

MAGNACIDE™ H Herbicide
APPLICATION AND SAFETY MANUAL

Registration Number 10948
Pest Control Products Act

Manual Revision Date: March 2017

Supersedes: February 2012

PLEASE SIGN AND RETURN

The attached MAGNACIDE H Herbicide Application and Safety Manual contains instructions for use concerning this label. Federal law requires that this handbook be in the possession of the applicator. Please acknowledge receipt of this handbook by signing below and returning this page to the address listed below.

I also acknowledge that I have successfully completed a MAGNACIDE H Herbicide Safety and Application training program and fully understand the techniques presented.

Alligare LLC c/o Baker Hughes
13 North 8th Street
Opelika, Alabama, 36801, USA

Signature

Date

Firm or Organization

Title or Capacity

RESTRICTED USE PESTICIDE

THIS PRODUCT TO BE STORED OR DISPLAYED SEPARATE FROM FOOD FOR HUMANS OR FEED FOR ANIMALS.

FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS OR PERSONS UNDER THEIR DIRECT SUPERVISION AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION.

The attached information is supplied by:

(Alligare LLC Representative)

(Date)

**MAGNACIDE™ H HERBICIDE
APPLICATION AND SAFETY MANUAL**

**RESTRICTED
FOR USE IN IRRIGATION CANALS ONLY**

READ THE LABEL AND THIS MANUAL BEFORE USE

DANGER



EXTREMELY FLAMMABLE



POISON



CORROSIVE

**MAY CAUSE EYE OR SKIN DAMAGE
KEEP OUT OF REACH OF CHILDREN**

**REGISTRATION NUMBER 10948
PEST CONTROL PRODUCTS ACT**

GUARANTEE: ACROLEIN 95%

**BAKER HUGHES CANADA COMPANY
GULF CANADA SQUARE, 1000-401 9TH AVE. SW
CALGARY, ALBERTA T2P 3C5**

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List of Abbreviations

cfs	Cubic foot per second
cps	Centipoise
DOT	U.S. Department of Transportation
gph	Gallons per hour
kPa	Kilopascal
kph	Kilometers per hour
lbs	Pounds
lph	Litres per hour
m ³ /sec	Cubic meters per second
mph	Miles per hour
mm	Millimeter
mmHg	Millimeters of mercury
NIOSH	National Institute of Occupational Safety and Health
OV	Organic vapor
PMRA	Canada Pest Management Regulatory Agency
ppm	Parts per million
psig	Pounds per square inch gauge
psi	Pounds per square inch

NOTICE TO USER: This pest control product is to be used only in accordance with the directions on the label. It is an offense under the Pest Control Products Act to use this control product in a way that is inconsistent with the directions on the label. The user assumes the risk to persons or property that arises from any such use of this product. The uses of Magnacide H Herbicide may be subject to other legislative requirements such as those under the Fisheries Act.

During application, one **trained** and **certified** applicator is required to be on site during application. The trained and certified applicator is required to contact a member of their organization no less than every two hours during the course of the application. No-one is allowed to participate in the application unless they are holding an appropriate pesticide applicator certificate or license recognized by the provincial/territorial pesticide regulatory agency where the pesticide application is to occur and applicators must complete a training program provided by the registrant within the last 12 months. The registrant training program must comprise, at the minimum, training on the safe and effective use of this product including all parts of this label and the MAGNACIDE H Herbicide Application and Safety Manual.

All applications must be made during daylight hours.

Do not exceed 8 applications per application point per year. An individual application point, as defined, may consist of multiple treatments/releases within a contiguous irrigation canal, to ensure aquatic weed control throughout the entire irrigation canal or portion thereof.

A minimum of 14 days between applications must be respected.

Applicators must placard or post signs at the start and end of each canal section, and around the perimeter of the application equipment area. Specific sign requirements are listed in the product Application and Safety Manual under **DIRECTIONS FOR USE**.

NATURE OF RESTRICTION: This product is to be used only in the manner authorized; contact local pesticide regulatory authorities about use permits that are required.

RESTRICTED USES

NOTE: THE USE OF MAGNACIDE H HERBICIDE REQUIRES AUTHORIZATION BY PROVINCIAL PERMIT. PROVINCIAL PERMITS MUST INCLUDE SPECIFICATIONS OF MEASURES:

- a) **TO PREVENT TREATED WATER WHICH CONTAINS ACROLEIN FROM ENDANGERING FISH IN NATURAL BODIES OF WATER AND RESERVOIRS USED AS COMMERCIAL AND RECREATIONAL FISHERIES.**
- b) **TO PREVENT THE RELEASE OF TREATED WATER INTO DUGOUTS USED FOR DOMESTIC AND LIVESTOCK WATER SUPPLIES.**
- c) **TO NOTIFY DOWNSTREAM USERS OF IRRIGATION WATER AND THE PUBLIC.**

DIRECTIONS FOR USE

MAGNACIDE H Herbicide is a water-soluble material for the control of submersed and floating weeds and algae in irrigation canals only. This material must be applied in accordance with the directions in the **MAGNACIDE H Herbicide** Application and Safety Manual. Applicators must be provincially certified and must also have been trained in **MAGNACIDE H Herbicide** safety and application or be under the supervision of trained personnel. Do not permit dairy animals to drink treated water. Do not use where waters will flow into potential sources of drinking water. Water treated with **MAGNACIDE H Herbicide** must be used for irrigation of fields, either crop bearing, fallow or pasture, where the treated water remains on the field OR held for 6 days before being released into fish bearing waters or where it will drain into them. Do not contaminate irrigation or drinking water supplies or aquatic habitats by cleaning of equipment or disposal of wastes.

I. INTRODUCTION

MAGNACIDE H Herbicide (active ingredient: acrolein, stabilized) is a product used for the control of submerged and floating weeds, and algae in irrigation canals. MAGNACIDE H Herbicide is registered with the Canadian Pest Management Regulatory Agency (PMRA) under Registration Number 10948 Pest Control Products Act. The legal uses of MAGNACIDE H Herbicide are limited to those listed on the product label and this manual. This manual provides information on the proper application and handling of MAGNACIDE H Herbicide.

Due to its toxicity by inhalation, and aquatic use (irrigation canals), MAGNACIDE H Herbicide is classified as a RESTRICTED USE PESTICIDE for retail sale to, and use only by, provincially certified applicators. The use of MAGNACIDE H Herbicide requires authorization by provincial permit. Please contact the appropriate agency in your province or territory for further information.

A. Physical and Chemical Properties of MAGNACIDE H Herbicide

MAGNACIDE H Herbicide is a formulation containing a nominal concentration of 95% (by weight) acrolein, the active ingredient. Typical physical and chemical properties are listed below.

Formula	(CH ₂ =CH-CHO)
Molecular weight	56.06
Appearance	clear, colorless to light yellow liquid
Odor	aldehydic (extremely irritating)
Specific gravity at 16 °C (60 °F)	0.847
Weight per gallon at 16 °C (60 °F)	3.21 kg (7.06 lb.)
Boiling point (@760 mmHg)	53 °C (127 °F)
Freezing point	-87 °C (-124 °F)
Vapor density	1.93 (air = 1.0)
Flash point	
Tag open cup	-29 °C (-20° F) (approx.)
Tag closed cup	-25 °C (-13° F) (approx.)
Flammability limits in air	
Lower limit	2.8% (by volume)
Upper limit	31.0% (by volume)
Solubility at 20 °C (68 °F)	
Acrolein in water	22% by weight
Water in acrolein	7% by weight
Vapor pressure at 35 °C (95 °F)	402.5 mmHg (8.6 psia)
Coefficient of expansion at 20°C (68 °F).....	0.000143 per °C (0.000762 per °F)
Viscosity at 0°C (32 °F) (Abs.)	0.43 cps
Threshold limit value (OSHA).....	0.1 ppm

B. General Product Information

MAGNACIDE H Herbicide controls submersed and floating vegetation in irrigation systems. Effective treatment rates in irrigation systems range up to 15 parts per million (ppm); in other words, 15 parts of MAGNACIDE H Herbicide per 1,000,000 parts of water. In irrigation systems, submersed weed control is obtained at these dosages with application times ranging from 30 minutes to 8 hours (see MAGNACIDE H Herbicide Concentration Table 3, Page 12, Metric Units or Table 6, Page 16, English Units). All typical submersed aquatic weed species and algae appear to be susceptible. Floating forms such as watercress, water hyacinth and water primrose are typically not completely controlled at label rates. Emergent species, such as cattails and tules, are not affected.

Closed system application equipment permits the introduction of MAGNACIDE H Herbicide into the irrigation system with minimal handling. MAGNACIDE H Herbicide is supplied in United States Department of Transportation (DOT) Specification pressurized containers. It is forced through a metering device using industrial grade nitrogen gas directly into the irrigation system.

MAGNACIDE H Herbicide is available in 198 Litre (52.4 gallon) cylinders or 1314 Litre (347 gallon) portable skid tanks. All orders are F.O.B. Taft, California USA. Round trip freight charges for the containers are included in the product billing. Empty containers should be returned collect to Taft, California.

Those interested in the commercial application of MAGNACIDE H Herbicide should contact:

Baker Petrolite LLC through its authorized distributor Alligare LLC

Telephone: (334) 741-9383 or (888)-255-4427 Facsimile: (334)-741-9395

II. CONTROLLING SUBMERSED AQUATIC VEGETATION WITH MAGNACIDE H HERBICIDE

A. Introduction

Aquatic vegetation is a serious pest in many of the world's waterways. This is particularly true in irrigation canals where weeds and algae reduce water flow below the designed capacity of the system. Unhampered weed growth causes the water level to rise, thus increasing the chance of overflow and canal breaks. Weeds collect silt and debris, necessitating periodic costly cleanouts. Occasionally these weeds break loose, clogging weirs, siphons and other canal structures. Control of this vegetation is a costly, but necessary part of the maintenance of these systems. The process of controlling submersed aquatic vegetation with MAGNACIDE H Herbicide, as described in this manual, is an effective means of overcoming many of these problems.

B. Mode of Action on Plants

MAGNACIDE H Herbicide is a general cell toxicant which reacts with various vital enzyme systems. The dead plant tissues gradually disintegrate without releasing any large masses of vegetation to clog canal structures. The weeds disintegrate slowly and clear out over a period of 1 to 14 days, depending on the water temperature and species of aquatic weeds present. The time for restoration of the canal to full capacity will depend on the rate at which the weeds disintegrate; however, some increase in capacity may be apparent within a few hours, as the weeds become flaccid and collapse to the canal bed.

C. Weed Specificity

Although MAGNACIDE H Herbicide appears to be toxic to all submersed weeds and algae, no special studies have been conducted to determine the relative susceptibility of the various species. However, among submersed aquatic weeds, forms such as *Zannichellia sp.* and *Potamogeton crispus* are more easily controlled than the forms which also have floating leaves such as *P. nodosus* and *P. illinoensis*. The latter types are best controlled when immature. The following examples of species are controlled by recommended label use rates:

Submersed and Floating Aquatic Weeds:

<i>Callitriche</i> spp.	Water starwort
<i>Ceratophyllum demersum</i>	Hornwort
<i>Elodea canadensis</i>	Canadian waterweed
<i>Heteranthera dubia</i>	Waterstargrass
<i>Lemna gibba</i>	Duckweed
<i>Potamogeton crispus</i>	Curlyleaf pondweed
<i>Potamogeton foliosus</i>	Leafy pondweed
<i>Potamogeton illinoensis</i>	Illinois pondweed
<i>Potamogeton nodosus</i>	American pondweed
<i>Potamogeton obtusifolius</i>	Bluntleaf pondweed
<i>Potamogeton pectinatus</i>	Sago pondweed
<i>Potamogeton richardsonii</i>	Richardson pondweed

<i>Potamogeton sulcatus</i>	Floating pondweed
<i>Najas</i> spp.	Naiad
<i>Zannichellia palustris</i>	Horned pondweed

Algae:

<i>Anabaena</i> spp.	Bluegreen algae
<i>Chara</i> spp.	Stoneworts
<i>Cladophora</i> spp.	Green algae
<i>Hydrodictyon reticulatum</i>	
<i>Navicula pelliculosa</i>	Freshwater diatom
<i>Selenastrum capricornutum</i>	Green algae
<i>Skeletonema costatum</i>	Marine diatom
<i>Spirogyra</i> spp.	Green algae

III. PRECAUTIONARY STATEMENTS**A. Hazards to Humans**

DANGER. EXTREMELY FLAMMABLE AND IRRITATING VAPOR AND LIQUID. POISONOUS BY INHALATION, SKIN CONTACT OR SWALLOWING. DO NOT BREATHE VAPOR. CORROSIVE. CAUSES EYE AND SKIN DAMAGE. DO NOT GET IN EYES, ON SKIN OR ON CLOTHING. KEEP AWAY FROM FIRE, SPARKS, AND HEATED SURFACES.

Liquid MAGNACIDE H Herbicide is absorbed by the skin and is particularly irritating to any lesion and to the eyes. The vapor is highly toxic and a strong irritant (lachrymator) which acts principally on the mucous membranes of the eyes, nose, throat and lungs. The vapor concentration tolerable to humans (0.1-1 ppm in air) serves as a warning of its presence and is close to the concentration that can cause lung injury (2-4 ppm). If you can smell the vapor, or if you experience lung or eye irritation, move away from the area immediately. Inhalation of the vapor can result in serious, permanent injury to the lungs.

B. FIRST AID

Call poison control center or physician immediately for treatment advice. Take container, label or product name and Pest Control Product Registration Number with you when seeking medical attention.

1. If Inhaled

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.

2. If on Skin or Clothing

- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15 – 20 minutes.

3. If in Eyes

- Hold eyes open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first five minutes, then continue rinsing eye.

4. If Swallowed

- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by a poison control centre or doctor.
- Avoid alcohol.
- NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON

5. TOXICOLOGICAL INFORMATION

Probable mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression and convulsion may be needed.

WARNING SIGNS AND SYMPTOMS: Liquid MAGNACIDE H Herbicide is absorbed by the skin and is particularly irritating to any lesion and to the eyes. The vapors act principally on the mucous membrane of the eyes and respiratory tract.

TREATMENT: Treat exposed area as a chemical burn. Thoroughly flush eyes with water and treat symptomatically. Persons exposed to MAGNACIDE H Herbicide vapors have a delayed reaction and experience irritation of the respiratory tract. In severe cases, this may progress to pulmonary edema. Therefore, it is advisable to keep persons exposed to MAGNACIDE H Herbicide under observation for 24 hours following exposure.

C. Environmental Hazards Statement

This product is toxic to aquatic organisms, birds, and mammals. Keep out of lakes, streams or ponds. Fish, shrimp and crabs will be killed at application rates recommended. Do not apply where they are important resources. Do not apply to natural bodies of water, or to water drainage areas where runoff or flooding will contaminate ponds, lakes, streams, tidal marshes and estuaries. Do not contaminate water by cleaning of equipment or disposal of wastes. Apply this product only as specified on the label.

IV. RECOMMENDATIONS FOR THE PROPER HANDLING OF MAGNACIDE H HERBICIDE

This section details the required handling methods for MAGNACIDE H Herbicide and summarizes the importance of personal safety equipment, proper storage and equipment use, and spill and fire control. All persons handling MAGNACIDE H Herbicide must be properly trained and certified in the correct application techniques and be familiar with its properties and emergency response procedures prior to performing an application. Baker Petrolite has an extensive training and certification program to qualify applicators.

A. Personnel Safety

If handled or used improperly, MAGNACIDE H Herbicide is very dangerous, particularly the concentrate. When setting up and breaking down application equipment, a full-face air purifying respirator with organic vapor (OV) cartridges approved by the National Institute of Occupational Safety and Health (NIOSH) and butyl rubber gloves must be worn. For visual inspection of equipment during treatment, chemical splash goggles must be worn. If spilled on clothing, gloves, or shoes, remove them immediately and wash thoroughly with soap and water before reuse. Do not reuse footwear until thoroughly aired. Apply product in the open air with adequate ventilation. Reseal the container tightly. After use and before eating, drinking or smoking, wash hands, arms, and face thoroughly with soap and water. After each day's use wash gloves, respirator and contaminated clothing.

Applicators must also have fresh water available in case of accidental irritation to the eyes or skin from MAGNACIDE H Herbicide liquid or vapors. In addition, the applicator must have a 4.5 kilogram (10 pound) dry chemical fire extinguisher at his disposal when working with MAGNACIDE H Herbicide. All of the equipment mentioned above must be provided for the applicator's use during each application. Personnel who may be involved with the storage, transportation, use, disposal or emergency response of MAGNACIDE H Herbicide must be trained in the safety and health aspects of acrolein, including, but not limited to, the use of personal protective equipment, respiratory protection and emergency response.

B. Storage and Equipment

Store containers of MAGNACIDE H Herbicide in a secured, well-ventilated area away from children, animals, food, feedstuffs, seed, fertilizers, and other chemicals. No alkalis or oxidizing materials should be near. Any electrical equipment should be Class 1 - Division 2 and properly grounded. MAGNACIDE H

Herbicide has a defined shelf life and should be used in a timely manner; therefore stock rotation is strongly recommended. If partially full containers are held from one season to the next, ensure there is a nitrogen blanket of 138 - 207 kPa (20 - 30 psig) applied to the container. Do not reuse empty container. Return empty containers to Baker Petrolite Corporation.

All equipment used in the MAGNACIDE H Herbicide system must be chemically compatible. Materials must not cause a reaction with the MAGNACIDE H Herbicide. All equipment and hardware must be free from all traces of contaminants, especially alkalis (such as ammonia and caustics) and acids. Contamination of MAGNACIDE H Herbicide with these substances can cause the container to rupture. All parts used in the MAGNACIDE H Herbicide Application Kit have been thoroughly tested for their compatibility with our product. No substitutions should be made without authorization from Baker Petrolite.

C. Spill Control Procedure

1. General Information

MAGNACIDE H Herbicide spills can be deactivated using sodium carbonate (soda ash). Sodium carbonate (in powder form) should be added to the spill followed by dilution with water. This will polymerize the acrolein forming a hard, odorless polymer. The deactivated polymer can then be placed in marked containers for disposal at an approved waste disposal facility. Never flush or allow spilled MAGNACIDE H Herbicide to flow into sewers or natural waterways as this can result in biological upset of treatment systems, kill fish in waterways, or create a toxic hazard. Notify proper authorities as required by local regulations.

2. Recommended Procedure For Handling Spills

1. All personnel responding to a spill of MAGNACIDE H Herbicide must have completed the appropriate training.
2. Evacuate all nonessential personnel to an upwind area.
3. All decontamination personnel must wear self-contained breathing apparatus and appropriate protective clothing.
4. Contain spill by diking with dirt.
5. Add sodium carbonate (soda ash) to the spill in powdered form. Follow by dilution with water.
6. When deactivation is complete, scoop the polymer in properly marked containers for disposal at an approved industrial waste disposal facility in compliance with provincial requirements.
7. For additional information regarding the cleanup of spills, contact the provincial regulatory agency or the manufacturer.

D. Disposal

Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. For information on the disposal of unused, unwanted product, contact the manufacturer or the provincial regulatory agency. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean-up of spills.

E. Fire and Polymerization Hazards

MAGNACIDE H Herbicide is a highly volatile liquid. In certain combinations with air (2.8 - 31% by volume) vapors have an explosive potential if ignition sources are present. Keep away from fire, sparks and heated surfaces.

Liquid MAGNACIDE H Herbicide is highly chemically reactive and readily forms polymers; this reaction generates tremendous heat. Contamination with alkalis or strong acids can initiate rapid polymerization. Contamination with all foreign materials must be avoided. If the product is stored or handled improperly, the polymerization may proceed with sufficient violence to rupture the container.

MAGNACIDE H Herbicide polymerizes slowly in the presence of air. Therefore, all containers are packaged with a blanket of nitrogen to exclude air. Hydroquinone is added to inhibit oxygen-catalyzed polymerization; however, hydroquinone does not inhibit polymerization catalyzed by alkalis and strong

acids. To avoid the possibility of air contamination during use, MAGNACIDE H Herbicide must only be pressured from the container with industrial grade nitrogen.

F. Recommended Fire Control

MAGNACIDE H Herbicide is highly flammable and produces toxic vapors. All fire fighting personnel must wear self-contained breathing apparatus and protective clothing. On a small fire, use carbon dioxide or dry chemical extinguishers. Alcohol-type foam is recommended for large fires. Water spray may be effective if used in large quantities, at least 20 volumes of water per volume of MAGNACIDE H Herbicide. Use water spray to help disperse vapors and cool containers. If container is heavily exposed to fire, evacuate area and let fire burn.

Note: At elevated temperatures, such as in fire conditions, there is the possibility of violent rupture of MAGNACIDE H Herbicide containers.

V. DIRECTIONS FOR USE

It is a violation of federal law to use this product in a manner inconsistent with its labeling. MAGNACIDE H Herbicide is a water soluble material for the control of submersed and floating weeds and algae in irrigation canals. Information contained in the following pages will assist the applicator in determining: (1) the required treatment rate; (2) the proper size orifice for MAGNACIDE H Herbicide application; (3) the nitrogen application pressure to use; and (4) the proper setup and shutdown of the MAGNACIDE H Herbicide application equipment (as distributed by Baker Petrolite).

Applicators must placard or post signs at the start and end of each canal section, and around the perimeter of the application equipment area (truck, hoses and skids). Signs posted around the application equipment area must be no more than 4.5 metres apart. All signs must conform to the following requirements:

- a) Signs shall be at least 35 cm by 25 cm in size, and letters at least 7 cm in height, unless smaller-sized signs are necessary because the treated area is too small to accommodate signs of this size. Letters shall be clearly legible.
- b) Signs must bear the following:
 1. The signal word "DANGER" and the skull and crossbones.
 2. The statements "DO NOT ENTER", "Pesticide Application in Progress" and "NO SWIMMING".
 3. The start date and time of application.
 4. The end date and time of application.
 5. The name of the pesticide.
 6. The name, address and telephone number of the applicator or pesticide handler.

Signs must remain posted during application and must be removed no later than 3 days after treatment. Only a certified applicator (or someone under his/her supervision) may remove warning signs.

Handlers must use a closed system that is designed by the manufacturer to prevent dermal and inhalation exposures by removing the product from the container and applying the product below the water's surface. At any disconnect point, the system must be equipped with a dry disconnect or dry couple shut-off device that will limit drippage to no more than 2 ml per disconnect. The closed system must function properly and be used and maintained in accordance with the manufacturer's written operating instructions. Handlers must wear the personal protective equipment on this labeling.

A. Provincial Permit Requirement

The use of MAGNACIDE H Herbicide requires authorization by provincial permit. Provincial permits must include specification of measures:

- a) to prevent treated water which contains acrolein from endangering fish in natural bodies of water and reservoirs used as commercial and recreational fisheries.
- b) to prevent the release of treated water into dugouts used for domestic and livestock water supplies.
- c) to notify downstream users of irrigation water and the public.

B. MAGNACIDE H Herbicide Application from Containers

MAGNACIDE H Herbicide is forced from the container with oxygen-free nitrogen gas and introduced directly into the canal over a period of 30 minutes to 8 hours. Because of its high activity against submersed vegetation, only concentrations up to 15 ppm are required for control. The amount of MAGNACIDE H Herbicide required to treat the irrigation system is primarily determined by the volume of water and weed density; although water velocity, temperature and quality must also be considered. Canal flow is generally stated in cubic meter per second (m^3/sec) or cubic feet per second (cfs), and the amount of material used can be expressed in terms of these values. As an example, if MAGNACIDE H Herbicide is recommended at a rate of 134 litres/ m^3/sec (1 gal/cfs), a canal flowing at 0.25 m^3/sec (10 cfs) will need a total of 33.5 litres (10 gal) of material.

MAGNACIDE H Herbicide, added over a time interval, proceeds down the irrigation system as a “wave” of treated water reacting with weeds as it moves. Because the wave of treated water bathes the weeds in herbicide as it travels, the amount of herbicide the weed receives is determined by (1) concentration and (2) exposure time. In fast flowing canals (linear velocity greater than 2.7 kph or 1.7 mph), masses of vegetation may be compacted or bent by the water; channeling may occur, preventing the free movement of the treated water through the weeds. The same situation may prevail in canals heavily infested with weed growth. Consequently, all plants may not receive their proportionate share of the available herbicide and control will be less effective. Therefore, in canals with heavy weed infestation or water flowing faster than 2.7 kph (1.7 mph), the dosages may have to be increased (up to 15 ppm) and/or the duration of treatment extended for effective treatment.

C. MAGNACIDE H Herbicide Treatment Rate Selection (Metric Units)

This section provides instructions on determining the appropriate treatment rates for various weed conditions in irrigation systems. The application time is determined at the convenience of the applicator and the specific system design. The rate of flow of the chemical is controlled by the orifice size and nitrogen pressure. Generally most application time options begin with a four hour treatment and future optimizations are determined based on specific canal results.

In order to begin calculation of the appropriate treatment levels, four basic items of information must be determined:

1. The weed growth condition: The more severe the weed growth condition, the more MAGNACIDE H Herbicide which will be required for control. Use Table 1. Weed Growth Condition Chart, to determine the weed growth condition and litres of MAGNACIDE H Herbicide per cubic meter per second (m^3/sec) for effective treatment.
2. Canal rate of flow: The volume of water that passes a particular reference section in a unit of time. Usually designated as cubic meters per second (m^3/sec). Calculated as mean depth in meters times mean width in meters times the linear velocity in meters per second.
3. Temperature ($^{\circ}C$) of the water to be treated.
4. Application time desired: Normal application times will range from 30 minutes to 8 hours. Items to be considered in selecting an application time are:
 - a. Contact time. MAGNACIDE H Herbicide is a contact herbicide. In fast flowing canals (3.2 kph or more) extend the application time to ensure good contact. In slower canals, shorten the application time.
 - b. Concentration of MAGNACIDE H Herbicide in parts per million (ppm) may be controlled by adjusting the application time (holding volume of chemical applied constant). Concentrations must not exceed 15 ppm.

After the above 4 items have been determined, the applicator can calculate the orifice size and nitrogen pressure setting required to conduct the treatment. The orifice plate sizes and nitrogen pressure are located in Table 2. This table is used by reading across from the calculated litres per hour of MAGNACIDE H Herbicide to the appropriate orifice size and up to the correct nitrogen setting.

Table 1. Weed Growth Condition Chart (Metric Units)

Condition Code		MAGNACIDE H Herbicide per m ³ /sec
A	Little algae and pondweed less than 150 mm long	= 22 litres per m ³ /sec
B	Algae (non-floating) and pondweed less than 300 mm long	= 33 litres per m ³ /sec
C	Algae (some floating) and pondweed 300-600 mm long	= 67 litres per m ³ /sec
D	Algae (some floating) and mature pondweed (over 600 mm long)	= 134 litres per m ³ /sec
E	Choked condition	= 200 litres per m ³ /sec

NOTE: Water temperatures also affect the amount of MAGNACIDE H Herbicide required for effective treatment. MAGNACIDE H Herbicide is less soluble in cooler water and plant reactivity is lowered. The above conditions are for temperatures above 15° C. Correct the amount of MAGNACIDE H Herbicide required for effective treatment as follows:

Water Temperatures	Increase Amount of MAGNACIDE H Herbicide
13.1° C - 15° C	20%
10.1° C - 13° C	50%
10° C or below	100%

The concentration of MAGNACIDE H Herbicide must not exceed 15 ppm. After the applicator has calculated the application rate for effective treatment, a check of Table 3 must be made to ensure the resulting concentration does not exceed 15 ppm. In situations where a temperature adjustment has been made, the applicator must use the following formula to determine ppm concentration and ensure the treatment rate does not exceed 15 ppm:

$$\frac{\{(Total\ litres\ of\ MAGNACIDE\ H\ Herbicide) / Canal\ flow\ in\ m^3/sec\} \times 14.1}{application\ time\ (minutes)} = ppm\ (MAGNACIDE\ H\ Herbicide\ concentration)$$

Alternately, if a treatment is selected based on a desired ppm concentration in the water, the following formula may be used to determine the application rate.

$$Litres\ per\ hour\ (lph)\ MAGNACIDE\ H\ Herbicide = m^3/sec \times 4.25 \times MAGNACIDE\ H\ Herbicide\ (in\ ppm)$$

D. MAGNACIDE H Herbicide Application Examples (Metric Units)

The following two examples will assist the applicator in developing expertise in determining treatment rates for appropriate applications.

Example A:

1. Weed growth condition: Some algae and pondweed 250 mm in length.
2. Canal rate of flow is 1.42 m³/sec.
3. Temperature of 18° C.
4. Application time 3 hours.

Step 1

Based on the parameters listed for Example A, a Condition Code B or 33 litres of MAGNACIDE H Herbicide per m³/sec exists (from Table 1. Weed Growth Condition Chart). **NOTE:** Temperature is above 15° C.

Step 2

Determine total volume of MAGNACIDE H Herbicide required for effective treatment by multiplying canal rate of flow (m³/sec) by weed growth condition code (MAGNACIDE H Herbicide per m³/sec) to determine the total litres of MAGNACIDE H Herbicide.

$$1.42 \text{ m}^3/\text{sec} \times 33 \text{ litres MAGNACIDE H Herbicide per m}^3/\text{sec} = 46.9 \text{ litres of MAGNACIDE H Herbicide required}$$

Step 3

Determine litres of MAGNACIDE H Herbicide required per hour by dividing the total litres of MAGNACIDE H Herbicide (calculated in Step 2) by application time (3 hours).

$$46.9 \text{ litres MAGNACIDE H Herbicide} / 3 \text{ hours} = 15.6 \text{ lph of MAGNACIDE H Herbicide}$$

Step 4

Determine the appropriate orifice size and nitrogen pressure setting for this treatment rate. Go to Table 2. Orifice Flow Table. Locate the litres per hour of MAGNACIDE H Herbicide calculated in Step 3 (or the closest number to the calculated value) in the table. Read to the left column to find the orifice size and read to the top row to find the appropriate nitrogen pressure setting. We determine 15.5 lph is the closest number to 15.6 lph and locate the orifice size and pressure setting of:

Orifice Size, Inches	Pressure Setting, psig
0.025	25 psig

Step 5

Check Table 3 to ensure treatment rate does not exceed 15 ppm. Locate 3 hours on the Application Time column and read across to Condition B (Step 1) to determine treatment rate is 2.6 ppm.

Example B:

1. Weed growth condition: Floating algae and floating pondweed 300 mm - 600 mm long.
2. Canal rate of flow 3.40 m³/sec.
3. Temperature 13.9°C.
4. Application time 4 hours.

Step 1

Based on the parameters listed for Example B, a Condition Code C or 67 litres of MAGNACIDE H Herbicide per m³/sec exists (from Table 1. Weed Growth Condition Chart). **NOTE:** A water temperature of 13.9° C will require a 20% increase in treatment rate.

Step 2

Determine the total volume of MAGNACIDE H Herbicide required for effective treatment by multiplying canal rate of flow (m³/sec) by weed growth condition code (MAGNACIDE H Herbicide per m³/sec) to determine the total litres of MAGNACIDE H Herbicide. Since the water Temperature is below 16 °C, a 20% increase in the volume of MAGNACIDE H Herbicide is required.

$$3.4 \text{ m}^3/\text{sec} \times 67 \text{ litres of MAGNACIDE H Herbicide per m}^3/\text{sec} = 227 \text{ litres MAGNACIDE H Herbicide}$$

Temperature Adjustment:

$$227 \text{ litres MAGNACIDE H Herbicide} \times 0.20 = 45.4 \text{ litres}$$

$$227 \text{ litres} + 45.4 \text{ litres} = 272 \text{ total litres MAGNACIDE H Herbicide}$$

Step 3

Determine litres of MAGNACIDE H Herbicide required per hour by dividing the total litres of MAGNACIDE H Herbicide (calculated in Step 2) by application time (4 hours).

$$272 \text{ litres MAGNACIDE H Herbicide} / 4 \text{ hours} = 68 \text{ lph of MAGNACIDE H Herbicide}$$

Step 4

Determine the appropriate orifice size and nitrogen pressure setting for this treatment rate. Go to Table 2. Orifice Flow Table. Locate the litres per hour of MAGNACIDE H Herbicide calculated in Step 3 (or the closest number to the calculated value) in the table. Read to the left column to find the orifice size and read to the top row to find the appropriate nitrogen pressure setting. We determine 70.0 lph is the closest number to 68.1 lph and locate the orifice size and pressure setting:

Orifice Size, Inches	Pressure Setting, psig
0.045	50 psig

Step 5

To determine the total litres of MAGNACIDE H Herbicide to be used based on the Table 2 value, multiply the litres per hour MAGNACIDE H Herbicide by the total application time.

$$70 \text{ litres per hour MAGNACIDE H Herbicide} \times 4 \text{ hours} = 280 \text{ total litres MAGNACIDE H Herbicide}$$

Use the ppm calculation formula to ensure the application rate will not exceed 15 ppm.

$$\frac{\{(280 \text{ total litres of MAGNACIDE H Herbicide}) / 3.4 \text{ m}^3/\text{sec}\} \times 14.1}{240 \text{ minutes (application time)}} = 4.8 \text{ ppm MAGNACIDE H Herbicide}$$

Table 2. Orifice Flow Table (Metric Units)

Orifice Size (in.)	Nitrogen Pressure Settings									
	6 psig	8 psig	10 psig	15 psig	20 psig	25 psig	30 psig	40 psig	50 psig	60 psig
	Litres per Hour									
0.014	2.5	2.7	3.2	4.0	4.5	4.9	5.3	6.1	7.2	7.9
0.016	3.2	3.7	4.0	4.9	5.7	6.4	7.2	8.3	9.01	9.8
0.020	4.9	5.7	6.1	7.9	9.1	10.2	10.6	12.5	14.0	15.1
0.025	7.9	8.7	9.8	12.1	14.0	15.5	17.0	19.3	22.3	22.7
0.030	10.6	12.5	14.0	17.4	20.1	22.3	24.2	27.6	32.2	34.8
0.035	14.8	17.0	19.3	23.5	27.3	29.9	34.8	39.7	42.0	47.3
0.045	24.2	26.5	32.2	39.7	44.7	49.6	53.7	62.5	70.0	79.5
0.055	37.1	42.0	46.9	56.8	64.3	75.7	83.3	94.6	90.8	114.0
0.070	56.8	64.3	79.5	94.6	106.0	121.0	133.0	151.0	174.0	185.0
0.081	79.5	90.8	102.0	125.0	144.0	159.0	178.0	201.0	227.0	246.0

Table 3. MAGNACIDE H Herbicide Concentrations (Metric Units)

MAGNACIDE H Herbicide Concentrations Flowing Irrigation Canals Concentration in ppm at Various Litres/m ³ /sec Rates					
Application Time	Weed Condition A	Weed Condition B	Weed Condition C	Weed Condition D	Weed Condition E
	m ³ /sec 22	m ³ /sec 33	m ³ /sec 67	m ³ /sec 134	m ³ /sec 200
ppm					
30 Minutes	10.0	-	-	-	-
1 Hour	5.0	7.8	-	-	-
2 Hours	2.6	3.9	7.8	-	-
3 Hours	1.7	2.6	5.2	10.4	-
4 Hours	1.3	2.0	3.9	7.9	11.8
6 Hours	-	1.3	2.6	5.2	7.9
8 Hours	-	1.0	1.9	3.9	5.9

E. MAGNACIDE H Herbicide Treatment Rate Selection (English Units)

This section provides instructions on determining the appropriate treatment rates for various weed conditions in irrigation systems. The application time is determined at the convenience of the applicator and the specific system design. The rate of flow of the chemical is controlled by the orifice size and nitrogen pressure. Generally most application time options begin with a four hour treatment and future optimizations are determined based on specific canal results.

In order to begin calculation of the appropriate treatment levels, four basic items of information must be determined:

1. The weed growth condition: The more severe the weed growth condition, the more MAGNACIDE H Herbicide which will be required for control. Use Table 4. Weed Growth Condition Chart, to determine the weed growth condition and gallons of MAGNACIDE H Herbicide per cubic foot per second (cfs) for effective treatment.
2. Canal rate of flow: The volume of water that passes a particular reference section in a unit of time. Usually designated as cubic feet per second (cfs). Calculated as mean depth in feet times mean width in feet times the linear velocity in feet per second.
3. Temperature (°F) of the water to be treated.
4. Application time desired: Normal application times will range from 30 minutes to 8 hours. Items to be considered in selecting an application time are:
 - a. Contact time. MAGNACIDE H Herbicide is a contact herbicide. In fast flowing canals (2 mph or more) extend the application time to ensure good contact. In slower canals, shorten the application time.
 - b. Concentration of MAGNACIDE H Herbicide in parts per million (ppm) may be controlled by adjusting the application time (holding volume of chemical applied constant). Concentrations must not exceed 15 ppm.

After the above 4 items have been determined, the applicator can calculate the orifice size and nitrogen pressure setting required to conduct the treatment. The orifice plate sizes and nitrogen pressure are located in Table 5. This table is used by reading across from the calculated gallons per hour of MAGNACIDE H Herbicide to the appropriate orifice size and up to the correct nitrogen setting.

Table 4. Weed Growth Condition Chart (English Units)

<u>Condition Code</u>		<u>MAGNACIDE H Herbicide per cfs</u>
A	Little algae and pondweed less than 6" long	= 0.17 gallons per cfs
B	Algae (non-floating) and pondweed less than 12" long	= 0.25 gallons per cfs
C	Algae (some floating) and pondweed 12-24" long	= 0.50 gallons per cfs
D	Algae (some floating) and mature pondweed (over 24" long)	= 1.00 gallons per cfs
E	Choked condition	= 1.50 gallons per cfs

NOTE: Water temperatures also affect the amount of MAGNACIDE H Herbicide required for effective treatment. MAGNACIDE H Herbicide is less soluble in cooler water and plant reactivity is lowered. The above conditions are for temperatures above 60° F. Correct the amount of MAGNACIDE H Herbicide required for effective treatment as follows:

<u>Water Temperatures</u>	<u>Increase Amount of MAGNACIDE H Herbicide</u>
60° F - 55° F	20%
55° F - 50° F	50%
50° F or below	100%

The concentration of MAGNACIDE H Herbicide must not exceed 15 ppm. After the applicator has calculated the application rate for effective treatment, a check of Table 6 must be made to ensure the resulting concentration does not exceed 15 ppm. In situations where a temperature adjustment has been made, the applicator must use the following formula to determine ppm concentration and ensure the treatment rate does not exceed 15 ppm:

$$\frac{\{(Total\ gallons\ of\ MAGNACIDE\ H\ Herbicide) / Canal\ flow\ in\ cfs\} \times 1884}{Application\ time\ (minutes)} = ppm\ (MAGNACIDE\ H\ Herbicide\ concentration)$$

Alternately, if a treatment is selected based on a desired ppm concentration in the water, the following formula may be used to determine the application rate.

$$Gallons\ per\ hour\ (gph)\ MAGNACIDE\ H\ Herbicide = cfs \times 0.032 \times MAGNACIDE\ H\ Herbicide\ (in\ ppm)$$

F. MAGNACIDE H Herbicide Application Examples (English Units)

The following two examples will assist the applicator in developing expertise in determining treatment rates for appropriate applications.

Example A:

1. Weed growth condition: Some algae and pondweed 10 inches in length.
2. Canal rate of flow is 50 cfs.
3. Temperature of 65° F.
4. Application time 3 hours.

Step 1

Based on the parameters listed for Example A, a Condition Code B or 0.25 gallons of MAGNACIDE H Herbicide per cfs exists (from Table 4. Weed Growth Condition Chart). **NOTE:** Temperature is above 60° F.

Step 2

Determine total volume of MAGNACIDE H Herbicide required for effective treatment by multiplying canal rate of flow (cfs) by weed growth condition code (MAGNACIDE H Herbicide per cfs) to determine the total gallons of MAGNACIDE H Herbicide.

$$50\ cfs \times 0.25\ gallons\ MAGNACIDE\ H\ Herbicide\ per\ cfs = 12.5\ gallons\ of\ MAGNACIDE\ H\ Herbicide\ required$$

Step 3

Determine gallons of MAGNACIDE H Herbicide required per hour by dividing the total gallons of MAGNACIDE H Herbicide (calculated in Step 2) by application time (3 hours).

$$12.5\ gallons\ MAGNACIDE\ H\ Herbicide / 3\ hours = 4.2\ gph\ of\ MAGNACIDE\ H\ Herbicide$$

Step 4

Determine the appropriate orifice size and nitrogen pressure setting for this treatment rate. Go to Table 5. Orifice Flow Table. Locate the gallons per hour of MAGNACIDE H Herbicide calculated in Step 3 (or the closest number to the calculated value) in the table. Read to the left column to find the orifice size and read to the top row to find the appropriate nitrogen pressure setting. We determine 4.1 gph is the closest number to 4.2 gph and locate the orifice size and pressure setting of:

<u>Orifice Size, Inches</u>	<u>Pressure Setting, psig</u>
0.025	25 psig

Step 5

Check Table 6 to ensure treatment rate does not exceed 15 ppm. Locate 3 hours on the Application Time column and read across to Condition B (Step 1) to determine treatment rate is 2.6 ppm.

Example B:

1. Weed growth condition: Floating algae and floating pondweed 12 - 24 inches long.
2. Canal rate of flow 120 cfs.
3. Temperature 57 °F.
4. Application time 4 hours.

Step 1

Based on the parameters listed for Example B, a Condition Code C or 0.50 gallons of MAGNACIDE H Herbicide per cfs exists (from Table 4. Weed Growth Condition Chart). **NOTE:** A water temperature of 57° F will require a 20% increase in treatment rate.

Step 2

Determine the total volume of MAGNACIDE H Herbicide required for effective treatment by multiplying canal rate of flow (cfs) by weed growth condition code (MAGNACIDE H Herbicide per cfs) to determine the total gallons of MAGNACIDE H Herbicide. Since the water temperature is below 60° F, a 20% increase in the volume of MAGNACIDE H Herbicide is required.

$$120 \text{ cfs} \times 0.50 \text{ gallons of MAGNACIDE H Herbicide per cfs} = 60 \text{ gallons MAGNACIDE H Herbicide}$$

Temperature Adjustment:

$$60 \text{ gallons MAGNACIDE H Herbicide} \times 0.20 = 12 \text{ gallons}$$

$$60 \text{ gallons} + 12 \text{ gallons} = 72 \text{ total gallons MAGNACIDE H Herbicide}$$

Step 3

Determine gallons of MAGNACIDE H Herbicide required per hour by dividing the total gallons of MAGNACIDE H Herbicide (calculated in Step 2) by application time (4 hours).

$$72 \text{ gallons MAGNACIDE H Herbicide} / 4 \text{ hours} = 18 \text{ gph of MAGNACIDE H Herbicide}$$

Step 4

Determine the appropriate orifice size and nitrogen pressure setting for this treatment rate. Go to Table 5. Orifice Flow Table. Locate the gallons per hour of MAGNACIDE H Herbicide calculated in Step 3 (or the closest number to the calculated value) in the table. Read to the left column to find the orifice size and read to the top row to find the appropriate nitrogen pressure setting. We determine 18.5 gph is the closest number to 18 gph and locate the orifice size and pressure setting:

Orifice Size, Inches
0.045

Pressure Setting, psig
50 psig

Step 5

To determine the total gallons of MAGNACIDE H Herbicide to be used based on the Table 5 value, multiply the gallons per hour MAGNACIDE H Herbicide by the total application time.

$$18.5 \text{ gallons per hour MAGNACIDE H Herbicide} \times 4 \text{ hours} = 74 \text{ total gallons MAGNACIDE H Herbicide}$$

Use the ppm calculation formula to ensure the application rate will not exceed 15 ppm.

$$\frac{((74 \text{ total gallons of MAGNACIDE H Herbicide}) / 120 \text{ cfs}) \times 1884}{240 \text{ minutes (application time)}} = 4.8 \text{ ppm MAGNACIDE H Herbicide}$$

Table 5. Orifice Flow Table (English Units)

Orifice Size (in.)	Nitrogen Pressure Settings									
	6 psig	8 psig	10 psig	15 psig	20 psig	25 psig	30 psig	40 psig	50 psig	60 psig
	Gallons per Hour									
0.014	0.65	0.72	0.85	1.05	1.2	1.3	1.4	1.6	1.9	2.1
0.016	0.85	0.98	1.05	1.3	1.5	1.7	1.9	2.2	2.4	2.6
0.020	1.3	1.5	1.6	2.1	2.4	2.7	2.8	3.3	3.7	4.0
0.025	2.1	2.3	2.6	3.2	3.7	4.1	4.5	5.1	5.9	6.3
0.030	2.8	3.3	3.7	4.6	5.3	5.9	6.4	7.3	8.5	9.2
0.035	3.9	4.5	5.1	6.2	7.2	7.9	9.2	10.5	11.1	12.5
0.045	6.4	7.0	8.5	10.5	11.8	13.1	14.2	16.5	18.5	21.0
0.055	9.8	11.1	12.4	15.0	17.0	20.0	22.0	25.0	27.0	30.0
0.070	15.0	17.0	21.0	25.0	28.0	32.0	35.0	40.0	46.0	49.0
0.081	21.0	24.0	27.0	33.0	38.0	42.0	47.0	53.0	60.0	65.0

Table 6. MAGNACIDE H Herbicide Concentrations (English Units)

MAGNACIDE Herbicide Concentrations Flowing Irrigation Canals Concentration in ppm at Various Gallons/cfs Rates					
Application Time	Weed Condition A	Weed Condition B	Weed Condition C	Weed Condition D	Weed Condition E
	Gal/cfs 0.17	Gal/cfs 0.25	Gal/cfs 0.50	Gal/cfs 1.0	Gal/cfs 1.5
ppm					
30 Minutes	10.0	-	-	-	-
1 Hour	5.0	7.8	-	-	-
2 Hours	2.6	3.9	7.8	-	-
3 Hours	1.7	2.6	5.2	10.4	-
4 Hours	1.3	2.0	3.9	7.9	11.8
6 Hours	-	1.3	2.6	5.2	7.9
8 Hours	-	1.0	1.9	3.9	5.9

G. Preventive Maintenance Program

It has been determined through various field studies that the most effective and economical method of aquatic weed control is obtained by utilization of a preventive maintenance program. Preventive maintenance programs require less herbicide usage. Better application results will also be obtained, as weeds are more susceptible when immature. This program consists of :

1. Making a series of MAGNACIDE H Herbicide applications over the irrigation season such that the aquatic weeds are never allowed to reach a "problem" condition.
2. The first MAGNACIDE H Herbicide application should be made as soon as aquatic weed growth appears (Weed Growth Conditions A or B). This will normally occur 3 - 6 weeks after the canal receives a constant supply of water.
3. The second and subsequent applications should be made at intervals, depending upon the regrowth of the aquatic weeds. Regrowth will depend on several variables such as water and atmospheric temperatures, species of aquatic plant, turbidity of water, water quality, and sunlight conditions.
4. By utilizing the preventive maintenance program, the irrigation system will be kept free of weeds throughout the irrigation season, solving water delivery problems and minimizing off-season maintenance created by aquatic weeds.

VI. APPLICATION FROM CYLINDERS AND SKID TANKS

A. General Instructions

The applicator must wear all appropriate personnel protective equipment including a full-face respirator when setting up or breaking down application equipment. The applicator must also ensure the availability of fresh wash water, either in a fixed or portable supply, for personal emergency use. The applicator should know the procedures thoroughly; rehearse them if necessary before the job. Turn all valves cautiously, ensuring there are no leaks and all hardware is working properly. Use only specified equipment as distributed by Baker Petrolite. Application equipment should be inspected prior to and during each application to ensure it is working properly. Only industrial grade nitrogen should be used to minimize the presence of oxygen. Oxygen will slowly consume the hydroquinone (stabilizer) and leave the MAGNACIDE H Herbicide susceptible to polymerization.

Once the application equipment is in place, and the treatment is in progress, an applicator should monitor the treatment if the containers are not secured. If the containers are secured (e.g., locked enclosures), the applicator should check on the treatment periodically.

Maintain accurate records of all MAGNACIDE H Herbicide applications including:

1. Date
2. Time application started and stopped
3. Location
4. Flow of canal (m³/sec or cfs)
5. Water temperature
6. Orifice size and pressure setting
7. Parts per million concentration of MAGNACIDE H Herbicide
8. Amount of MAGNACIDE H Herbicide injected
9. Any additional information required by the provincial/federal authorities.

B. Application Instructions

The following section provides step by step instructions for the setup, testing and shutdown of application equipment. Refer to Figure 1, MAGNACIDE H Herbicide Application Setup, and Figure 2, MAGNACIDE H Herbicide Application Kit for associated diagrams.

1. Calculate proper orifice size and regulator pressure setting using the appropriate tables shown in Section V, Directions for Use.
2. Install orifice plate in orifice assembly (18). Make sure the screen filter is **clean** and **in place**. Wrap threads on orifice assembly with two layers of Teflon[®] tape to ensure that a good seal is obtained. Wrap the threaded portions (14) of the nitrogen (blue) (A) and MAGNACIDE H Herbicide (orange) (B)

assemblies with two layers of Teflon tape to ensure that a good seal is obtained.

3. Secure nitrogen cylinder to prevent it from falling over. DO NOT lay cylinder down on its side. Connect nitrogen regulator (1) to nitrogen cylinder. Connect nitrogen hose (5) to cross tee (4).

Note: It is necessary to examine the integrity of the nitrogen check valve and excess flow valve each time a new cylinder of nitrogen is used.

4. To check excess flow valve: ensure nitrogen cylinder valve (F) is shut off and nitrogen pressure handle (G) is closed (counterclockwise). Remove check valve and attachments. Excess flow valve should remain attached to the regulator. Open nitrogen cylinder valve. Start to open quickly (clockwise) the nitrogen regulator pressure handle. Excess flow valve (2) should activate to prevent unrestricted flow of nitrogen. Repair or replace excess flow valves if necessary. Close nitrogen cylinder valve (F) and nitrogen pressure handle (G).
5. To check integrity of check valve: reinsert check valve (3) backwards (arrow pointing toward regulator). Open nitrogen cylinder valve (F). Turn nitrogen regulator pressure handle (G) clockwise to approximately 10 psi. Listen and check with finger to see if any nitrogen is escaping through the check valve. Repair or replace check valve if necessary. Close nitrogen cylinder valve (F) and nitrogen pressure handle (G). Reverse check valve (arrow pointing away from cylinder), retape and reassemble nitrogen regulator system in original configuration.

Note: Put on gloves, respirator and have wash water available before proceeding to Step 6.

6. Open container bonnet. Check MAGNACIDE H Herbicide container valves, nitrogen intake valve (blue) (C) and MAGNACIDE H Herbicide discharge valve (orange) (D) to ensure that they are in the closed and secured (locked) position. Inspect purging assembly ball valve (blue) (11) and bleed off valve (6) on the application equipment to ensure each is closed.
7. Remove the plugs from the nitrogen intake (blue) (C) and MAGNACIDE H Herbicide (orange) (D) valves. Remove any Teflon tape that may be in the valves. This tape could restrict flow of MAGNACIDE H Herbicide and the desired application rate may not be obtained. Connect the nitrogen assembly (blue) (A) to the nitrogen intake valve (blue) (C). Connect the MAGNACIDE H Herbicide assembly (orange) (B) to the MAGNACIDE H Herbicide discharge valve (orange) (D).
8. Connect the MAGNACIDE H Herbicide injection hose (21) to the MAGNACIDE H Herbicide assembly (B) at the orifice outlet (19). A weight must be attached to the end of the injection hose (22) to insure that the hose remains submerged. Prevent coils in the hose if possible. Drop the weighted end of the injection hose into the canal at a point where MAGNACIDE H Herbicide will mix thoroughly. If a canal location with good mixing is not available, alternative measures such as a recirculation pump should be used to obtain an adequate product mix in the water.
9. Connect nitrogen hose (5) to the nitrogen assembly (blue) (A) on container.
10. In order to pressure test the application system for leaks, slowly open the nitrogen cylinder valve (F). Adjust regulator (G) to 30 psi. Check for leaks on nitrogen assembly, using soap solution. Retighten connections if necessary.
11. Disconnect nitrogen hose at quick coupler (8) on nitrogen assembly (A). Reconnect nitrogen quick coupler (8) to the blue purge valve (9) on orange MAGNACIDE H Herbicide assembly (B). Open handle on purge valve (11). Check for leaks using soap solution. Retighten connections if necessary. Close nitrogen cylinder valve (F) and open bleed valve (6) to relieve nitrogen pressure. Reconnect nitrogen hose (5) to nitrogen assembly (blue) (A) on container.
12. Slowly open blue nitrogen intake valve (C) on container. Read container pressure on low pressure regulator gauge (7). If reading is greater than desired pressure setting for application (Step 1), the excess pressure must be bled off. Connect the MAGNACIDE H Herbicide injection hose (21) to the pressure bleed off valve (blue) (6). Bleed the container pressure down below the desired application pressure. After bleeding down, the hose can be purged with nitrogen by closing the container blue nitrogen intake valve (C), opening the nitrogen cylinder valve (F) and opening the nitrogen pressure handle for 30 seconds. Close the bleed off valve (6) and remove the MAGNACIDE H Herbicide hose (21). Reconnect the application hose (21) to MAGNACIDE H Herbicide assembly (orange) (B).
13. Open nitrogen cylinder valve (F) and set pressure, as calculated in Step 1, using the nitrogen regulator pressure handle (G). Check for leaks.

14. Slowly open blue nitrogen cylinder valve (C). The container will pressurize with nitrogen to the desired setting. Check for leaks.
15. Slowly open orange MAGNACIDE H Herbicide container valve (D). You should observe MAGNACIDE H Herbicide flowing through the injection hose (21).
16. Check for leaks on the orange MAGNACIDE H Herbicide assembly (B) and hose (21). If a leak is detected, close the orange MAGNACIDE H Herbicide discharge valve (D). If necessary, rinse with water. In most cases, the leak can be repaired by tightening the threaded connections on the orange MAGNACIDE H Herbicide assembly (B) and hose (21).
Note: The orange MAGNACIDE H Herbicide assembly (B) and injection hose (21) may need to be disassembled and retaped with Teflon tape to repair the leak. Follow shutdown steps 20 - 26 to purge MAGNACIDE H Herbicide from assembly and hose before disassembly of injection equipment. Repair leak and follow Application Instruction Steps 8 - 16. Be sure nitrogen pressure is readjusted to desired application pressure as determined in Application Instruction Step 1.
17. Make note of time that application begins.
18. Periodically check MAGNACIDE H Herbicide application equipment to insure that equipment is functioning properly.
19. Monitor the nitrogen cylinder pressure during application to ensure it never drops below 100 psi. If nitrogen pressure does drop below 100 psi, the 100 psi check valve (30) will stop the flow of nitrogen from the nitrogen cylinder. This valve, in addition to the 1 psi check valve (3), will prevent any backflow of MAGNACIDE H Herbicide vapors into the nitrogen cylinder.

C. Shutdown Procedure

Note: Put on respirator and gloves and have wash water available before proceeding to Step 20.

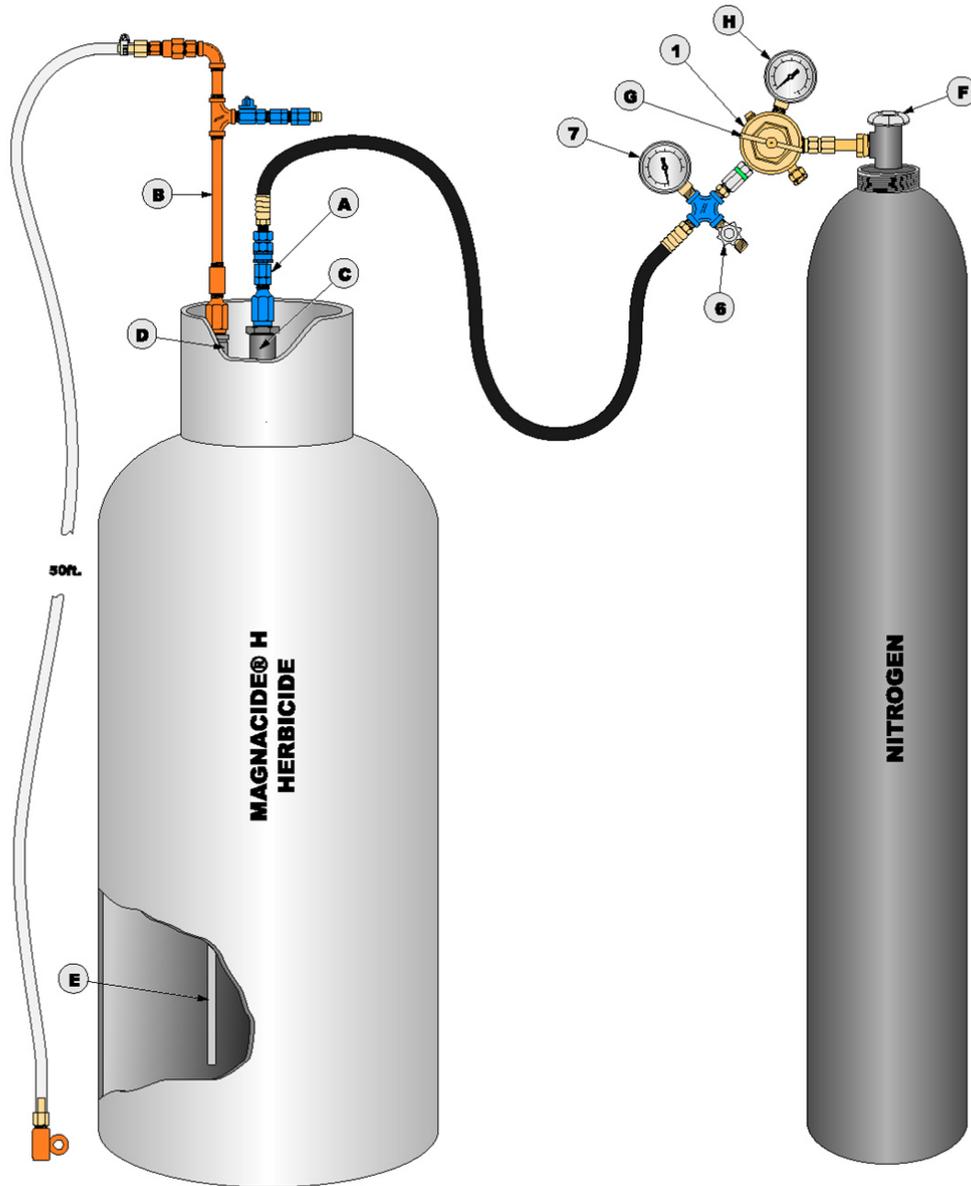
20. Close orange MAGNACIDE H Herbicide discharge valve (D); note end time of application and determine the duration of application. Note in application record.
21. Close blue nitrogen intake valve (C) and secure the valve handle.
22. Remove nitrogen hose from nitrogen assembly (blue) (A).
23. Connect nitrogen hose female quick coupler (8) to the blue purge valve (9) on orange MAGNACIDE H Herbicide assembly (B). With the nitrogen regulator pressure handle (G), increase pressure 10 psi higher than the application pressure. Open handle on purge valve (11). Nitrogen will flow through the application hose and bubbles will be seen in the canal. Let nitrogen flow for at least 60 seconds to purge all MAGNACIDE H Herbicide out of injection hose. Check any coils for remaining chemical.
24. Open and close orange MAGNACIDE H Herbicide discharge valve (D) several times to force all MAGNACIDE H Herbicide in chemical assembly and valve back into container.
25. Close orange MAGNACIDE H Herbicide discharge valve (D) and secure. Close purge valve (11).
26. Remove nitrogen hose female quick coupler (8) from purge valve (9).
27. Close nitrogen cylinder valve (F).
28. Bleed pressure from nitrogen regulator (1) with pressure bleed off valve (6) on regulator.
29. If MAGNACIDE H Herbicide container is empty, the pressure in the tank must be adjusted for return. Reattach the nitrogen hose (5) to the nitrogen assembly (Blue) (A) on the container. Read the MAGNACIDE H Herbicide container pressure on the low pressure nitrogen gauge (7). If the container pressure exceeds 10 psig, the excess pressure must be bled off. Connect the MAGNACIDE H Herbicide injection hose (21) to the bleed off valve (blue) (6). Bleed the container pressure down to 10-12 psi. Close the nitrogen intake valve (C) on the container. After bleeding down, the hose can be purged with nitrogen, opening the nitrogen cylinder valve (F) and opening the nitrogen regulator pressure handle and opening the pressure bleed off valve (6) for 30 seconds. Close the nitrogen cylinder valve (F). Relieve the nitrogen regulator pressure by opening the bleed (blue) (6). Detach the MAGNACIDE H Herbicide injection hose. Lock the nitrogen intake valve C on the MAGNACIDE H Herbicide container.

30. Disconnect nitrogen regulator (1) from nitrogen cylinder. Wrap regulator in a protective covering to protect it from damage.
31. Replace nitrogen cylinder valve stem cover, if applicable.
32. Remove blue nitrogen assembly (A) from container valve (C), place in wash water, and install valve plug.
33. Disconnect injection hose (21) from orange MAGNACIDE H Herbicide assembly (B) if still attached.
34. Remove orange MAGNACIDE H Herbicide assembly from container valve (D), place in wash water, and install valve plug.
35. Secure container bonnet lid.
36. Remove respirator and gloves.
37. Wash assemblies and application hose with fresh water to remove any remaining traces of MAGNACIDE H Herbicide in order to prevent any inadvertent exposure to acrolein vapors. Disassemble MAGNACIDE H Herbicide assembly (B). Remove Teflon tape, wash filter screen and orifice plate.
38. Store all equipment properly. Store all personal protective equipment separately from application equipment to prevent contamination.

VII. MAGNACIDE H HERBICIDE APPLICATION SET UP INDEX
(for use with Figure 1. MAGNACIDE H Herbicide Application Set Up)

- A. Nitrogen assembly (blue)
 - B. MAGNACIDE H Herbicide assembly (orange)
 - C. MAGNACIDE H Herbicide cylinder nitrogen intake valve
 - D. MAGNACIDE H Herbicide cylinder MAGNACIDE H Herbicide discharge valve
 - E. MAGNACIDE H Herbicide dip tube (delivers chemical from bottom of cylinder to Assembly B)
 - F. Nitrogen tank valve
 - G. Nitrogen regulator pressure handle
 - H. Nitrogen tank high pressure (psi) gauge
-
- 1. Nitrogen regulator with high pressure
 - 6. Nitrogen bleeder off valve (blue)
 - 7. Low pressure nitrogen gauge

Figure 1. MAGNACIDE H Herbicide Application Set Up



VIII. MAGNACIDE H HERBICIDE APPLICATION KIT INDEX
(for use with Figure 2. MAGNACIDE H Herbicide Application Kit)

1. Nitrogen regulator with high pressure gauge
2. Excess Flow Valve
3. Check valve
4. Tee
5. Nitrogen hose
6. Pressure bleed off valve
7. Low pressure nitrogen gauge
8. Nitrogen hose female quick coupler
- 9,14. Nitrogen assembly (A)
- 9-19. MAGNACIDE H Herbicide assembly
- 18-19. Orifice assembly with screen filter
20. One set of orifice plates
21. 15.2 m (50 ft) MAGNACIDE H Herbicide injection hose
22. Hose end for attaching weight
23. Teflon tape
24. Goggles
25. Respirator
26. Butyl rubber gloves
27. Placards (8 total – 1092 and flammable)
28. Plastic 22.7 litre (6 gal) bucket with lid
29. Soap solution

Figure 2. MAGNACIDE H Herbicide Application Kit



X. TRANSPORTING MAGNACIDE H HERBICIDE CONTAINERS

1. Transporting vehicle must be placarded when hauling full, partial or empty containers. Required placards are Inhalation Hazard 1092 (6) and Flammable Liquid (3), available at cost through Baker Petrolite Corporation. All four sides of the transporting vehicle must have placards displayed, with the 1092 placards (primary hazard) in left or upper position.
2. Driver must carry correct shipping papers at all times, to include: The correctly worded bill-of-lading supplied by Baker Petrolite Corporation or commercial freight line, material safety data sheet on MAGNACIDE H Herbicide, and Chemtrec/Canutec emergency response information (supplied with bill-of-lading).
3. Bills-of-lading should be corrected after applications to show only the poundage remaining in the container.
4. Bills-of-lading for transportation of empty containers are available from your Baker Petrolite technical sales representative or Baker Petrolite headquarters.
5. Special driver's license requirements are in effect for transporting hazardous materials. For details contact the Department of Motor Vehicles in your province or territory.

XI. RETURN OF EMPTY MAGNACIDE H HERBICIDE CONTAINERS

Empty containers are to be returned, freight collect, to:

**Taft Manufacturing Company
19815 South Lake Road
Taft, California 93268 USA**

Please Note: No partly used containers should be returned to Baker Petrolite Corporation without prior notification. For information concerning the return of partly used containers contact:

**Taft Manufacturing Company
19815 South Lake Road
Taft, California 93268 USA
Telephone: +1 (661) 763-7103**

Normally, no credit will be issued for unused material returned from opened cylinders or skid tanks.

A. Preparation for Shipment of Empty Containers

1. Relieve container pressure down to 10 - 12 psig. This is normally accomplished by venting into the irrigation system during treatment.
2. Replace plugs in the inlet and outlet valves and tighten securely.
3. Fasten down valve handles securely.
4. Close lid and secure with wire or latch.
5. Containers should be transported upright. Alert the carrier to tie down containers to prevent overturning during travel.

There are special shipping paper requirements for shipment of empty containers which previously contained a hazardous material. Properly worded bills-of-lading for empty containers are available through your Baker Petrolite technical sales representative or Baker Petrolite Corp., Bakersfield, CA office. Trucks transporting empty containers must be placarded. It is the responsibility of the shipper to provide necessary placards.

APPENDIX A: Reducing the Potential to Wildlife Exposures

On an acute exposure basis, MAGNACIDE H Herbicide is very highly toxic to freshwater fish and invertebrates, estuarine/marine invertebrates and it is highly toxic to estuarine/marine fish. Chronic exposure to MAGNACIDE H Herbicide has resulted in reduced growth and survival in fish and reduced survival in aquatic invertebrates. MAGNACIDE H Herbicide will kill fish at levels significantly lower than levels required for treating aquatic weeds.

It is imperative that you minimize the potential impact on non-target aquatic organisms. Some ways to reduce the potential risk are:

- Eliminate entrance of fish to canals with fish screens or other barriers
- Do not allow dead fish back into rivers or other natural waterways
- Limit the possible contamination of natural fish-bearing waters through the potential release of acrolein-treated canal water, by adhering to the following label statement:

“Water treated with MAGNACIDE H Herbicide must be used for the irrigation of fields, either crop-bearing, fallow or pasture, where the treated water remains on the field OR must be held for 6 days before being released into fish bearing waters or where it will drain into them.”

and utilize the following examples to ensure product degradation before release:

- Irrigate the treated water directly onto crops,
- Hold the treated water in the canal, *or*

Recirculate the treated water through the irrigation system (if system is so designed)

APPENDIX B: MAGNACIDE H Herbicide MONITOR

The MAGNACIDE H Herbicide monitor is a hand held colorimeter designed to quickly and easily determine the concentration of MAGNACIDE H Herbicide in irrigation waters. The instrument's compact size and easy operating procedures make it a handy tool for measuring MAGNACIDE H Herbicide levels in even the most remote irrigation canals.

A simple test determines the parts per million (ppm) of chemical present in the treated water with an accuracy of 0.1 ppm. The monitor readily measures the concentration of MAGNACIDE H Herbicide in the range of 0.25 to 15.0 ppm. Test results are read directly off the monitor's scale, thus eliminating the need for complicated calculations.

The MAGNACIDE H Herbicide monitor is furnished in a kit with all necessary equipment to conduct a number of tests. For additional information on the MAGNACIDE H Herbicide monitor, please contact your Baker Petrolite technical sales representative.

Appendix C: Water Measurement Equivalents

Discharge or Rate of Flow	The volume of water that passes a particular reference section in a unit of time. Usually designated as cubic feet per second or miner's inches.
1 cfs	1 cubic foot per second (mean depth (ft) x mean width (ft) x linear velocity (ft/sec)).
Miner's Inch	The quantity of water which will flow through an orifice one inch square under a stated head which varies from 4 to 6 1/2 inches in different localities.
Acre Foot	A commonly employed unit of volume defined as that quantity of water required to cover one acre of land to a depth of one foot or 43,560 cubic feet.
1 cfs	450 gallons per minute
1 cfs	50 miner's inches in Idaho, Kansas, Nebraska, New Mexico, North Dakota, South Dakota, Northern California, Washington and Utah.
1 cfs	40 miner's inches in Arizona, Southern California, Montana and Oregon.
1 cfs	38.4 miner's inches in Colorado.
1 cfs Flowing 1 Hour	1 acre inch.
1 cfs in 12 Hours	1 acre foot.
1 cu. ft. of Water at 25°C	62.2 lb., 7.48 gallons.
1 Gallon Water	8.34 lb.
1 Acre Foot of Water	2.7 million lb.
2.7 lb. Product/Acre Ft.	1 ppm MAGNACIDE H Herbicide.
1 lb. Product/Million Gallons	0.12 ppm MAGNACIDE H Herbicide.
1 Acre	43,560 sq. ft., 1/640 square mile.
1 Mile	5,280 feet, 1,760 yards.
1 Kilometer	0.62 miles.
1 Inch	2.54 cm = 25.4 mm.
1 Ounce	28.35 grams.
1 Gram	0.0353 ounces.
1 lb.	453.59 grams.
1 Fluid Ounce	29.57 ml.
1 Pint	473.2 ml.
1 Gallon (U. S.)	0.823 gallon (British)
1 mph	88 ft/min = 1.5 ft/sec.
m ³	264.2 gallons
1.6 kilometers	1 mile
1 m ³ /sec.	35.3 cubic ft/sec.
1 hectare	2.47 acres
3.79 liters	1 gallon
2.2046 lbs.	1 kilogram
2.4 mega liters/day	1 cubic foot per second