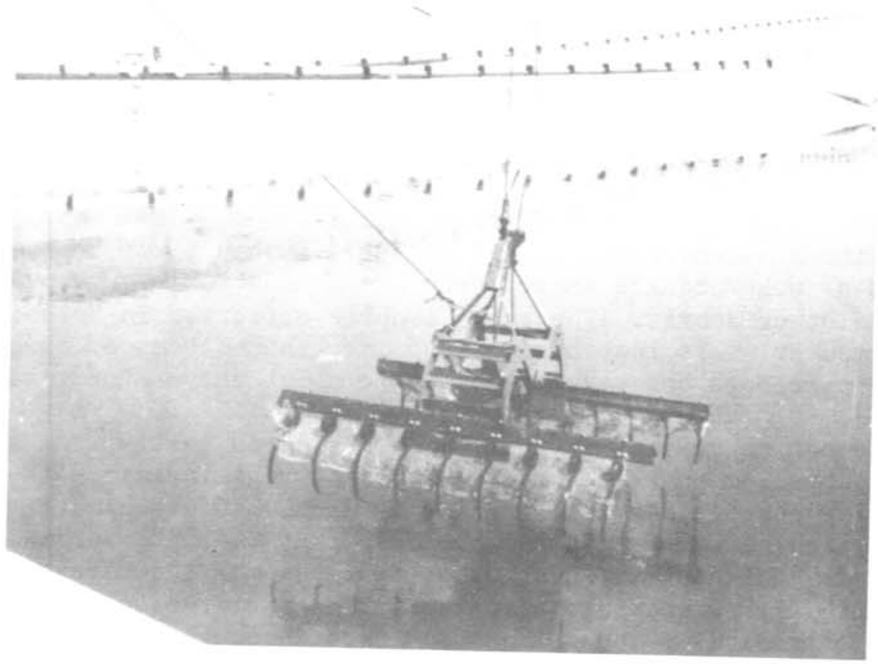


Figure 181

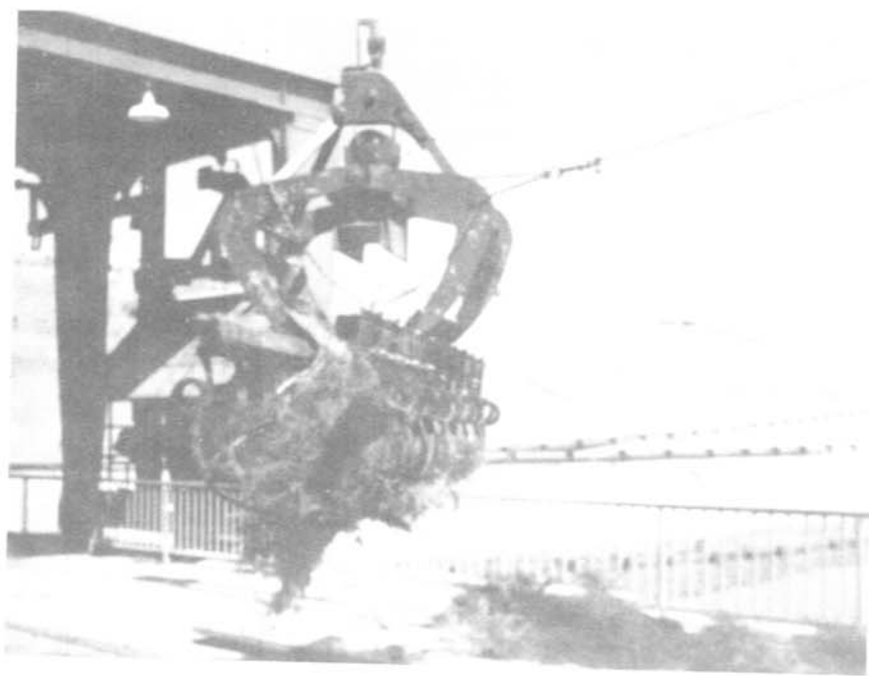


Figure 182

One spring, after a very windy winter, a drain contained more loose, blown-in, alkali weeds than ever before. It was decided to try this rake and a dragline to pull the weeds onto the bank where they could be burned. The results of this trial were more dramatic than results of the original trial on the canal. The previous year, 15 days had been spent with the same dragline and operator (with a regular bucket) removing weeds from 4 miles of the drain and an adjacent canal. With the "rake," weeds were removed from 5 miles of the drain and one-half mile of the adjacent canal in 4-1/2 days. It has since been used on sections of other canals where there was a need for the removal of weeds and other debris. The rake is quite effective in "ripping up" bars formed by weeds that have silted into the bottoms of canals. The dragline operators are very enthusiastic about the use of this implement.

The implement as originally built was fabricated mostly from scrap iron and material on hand. Strength of material indicated in figure 183 is greater than that originally used, since field trials quickly revealed weak spots. It is felt that the material indicated is adequate, but conditions at other stations may indicate a need for change. It is possible also that spacing of the teeth might be reduced to probably 7 inches for use in pondweed removal, but for general work the 9-inch spacing works well.

Figures 184 and 185 show the weed rake in operation.

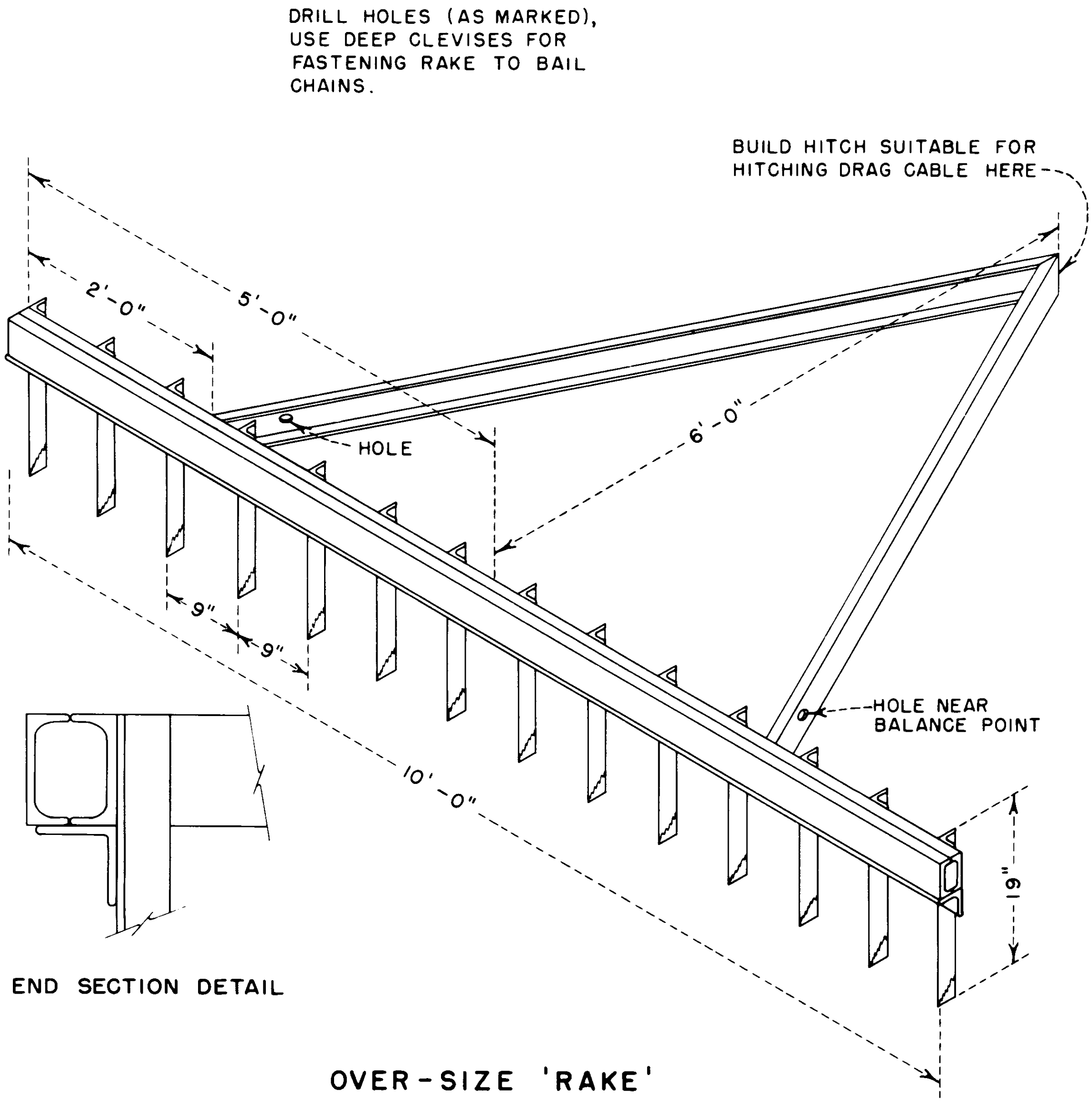
Aquatic Weed Removing Bucket

The bucket shown in figure 186 was fabricated in the shops of the Salt River Valley Water Users' Association in Phoenix, Ariz., for use with the Association's fleet of excavators to expedite and facilitate the removal of pondweed from the canals and laterals of the irrigation system.

The bucket is shaped much like a 60-inch ditch-cleaning bucket supplied by the excavator manufacturer. However, the Salt River bucket is 72 inches wide, has a serrated cutting edge, and the bucket plate has been perforated, as it is normally used under water.

A large amount of pondweed and silt can be removed with each pass of the bucket, cleaning about 1 mile of ditch per day. Cleaning of the canal or lateral while removing pondweed also eliminates an additional pass through the ditch at a later date.

The operation of a smaller weed bucket is illustrated in figure 187. The trashracks can be cleared rapidly after a severe windstorm with the rubber-mounted equipment on the Columbia Basin project. The dead tumbleweeds which accumulate on the trashracks are burned in place on the landing mat platform.



OVER-SIZE 'RAKE'

FOR REMOVING LOOSE WEEDS, DEBRIS FROM CANALS AND DRAINS WITH LIGHT DRAGLINE. IT CAN BE USED ALSO FOR REMOVAL OF PONDWEED FROM CANALS.

MATERIAL NEEDED:

4" CHANNEL IRON, 2 PCS. 10' LONG, 2 PCS. 6' 8" LONG	180 LBS.
3" X 3" X 5/16" ANGLE, 1 PC. 10' LONG	49 LBS.
2" X 2" X 1/4" ANGLE, 14 PCS. 19" LONG	71 LBS.
TOTAL	300 LBS.

WELD ALL JOINTS AND SEAMS AS NEEDED.

Figure 183

Figure 184

Figure 185

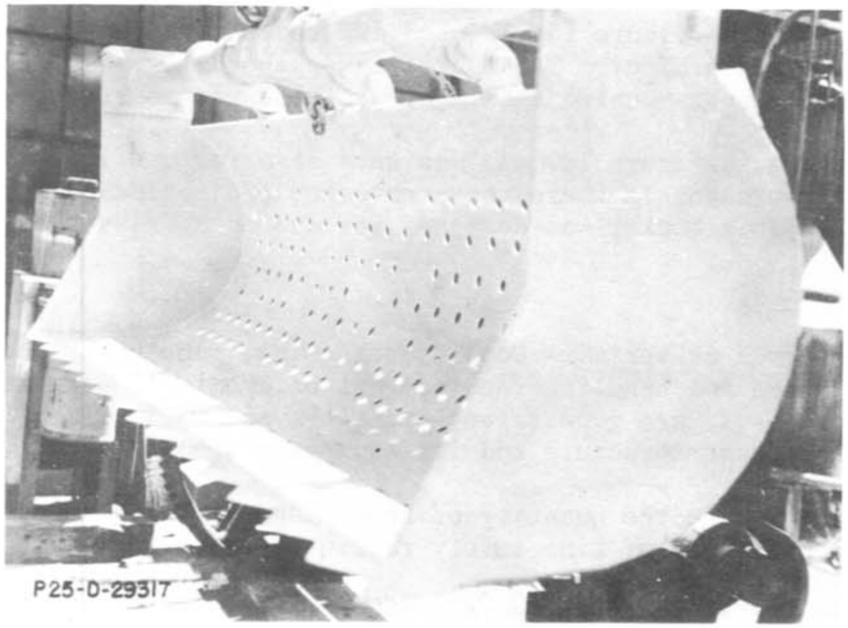


Figure 186

Figure 187

For use where bucket teeth may catch on rocky banks, the reinforced weed bucket shown in figure 188 is used in weed removal operations on the Columbia Basin project. The bucket is designed for mounting on a similar type rubber-mounted excavator as those previously shown.

The bucket shown in figure 189 was designed also for use in removing tumbleweeds from channels where rocks or other projections will damage bucket teeth. This bucket was designed for use on a 3/4-yard dragline.

Pesticide Storage

General storage criteria. - Good housekeeping, plus consideration of the storage and handling requirements of chemicals used in the control of pests, are good safety practices and will prevent accidents. A storage structure and its equipment should:

1. Accommodate the quantity of herbicide purchased and over a practical length of time safely retain material until used.

2. Provide means for measuring the material into and out of storage.

3. Not present a hazard to the community in the event of fire, collision, or other extraordinary circumstances. Typical hazards are air pollution, water pollution, or a long-term odor nuisance.

4. Conform with the safety requirements of the local government.

The Code of Federal Regulations 40, chapter 1, subchapter D, part 112, revised as of July 1, 1975, provides that, for any facility that stores oil of any type in specific quantities, a spill prevention control and implementation plan must be prepared.

Do not purchase more pesticides than will be used during one season. Pesticides should not be allowed to freeze, as their chemical composition may be altered. Check with the supplier.

Store powder-, granular-, or pellet-type pesticides on shelves or pallets.

Preferably, pesticides should be kept in a ventilated building separate from normal warehouse stores, and access should be restricted to the person responsible for custody and accounting. Pesticides (i.e., herbicides and insecticides) should be stored separately. The pesticide storage area should be adequately posted with warning signs both in Spanish and English.

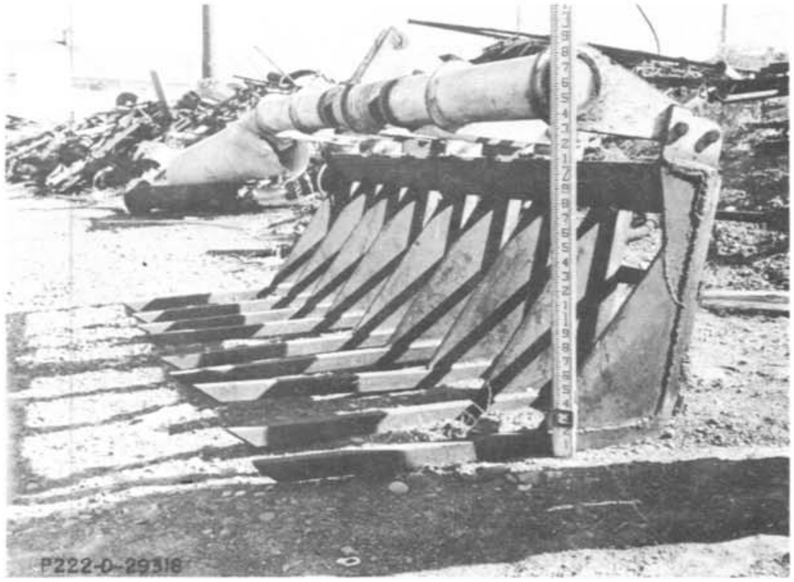


Figure 188

Figure 189

Bulk storage. - Bulk storage of fluids and flowable herbicides is feasible where:

1. Large quantities are used.

2. The storage can be near the point of use.

3. The disposition of many small containers is a problem.

4. The herbicide may be obtained at a lower price in bulk than in small containers.

Storage tanks for xylene, weed oils, and 2,4-D are best constructed aboveground for delivery by gravity so that:

1. No pump or electrical installation is required.

2. Inspection of the tank for leaks is a simple procedure.

3. The tank may be readily cleaned.

Such a tank, used by the Big Wood Company, Shoshone, Idaho, is shown in figure 190.

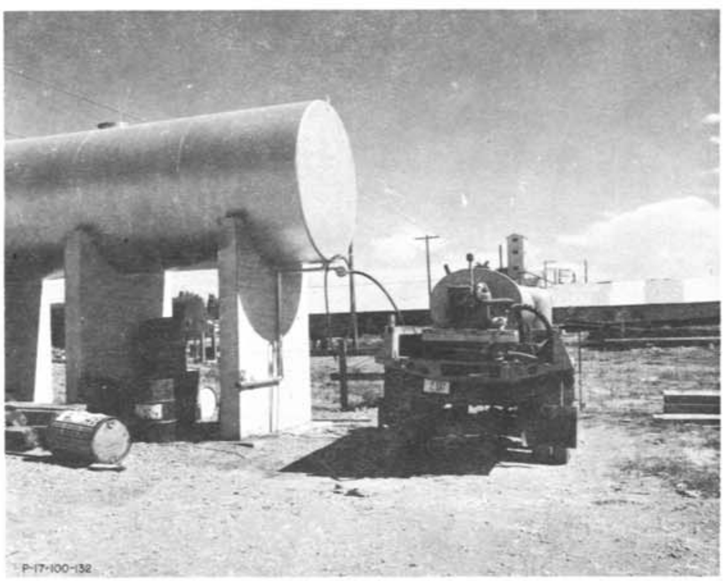


Figure 190

If underground installations are required to satisfy local regulations, to prevent a hazard or nuisance to the community, or to save space, precautions should be taken against rust and electrolytic corrosion. A means of checking and cleaning the inside of the tank should be provided. Figure 191 shows an underground xylene storage tank located to the right of the 2,4-D vault on the Quincy-Columbia Basin Irrigation District. Concrete vaults were constructed at various locations on the Columbia Basin project to house 1,000-gal tanks used for storage of bulk 2,4-D. The vaults shown in figures 191 and 192, allow for visual inspection of the tank and would contain any possible spill or leak.

Pumps, meters, piping, hose, and other equipment used at storage sites in the filling of transporting equipment should be made of chemically resistant materials. Tank construction should be such that galvanic activity will not take place between dissimilar metals in a medium which will conduct an electric current. Containers should be grounded to take care of static electricity.

Reasonable precautions should be taken to install tanks where the herbicide will not excape, in the event of tank leakage, into a ground-water or surface-water supply.

Safety aspects of storing pesticides. - Storage of pesticides offers few problems other than those encountered with other materials required for operation and maintenance of the irrigation system. Costs may be reduced as the quantities required become large enough for bulk storage, especially the storage of liquids, but xylene, acrolein, oils, and other inflammable materials have specific storage requirements.

Most insecticides and a few herbicides, such as dinitro, are highly toxic to humans and animals when taken internally. Several herbicides, especially those containing chlorinated phenol components, provide a long-lasting odor and taste to water used for domestic purposes. The aromatic solvents (xylene, acrolein, and solvents employed as liquid carriers in some pesticides) may be highly toxic in closed rooms under conditions which would expose humans to fairly high concentrations in the air or, in the case of some of these materials, to low concentration for a long period of time.

Few chemicals used to control weeds are highly acid or alkaline or strongly irritating to the skin on short contact unless in concentrated form. Diluted forms may be a source of irritation if left in contact with the skin for several hours. Susceptible individuals may show allergic reactions to one or more herbicides. The diagnosis and treatment of these conditions are medical problems.

Figure 191

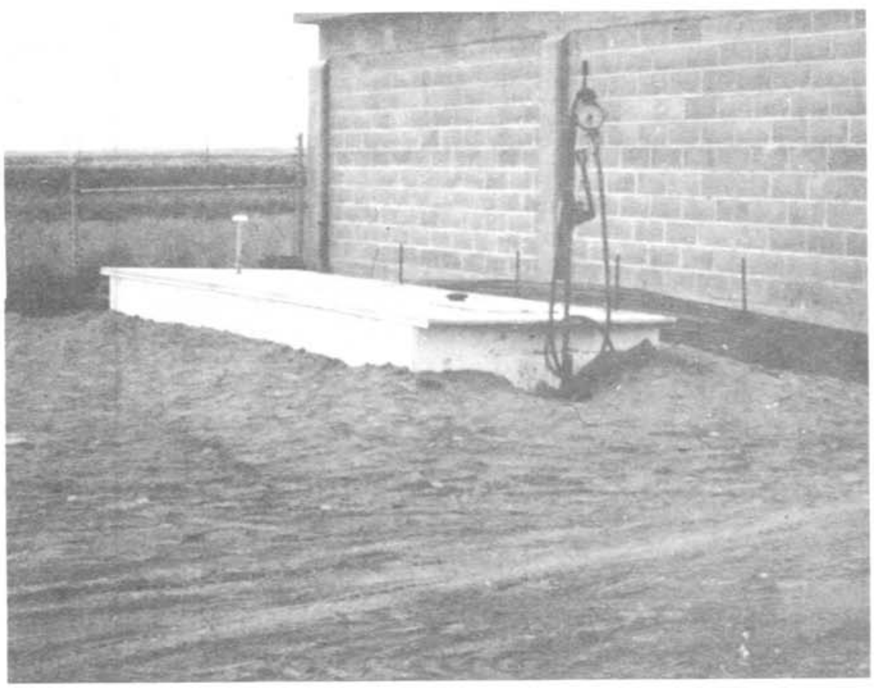


Figure 192

Copper sulfate in solution in water is highly corrosive on metal containers and parts, and xylene accelerates the disintegration of natural rubber and paints.

Disposal of empty pesticide containers. - Pesticide containers should not be reused - puncture cans and slit sacks, bags, or plastic cartons. Do not dispose of empty pesticide containers with normal warehouse refuse. Empty pesticide containers should be retained in the pesticide storage building until transfer to an approved disposal area.

The weed crew foreman or designated warehouseman should be responsible for checking out material and pouring pesticides into spray equipment and the emptying and rinsing of containers. Always rinse pesticide containers, from the standpoint of saving material and minimizing a potential hazard. Dispose of the rinsate where it will not contaminate lakes, ponds, streams or water for irrigation or domestic water supplies.

Clean spray rigs in the approved manner following application of pesticide, and follow the recommendation on cleaning equipment for winter storage. Do not use the same equipment to apply herbicides and insecticides. It is virtually impossible to clean spray equipment to remove all traces of some pesticides.

Unwanted, surplus, or obsolete pesticides should not be poured down the drain. If at all possible, use the pesticides in the approved manner as indicated on the label or recommended by the manufacturer, or transfer the materials to an entity that can apply the chemicals in an approved manner. Dispose of pesticides or empty pesticide containers in accordance with local regulations. Most counties have separate disposal or decontamination areas for pesticide containers other than at the normal trash or garbage landfill areas.

A designated staff individual should be responsible for storage, accountability, dispersement, and overall use of pesticides, including handling and disposal of empty pesticide containers. This responsible individual should collaborate with the safety officer on precautions for workmen using and applying pesticides and with County or State officials on disposal of empty pesticide containers.

Recordkeeping

In view of the recent increase in ecological concern, the need for complete and accurate records of weed control activities has become more important. These records should be kept by the applicator to insure accurate accounts of the field application. The records should also be complete in form to provide possible information needed to analyze undesirable occurrences that can be contributable to the treatment of weed control chemicals. Valuable data can also be obtained from the records to aid the applicator in adjusting the rate of treatment for optimum results. Care should be taken in the preparation of the records to include only the necessary data so as to eliminate needless time spent on recordkeeping. Some of the data that should be recorded are: date of treatment; area treated, by canal, lateral, or drain number and stations or miles or by land description; type of treatment; rate of treatment; method; weather conditions; and the surrounding conditions under which the application was made. Figures 193 and 194 show examples of weed control application reports used in the Lower Missouri Region.

R7-292 (REV 8/66)
BUREAU OF RECLAMATION
REGION 7

RI 218
FG 44

WEED SPRAY REPORT

To be completed by spray operator at the end of each day. Each area treated will be reported on a separate form.

NAME OF CANAL, LATERAL, DRAIN, OR DAM SPRAYED

LOCATION

WATER USED:

_____ LOADS $ ________
OR
_____ GALLONS $ ________

SOURCE OF WATER (Name of Town, City, Ditch, etc.)

CHEMICAL USED:

2, 4-D	_____ Lbs. or	_____ Gals.	$ _____
STERILANT	_____ Lbs. or	_____ Gals.	$ _____
*OTHER	_____ Lbs. or	_____ Gals.	$ _____
*TYPE--	_____		

AREA TREATED:

FROM: Mp _____ to Mp _____
or: Sta _____ to Sta _____
NO. OF MILES _____ OR ACRES _____

REPAIRS TO WEED SPRAYER:

_____ $ _____
_____ $ _____
_____ $ _____
_____ $ _____

WIND DIRECTION AND VELOCITY:

_____, _____mph, at _____a.m.
_____, _____mph, at _____p.m.

WEATHER CONDITION:

☐ BRIGHT SUNSHINE ☐ CLOUDY
☐ RAIN

EQUIPMENT OPERATION:

	MILEAGE IN	MILEAGE OUT	COST
WEED SPRAYER			$
TRANSPORTATION			$
HOURS OPERATED			$

LABOR:

EMPLOYEES' NAMES	COST
	$
	$
	$
	$

RECORD OF CLIMATIC CHANGES, ADJACENT CROPS, LOCATION OF NOXIOUS WEED, ETC.

OPERATOR'S SIGNATURE

DATE

GPO 830-711-26

Figure 193

R7-299 (REV 8/66)
BUREAU OF RECLAMATION
REGION 7

REPORT ON APPLICATION OF CHEMICALS FOR WATERWEED CONTROL

RI 218
FG 44

NAME OF ☐ CANAL ☐ LATERAL ☐ DRAIN TREATED

PROJECT

STATE

NAME OF WEED(S) TREATED

TYPE OF INFESTATION
☐ LIGHT ☐ MEDIUM ☐ HEAVY

TOTAL DESIGNED CAPACITY OF CANAL

INTRODUCTION OF CHEMICAL			QUANTITY OF WATER TREATED		CHEMICAL INTRODUCED				LABOR	
TIME REQUIRED	M.P.	STATION	FLOW OF WATER AT:	c.f.s.	gals. or	lbs.	Cost	NAME OF CHEMICAL	EMPLOYEE NAME(S)	COST
MINUTES			INITIAL POINT							
MINUTES			2nd RECHARGE STATION							
MINUTES			3rd RECHARGE STATION							
MINUTES			4th RECHARGE STATION							
MINUTES			5th RECHARGE STATION							

EQUIPMENT USED: ☐ WEED SPRAY ☐ CENTRIFUGAL PUMP ☐ BAGS ☐ OTHER- $

WEATHER CONDITIONS: ☐ SUNSHINE ☐ CLOUDY ☐ RAIN AIR TEMPERATURE °F

WATER CONDITION: ☐ CLEAR ☐ LIGHT SILT ☐ HEAVY SILT AND DEBRIS WATER TEMPERATURE °F

DISPOSITION OF TREATED WATER: ☐ USED TO IRRIGATE FARM CROPS OR PASTURE ☐ OTHER-
☐ WASTED INTO WASTEWAY OR STREAM

FARM ANIMALS OBSERVED IN AREA:

FISH SPECIES OR OTHER MARINE LIFE KILLED WITH CHEMICAL:

RECORD OF RESULTS:

GPO 830-081-65

DATE OF TREATMENT: ____________ SIGNATURE OF OPERATOR: ____________

Figure 194

APPENDIXES

APPENDIX I

CONVERSION TABLES AND ABBREVIATIONS

Conversion tables

1 kilogram (kg)	= 1000 grams (g)	= 2.2 pounds
1 gram (g)	= 1000 milligrams (mg)	= 0.35 ounces

1 gallon of water weighs approximately 8.3 pounds
1 pint of water weighs approximately 1 pound

1 rod	= 16.5 feet
1 acre	= 43,560 square feet
1 mile	= 5,280 feet
1 square mile	= 640 acres
1 mile by 8 feet	= 1 acre (approximately)

Liquid

1 gallon = 128 fluid ounces
1 gallon = 4 quarts = 8 pints
1 gallon = 3.78 litres
1 gallon = 8.3 pounds

Abbreviations

WP - wettable powder
EC - emulsifiable concentrate
D - dust
G - granular
Sol. - solution
tsp. - teaspoon
tbsp. - tablespoon

gal - gallon
qt - quart
pt - pint
lb - pound
oz - ounce

1 part per million (p/m) = 1 milligram/litre (liquid)
1 part per million (p/m) = 1 milligram/kilogram (tissues or soil)
p/b = parts per billion

1 percent	= 10 000 p/m	= 10 000 milligrams/litre
.1 percent	= 1 000 p/m	= 1 000 milligrams/litre
.01 percent	= 100 p/m	= 100 milligrams/litre
.001 percent	= 10 p/m	= 10 milligrams/litre
.0001 percent	= 1 p/m	= 1 milligram/litre

lb/in^2 = pounds per square inch

APPENDIX II

CALIBRATION - Terrestrial Weeds

Application equipment should be calibrated under actual field trials in order to enable the operator to apply the desired rate of pesticide for a particular job. The *first step* in calibrating any spraying, dusting, or granulating equipment is to read the entire label of the pesticide to be used. The labeling directions must be completely understood by the supervisor before proceeding with equipment calibration. The *second step* requires that applicators read and understand the spray equipment directions. The *third step* would be the selection of a nozzle or nozzles to provide the proper application rate within the recommended range of pressures. The *fourth step* is to locate the nozzle or nozzles so that coverage is uniform. The *fifth step* is to regulate the pressure to give proper nozzle discharge rate and spray pattern. The *last step* would be to maintain recommended ground speed.

By carrying out the above steps the applicator has properly calibrated his sprayer and should know the exact amount of material that will be applied per acre.

Application rates are usually expressed as pounds or gallons of a formulation per acre.

The <u>number of gallons per acre of a liquid</u> formulation applied by surface operated or aerial sprayers is determined by:

(1) Speed of application.
(2) Nozzle pressure used.
(3) Swath width or nozzle spacing.
(4) Number of nozzles and their size.

<u>The number of pounds of dry material</u> being applied per acre is determined by:

(1) Speed of application.
(2) Swath width.
(3) Gate setting.
(4) Kind of material applied.

These four factors must remain constant during the operation. Changing any one or more of these four alters the rate of application, so they should be maintained the same during the calibration tests as for the field application.

If the calibration shows that the application rate is too low, increase the rate by reducing the speed of travel or increasing the pressure. You may decrease the rate by doing the opposite in each case. The three factors which must be considered for successful application of pesticides are:

(1) Selection and correct dosage of proper chemicals.
(2) Proper timing of application.
(3) Use of good spraying equipment that is properly adjusted, calibrated and operated.

Drift of Pesticides

Persons applying pesticides are responsible for the drift of such materials and they must take all precautions possible to keep it to a minimum. The damages resulting from pesticide drift are essentially of two types:

(1) Unlawful residues.
(2) Harm to nontarget plants and animals.

Drift is caused by the interaction of many factors, a few of which will be discussed here.

a. *Wind* - Do not spray or dust when wind velocity exceeds 10 mi/h. If there is a breeze, work so that the spray or dust blows away from the operator or anyone else in the area, as well as away from susceptible crops that might be endangered. Cool, calm weather conditions with very little air turbulence favor rapid settling of spray or dust materials.

b. *Convective Currents* - Rising air currents on a hot day may move vapors long distances.

c. *Methods of Application* - Aircraft applications result in more drift than ground equipment. High-pressure equipment produces more drift than low pressure. This effect is closely related to droplet size, small droplets drift farther than large droplets. Coarse sprays are less likely to result in drift problems.

d. *Type of Pesticide* - Materials such as 2,4-D and parathion are volatile and drift long distances as vapors. When selecting 2,4-D products use nonvolatile formulations such as the amines (e.g., diethylamine salt of 2,4-D) whenever practicable.

e. *Type of Formulation* - Dusts are notorious offenders for drifting, while granular materials drift very little.

f. *Amount of Material Applied* - A large scale operation will potentially cause more trouble than a small area treatment.

Examples of Calibration

1. Determine the number of acres sprayed:

$$\frac{A \times B}{C} = D$$

A = width of swath in feet
B = distance traveled
C = 43,560 ft^2/acre
D = acres sprayed
E = gallons of spray used
F = gallons/acre

Example: (a) A swath 4 feet by 1 mile long was sprayed. How many acres were sprayed?

$$\frac{4 \times 5280}{43{,}560} = .5 \text{ acres}$$

(b) If 10 gallons of the chemical were used, how many gallons per acre will be applied?

$$\frac{10}{5} = 20 \text{ gal/acre}$$

2. Determine gallon/acre when a known volume is used to spray a known area.

C = 43,560 ft^2/acre
G = known acreage
H = the number of times a given area will fit into 1 square acre of land

$$\frac{C}{G} = H$$

If 1 quart of chemical was used to spray 600 square feet, how many gallons per acre were applied?

$$\frac{43{,}560}{600} = 72.6 \text{ qts}$$

You need 72.6 quarts to spray 1 acre, so divide by 4 (4 quarts in a gallon) to obtain number of gallons.

$$\frac{72.6}{4} = 18.1 \text{ gallons/acre}$$

3. Determine the amount of active ingredient needed, when the following factors are known:

(1) Volume of mixed chemical per area
(2) Amount of active ingredient per sprayer volume

Your sprayer holds 3 gallons and you need 12 gallons of chemical to spray 1,000 square feet. You use 5 oz of active ingredient per 3 gallons of spray solution. How many ounces are needed to spray the 1,000 square feet?

$$\frac{12 \text{ (gallons)}}{3 \text{ (gallons)}} = 4$$

$$4 \times 5 \text{ oz} = 20 \text{ oz}$$

4. Preparing a dilute spray from a liquid concentrate (emulsifiable concentrate or oil solution).

$$Q = \frac{P \times A \times D}{100\% \times W}$$

Q = Quantity of concentrate required in gallons
P = Percentage of active ingredient in the finished spray
A = Amount of spray to be prepared in gallons
D = Density: weight of 1 gallon of diluent

(water - 8.3 pounds per gallon)
(Kerosene - 6.6 pounds per gallon)

W = Weight (lb) of the active ingredient in 1 gallon of the concentrate

Example: Prepare 50 gallons of 0.25 percent Malathion emulsion from a Malathion concentrate of 2 lb/gal. How many gallons of a 2.0 lb/gal concentrate are needed?

$$\frac{.25 \times 50 \times 8.3}{100 \times 2} = 0.52 \text{ gallons of Malathion concentrate}$$

Add .52 gallons of concentrate to 49.48 gallons water to make a 50 gallon emulsion.

5. Preparing dilute spray (suspension or solution) from a solid concentrate (wettable powder) or from a technical grade pesticide.

$$Q = \frac{P \times A \times D}{C}$$

Q = Quantity of concentrate or technical grade pesticide
P = Percentage of active ingredient in the finished spray
A = Amount in gallons of finished spray
D = Density
C = Concentrate: percentage of active ingredient

Example: Prepare 50 gallons of 1.2 percent "chemical" suspension from a 25 percent "chemical" wettable powder.

$$\frac{1.2\% \times 50 \times 8.3}{25\%} = 20 \text{ lb}$$

Add 20 pounds of the 25 percent wettable powder in sufficient water to make a total volume of 50 gallons.

Example: Prepare 200 gallons of 1.5 percent "chemical" kerosene solution from a 50 percent "chemical" technical grade pesticide. Density of kerosene 6.6 lb/gal.

$$\frac{1.5\% \times 200 \times 6.6}{50\%} = 39.6 \text{ gal}$$

Add 39.6 gallons of technical grade pesticide to 160.4 gallons of kerosene to make 200 gallons of kerosene solution.

6. To determine the amount of emulsifiable concentrate, wettable powder or dust needed for a required amount of active ingredient per acre.

$$Q = \frac{N \times R}{C}$$

Q = Quantity of concentrate needed
N = Number of acres to be treated
R = Pounds of active ingredient required per acre
C = Concentrate: pounds active ingredient per gallon of emulsifiable concentrate, or percent active ingredient per pound of wettable powder or percent active ingredient per pound of dust. For wettable powders and dusts convert the percent to a decimal. (50 percent = 0.50, 5 percent = 0.05)

Example: How many gallons of 46 percent Fenthion (Baytex^R) emulsifiable concentrate (4 pounds of active ingredient per gallon) are needed to give .05 pounds of active ingredient per acre when filling a 150 gallon tank of a 10 gallon per acre sprayer. (150 gallons covers 15 acres).

$$Q = \frac{15 \times .05}{4 \text{ lb}} = 0.18 \text{ gal}$$

Answer: 0.18 gallons of 46 percent Fenthion are needed

Using the above formulas the following is an example of how to calibrate the average spray rig.

First, make sure all nozzles are discharging evenly. If there is a serious variation in pressure, clean or replace the faulty nozzle. To determine the amount of liquid a sprayer will apply per acre:

(1) Select an area for a test run that is similar to the canal or lateral bank to be sprayed. Measure off a distance of 660 feet as an example.

(2) Place the sprayer on level ground and fill the tank to the brim with water.

(3) Spray the 660-foot test run at the same speed that will be used when spraying.

(4) Shut sprayer off and return to the original filling postion. Measure the amount of water in gallons required to refill to the brim.

(5) Calculate gallons applied per acre as follows:

$$\frac{Gw \text{ (gal)}}{W \text{ (ft)} \times L \text{ (ft)}} \left[\frac{43{,}560 \text{ (ft}^2\text{)}}{\text{(acre)}}\right] = \text{gallons water applied per acre}$$

Gw = No. of gallons; W = width of swath; L = length of test run

Example: Suppose 3 gallons of water were used (for larger tanks a longer test run might be required) in the test run and the spray swath is 30 feet wide,

$$\frac{3(43{,}560)}{30(600)} = 6.6 \text{ gallons water per acre}$$

(6) To determine the acres that can be sprayed with one tank full, **divide the number of gallons in the tank by the number** of gallons applied per acre.

Example:

$$\frac{\text{100-gal tank}}{\text{6.6 gal per acre}} = 15.15 \text{ acres}$$

(7) Suppose you want to kill annual and perennial weeds along the canal bank and decide to use 2 pounds of 2,4-D acid per acre. Multiply 15.15 x 2 = 30.30 pounds. For each tank full of water add 30.30 pounds of 2,4-D acid.

(8) Commercial 2,4-D products contain different amounts of 2,4-D acid. Some products contain 4 pounds per gallon; some contain 3.34; some 2 and some even 6 pounds. You must check the label on the container for this information.

Suppose a product contains 4 pounds of acid equivalent per gallon and you want to add 30.30 pounds of 2,4-D acid per tank. Divide 30.30 by 4 to find the number of gallons of commercial product to add.

Example:

$$\frac{30.30}{4} = 7.57 \text{ gallons}$$

As previously stated, for the calibration to be accurate; you must always drive at the same speed as the test run and the sprayer must opperate at the same pressure. A change of 1 mile per hour, or a variation of 10 pounds' pressure, will change the application rate 25 percent.

In some instances, it is desirable to know the miles per hour a spray rig is traveling. This is obtained from the following formula:

$$\frac{0.682 \times \text{feet}}{\text{seconds}} = \text{mi/h}$$

Example: In a test run suppose you travel 600 feet in 100 seconds,

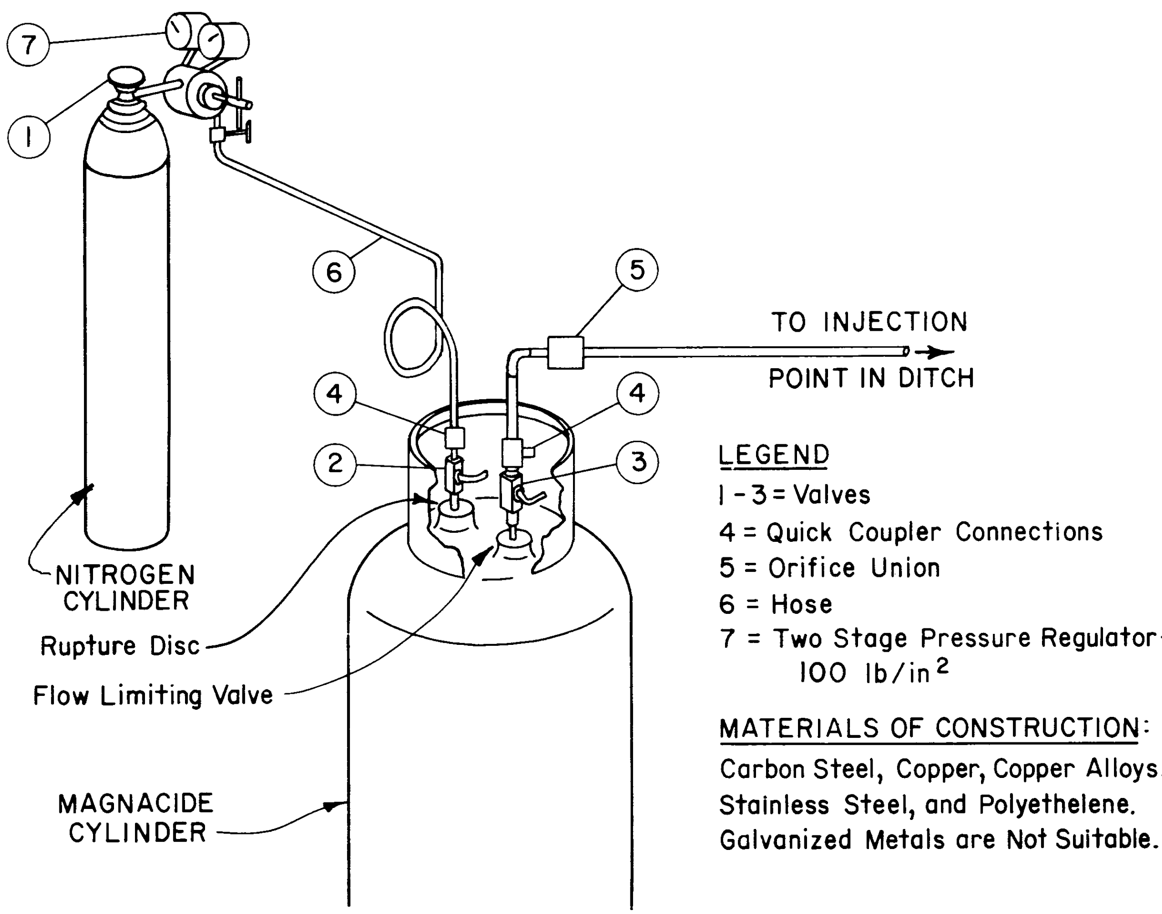
$$\frac{0.682 \times 600}{100} = 4.09 \text{ mi/h}$$

APPENDIX III

CALIBRATION - Aquatic Weeds - Acrolein (Magnacide H)

The method used to calibrate and control the application rate of acrolein is by the use of various sized orifices in combination with different pressures. Information from the field indicates that the orifice control is reliable and accurate, particularly on low application rates.

The following tables and charts provide the necessary information to determine the application rates for orifice equipment.



Recommended Equipment for Using
MAGNACIDE H Shipped in Pressure Cylinders
Metering Control -- Pressure with Orifice

ORIFICE FLOW CHART

MAGNACIDE "H" (gal/h)

Pressure - lb/in^2

Orifice - Inches	6	8	10	15	20	25	30	40	50	60
.014	0.65	0.72	0.85	1.05	1.2	1.3	1.4	1.6	1.9	2.1
.016	0.85	0.98	1.05	1.3	1.5	1.7	1.9	2.2	2.4	2.6
.020	1.3	1.5	1.6	2.1	2.4	2.7	2.8	3.3	3.7	4.0
.025	2.1	2.3	2.6	3.2	3.7	4.1	4.5	5.1	5.9	6.3
.030	2.8	3.3	3.7	4.6	5.3	5.9	6.4	7.3	8.5	9.2
.035	3.9	4.5	5.1	6.2	7.2	7.9	9.2	10.5	11.1	12.5
.045	6.4	7.0	8.5	10.5	11.8	13.1	14.2	16.5	18.5	21.0
.055	9.8	11.1	12.4	15.0	17.0	20.0	22.0	25.0	27.0	30.0
.070	15.0	17.0	21.0	25.0	28.0	32.0	35.0	40.0	46.0	49.0
.081	21.0	24.0	27.0	33.0	38.0	42.0	47.0	53.0	60.0	65.0

FLOWING IRRIGATION CANALS AND DRAINAGE DITCHES

MAGNACIDE "H" CONCENTRATION

Application time	Concentration in p/m at gal per ft^3/s				
	0.16	0.20	0.25	0.50	1.0
30 min	10.0	12.6	15.7	-	-
1 hour	5.0	6.3	7.85	15.7	-
2 hours	3.3	3.0	3.90	7.8	15.7
3 hours	1.7	2.1	2.6	5.2	10.4
4 hours	1.3	1.6	1.95	3.9	7.9
6 hours	0.83	1.04	1.30	2.6	5.2
8 hours	0.62	0.78	0.95	1.9	3.9
10 hours	0.49	0.62	0.75	1.5	3.1
12 hours	0.42	0.52	0.65	1.3	2.6
24 hours	0.21	0.26	0.33	0.65	1.3
36 hours	0.14	0.17	0.22	0.43	0.87
48 hours	0.10	0.14	0.18	0.34	0.68

The concentration of MAGNACIDE "H" should not exceed 15 p/m.

CONVERSION FACTORS

1 fluid ounce	=	29.57 ml
1 pint	=	473.2 ml
1 gallon (U.S.)	=	0.83 gallon (British)
1 bushel (U.S.)	=	32 quarts
1 mi/h	=	88 ft/min, 1.5 ft/s

0.01-inch rainfall	=	1 ton water, 272 gal/acre
0.5-inch rainfall	=	57 tons water, 13,584 gal/acre
1.0-inch rainfall	=	113 tons water, 27,167 gal/acre

1 ft^3/s (450 gal/min or acre in./h) will divide into:

90 furrows at 5 gal per min/furrow
45 furrows at 10 gal per min/furrow
30 furrows at 15 gal per min/furrow
22 furrows at 20 gal per min/furrow
9 furrows at 50 gal per min/furrow
6 furrows at 70 gal per min/furrow

20-inch rows = 26,241 ft of row/acre
30-inch rows = 17,424 ft of row/acre
40-inch rows = 13,081 ft of row/acre

$$\frac{\text{width (ft)} \times \text{depth (ft)}}{8.25} = \text{acre-ft/mi}$$

$$\frac{\text{dosage (gal/ft}^3\text{/s)} \times 1884}{\text{application time (minutes)}} = \text{p/m (MAGNACIDE "H" concentration)}$$

SUGGESTED WATER MEASUREMENT REFERENCES

"Water Measurement Manual," USDI, Bureau of Reclamation, Denver, Colorado, 1974.

Metric Supplement to Water Measurement Manual, USDI, Bureau of Reclamation, Denver, Colorado, May 1971.

"An Irrigation Guide for Colorado" Bulletin 432-A, April 1954, Colorado Agricultural and Mechanical College, Fort Collins.

"Measuring Irrigation Water" Bulletin 448-A, Colorado State University, Fort Collins.

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