STARTUP

Before using, turn on air compressor in the control cabinet (shown on page 6) and fill water tank (page 3). Flush a few times until water completely fills the system (twice usually does the job). Flush by pushing and momentarily holding the flush button at the rear of the stool. Toilet is ready for use.

ABOUT THIS OPERATION MANUAL

The purpose of this manual is to familiarize you with how FCM’s portable toilet system operates. This manual contains information for the proper operation and maintenance of the following:

- Air Line Components
- Microflush Air Operated Toilets
- On-Board Sewage Treatment Systems
- Chlorinators and Chlorine
- Water Tank
- Satellite “Blue Room”

To get familiar with this easy to use toilet system simply page through this manual and read the instructions with the accompanying photographs.

HOW THE MICROPHOR SYSTEM OPERATES

AIRLINE COMPONENTS FUNCTIONS

The Air Filter-Regulator (left bowl) removes moisture and dirt from the air line to the toilet to prevent damage. Regulator is preset to 60-65 psi of pressure.

The Air Line Lubricator (right bowl) adds a small amount of lubricant to the air system to help lubricate the moving components of the toilet. Use a silicone based air tool oil for best protection. A check should be made periodically to determine if there is enough oil to lubricate the toilet parts. The oiler should be adjusted to add one drop of oil per flush. The slotted adjustment screw is located on the top of the oiler. Turning clockwise decreases the amount of oil, and counterclockwise increases the amount of oil.

NOTE: Make sure the air supply is shut off before the air line lubricator is opened to fill with oil.

TOILET FUNCTION

Human waste enters the Microphor Air Operated Toilet. When the toilet is flushed, the flapper at the bottom of the bowl opens allowing the effluent (waste water) to enter the hopper below. At the same time fresh water from the rim washes the bowl. After about six seconds the flapper closes and fresh water fills the bowl. At the same time compressed air enters the hopper and pushes the influent through the waste line into the Treatment Tank.

TOILET REQUIREMENTS

**Air:** Supply compressed air at 60-65 psi at the toilet.
**Water:** Gravity fed
**Flush Activator:** Toilet mounted at the rear. Some units may have an optional remote mounted flush activator button.
**Air/Water Valve:** The air and water (A/W) sequence valve is the air controlled valve that operates the toilet. The valve is mounted at the rear of the toilet stool where the water line enters the stool.
CLEANING the TOILET

Use Microphor’s Micro-Clean Organic Spray Cleaner, P/N 24542 or equivalent.

NOTE: Sanitizers like Lysol, Pine-Sol, Hezol or Ammonia base products should never be used. These sanitizers when flushed into the treatment tank can stop the biological action. Never use any anti-bacterial product in the Microphor System.

WINTERIZING the TOILET

If the toilet system is taken out of service during freezing conditions and propylene glycol has not be added to the water supply, turn off water line to toilet, drain water tank, flush toilet until no more water flows into bowl. Flush once more to clear ejection chamber under toilet. To reactivate: fill water tank, turn on water line and flush toilet. When outside temperatures are consistently above freezing use water only without any additives.

USING the TOILET in FREEZING CONDITIONS

For freeze protection during freezing conditions add food grade propylene glycol to water supply. A 30% mix protects to about 12°F and a 60% mix protects to about minus 40°F. Food grade propylene glycol is available through chemical dealers everywhere.

UNPLUGGING the TOILET

The system can only decompose human waste and tissue. Heavy paper towels will not decompose and will eventually clog the passages in the treatment tank. If the toilet becomes plugged, a standard plunger can be used to help unplug the unit. If the toilet is plugged, shut off the water supply and disconnect the air supply. Press the flush button several times to bleed off the air pressure. When air pressure is out of the valve, the flapper in the bottom of the toilet can be pushed open. Use the plunger as with any standard toilet. If this does not clear the toilet the waste line to the treatment tank may be plugged. To clear the waste line remove flexible junction just outside toilet cab ana and clear with a wire or flush with a stream of water.

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Water shut-off valve and tank drain

Note: Never use ethylene glycol based products in place of the propylene glycol. The alcohol based products will shut down the bacteria action when flushed into the treatment tank. Products advertised to protect RV water systems cannot be used.
If the A/W sequence valve becomes erratic the following trouble shooting action can be taken:

A. Flush Button Sticks: If the flush button becomes sticky and does not press down and return freely, apply silicone lubricant directly onto the shaft, press up and down until free.

B. Flapper Stays Open and Will Not Close: clean or replace Bleed-Off Plug, Lubricate Air Cylinder Rod.

C. Flapper will open and close rapidly, not allowing unit to go through full cycle:
   1. Check for air leaks
   2. Hole in Bleed Plug could be oversized due to wear or damage, replace plug.
   3. Check valve in bottom cap of A/W is malfunctioning:
      a. Remove hoses attached to bottom of valve (#1 & #2).
      b. Unscrew bottom (#6) from valve.
      c. Using a 7/16 nut driver, remove spring retainer nut (#3) from inside of bottom cap. Do not lose spring (#4) when removing small check valve with rubber O-ring (#5).
      d. Clean all parts – blow out air passages in bottom cap and needle before reassembly.
      e. Re-assemble in reverse order of above.

TOILET HOPPER and COMPONENTS

Shown left to right to left are the following components:
Top Row:
1. Hopper Top w/Flapper, P/N 90040
2. Hopper, bottom only, P/N 90041
3. Hopper, complete, P/N 90039 (does not include air cylinder)
4. Crank Assembly only, P/N 90042
5. Air Cylinder, P/N 94560
6. Flapper Assembly only, P/N 90048
7. Hopper O-Ring Seal, P/N 27270

Note: these are Microphor part numbers

TREATMENT TANK FUNCTION

In the treatment tank, solid waste and toilet paper is broken down by bacteria into liquid and gas. The gas escapes out the tank vent. The liquid then flows through the filters to the bottom of the treatment tank, then into the chlorinator. Microphor recommends adding a cup of Micro Culture monthly to insure proper operation.

TREATMENT TANK VENT

The vent in the treatment tank is a key part of the Microphor treatment process. The vent allows oxygen into the tank and also allows CO₂ gas out of the tank. This exchange is critical to the decomposition process.
CHLORINATOR

In the Microphor process, the effluent from the treatment tank flows through the chlorinator which is to be kept full of chlorine slugs. The chlorinator is located on the side of the treatment tank.

The chlorinator should be filled as full as possible with chlorine slugs while making a tight seal. Consumption of chlorine is dependent upon frequency of use of the system. Use product similar or equal to Microphor Chlorinating Slugs (P/N 94135). Lubricate chlorinator lid O-Ring before replacement.

CHLORINATOR FILLING INSTRUCTIONS – Maintenance and Safety Procedure

1. Microphor recommends using rubber gloves and goggles or a face shield. High ambient heat can cause higher levels of chlorine vapor and may require the use of a respirator, depending on ventilation at chlorinator. (Refer to Material Safety Data Sheet [MSDS])

2. Inspect chlorinator for chlorine slugs by pressing downward on cap while turning counterclockwise ¼ turn and then lift cap off very slowly. If water is seen coming out around the cap, replace cap immediately. Rectify blockage in outlet of system.

3. If chlorinator is full of slugs, replace cap by placing on the chlorinator body and, while pressing down, turn clockwise until locking lugs on cap engage chlorinator and it is sealed.

4. If slugs must be added, make sure any residual chlorine at bottom is not blocking opening on lower portion of chlorinator. If residual chlorine is caked, carefully probe with a screwdriver or similar tool to break up.

5. Add slugs until chlorinator is full. Lay slugs flat, one on top of another, not on their edges. Refill as much as possible with slugs, but do not overfill, as this will put undue pressure on cap and possibly cause damage or packing of slugs.

6. The chlorinator unit is designed to hold slugs and seal off chlorine odors. Inspect the unit carefully to make sure rubber cap seal or o-ring on chlorinator body is in place and is lubricated with silicone lubricant only. Inspect hoses, clamps, etc. to make sure they are tight and in good condition.

7. Chlorine is highly corrosive, causes skin and eye damage, is irritating to nose and throat and may be fatal if swallowed. Avoid breathing dust or vapor.

8. ENVIRONMENTAL HAZARDS: Chlorine is toxic to fish. Do Not dispose into lakes, ponds, streams, estuaries, oceans or public waters unless this product is identified and addressed in a NPDES Permit. For guidance, contact the regional office of the EPA.

9. PHYSICAL and CHEMICAL HAZARDS: Strong oxidizing agent! Mix only with water. Do Not add this product to any dispensing device containing remnants of any other product. Such use may cause violent reaction leading to fire or explosion.

10. STORAGE and DISPOSAL: Keep this product dry in a tightly closed container when not in use. Store in a cool, dry, well ventilated area away from heat or open flame. Shelf life is one year from manufacturing date. Refer to MSDS for disposal.

11. PRACTICAL TREATMENT (First Aid):

   - **Eye/Skin Contact** – Flush with plenty of water for at least 15 minutes, while removing contaminated clothing and shoes. For eye contact seek immediate medical attention. If skin irritation occurs, seek medical attention.
   - **Inhalation** – Relocate to fresh air. If signs of irritation or discomfort occur, take immediately to a hospital or physician.
   - **Swallowing** – If conscious, drink large quantities of water. Do Not induce vomiting. Take immediately to a hospital or physician. If vomiting occurs, administer additional water. If unconscious or in convulsions, take immediately to a hospital.
SECONDARY CHLORINATOR

The secondary chlorinator is a contact chamber designed to hold effluent long enough to give the chlorine an opportunity to kill the bacteria contained in the effluent. Effluent is displaced from the secondary chamber into an evaporation pan under the treatment tank to avoid puddles from forming under the unit. The total bacteria kill of the effluent allows the Microphor system to meet antipollution recommendations of the Association of American Railroads which exceed the requirements of the Food and Drug Administration.

SATELLITE CABANA (Blue Room)

The Satellite brand cabana is double walled and has a toilet paper dispenser, hand cream dispenser and a coat hook mounted to the interior walls. Cabana and stainless steel stool can be cleaned with a power washer. Do Not use anti-bacterial cleaners at any time. Toilet paper dispenser holds two 9 inch rolls of tissue.

To replenish tissue paper place key into top of dispenser and push down until cover opens. To prevent motion of portable railroad toilet from unrolling tissue, slightly squeeze tissue roll to make center cardboard core oblong. Hand cleaner dispenser can be replenished by pushing up on tab at bottom front of dispenser. Replacement cartridges are available from Satellite, part number found on inside cover.

COMPRESSED AIR SUPPLY

Compressed air is required to operate this toilet. Air is supplied to the unit via the 1.5 cfm compressor located in the control cabinet. Typically the compressor replenishes the air reservoir after about a few flushes of the stool. Toggle switch on side of compressor turns the compressor off and on. On early models, compressor on and off settings are made with the small knobs on the face of the air gage attached to the circuit board in the control cabinet. Compressor on should be set at 50 - 60 psi and compressor off at 70 psi.

On later models of toilets (serial #’s higher than 028) with the compressor shown below, a solid state non-adjustable switch turns the compressor on and off. Some early model toilets have been refitted with the later style compressor. With this style of compressor the air reservoir pressure is 110 psi and air to the toilet valve is regulated at 65 psi at the regulator/lubricator valve. If you have a later style compressor and unit has gage on panel as shown above, turn left knob full left and right knob full right, gage will indicate reservoir pressure.
SOLAR PANEL

FCM’s Portable Skid Mount Toilet is powered by compressed air which is furnished by the 1.5 cfm air compressor located in the control cabinet. A deep cycle battery powers the compressor and the solar panel keeps the battery charged. For best results keep the solar panel faced to the south. Facing the solar panel south keeps the panel in sunlight during all the daylight hours. Unit has sufficient battery power to run compressor during periods when no sunlight is available for up to four days.

Solar Panel

WARRANTY

Water-Loo warranties this unit for a period of one year from purchase date. MicroPhor has warranty on the stool components for a period of one year and two years on the treatment tank.

ABOUT WATER-LOO Inc.

Water-Loo Inc is a FCM Rail Company. FCM Rail is primarily a leasing company located in Fenton, Michigan. Phone number is 810-714-4626. For more information about our company and other products, please visit our website at www.fcmrail.com

REPAIR & SPARE PARTS

The following are the part numbers for repair and spare parts. These parts are available through FCM Transportation Products Company at 1-708-687-5850 or fax 708-687-5875.

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flush Activator/Flush Button</td>
<td>95561</td>
</tr>
<tr>
<td>Air Water Sequence Valve</td>
<td>39014</td>
</tr>
<tr>
<td>Air Water Sequence Valve Repair Kit</td>
<td>95057</td>
</tr>
<tr>
<td>Flush Activator Kit</td>
<td>95020</td>
</tr>
<tr>
<td>Air Cylinder</td>
<td>94540</td>
</tr>
<tr>
<td>Air Cylinder Kit</td>
<td>94502</td>
</tr>
<tr>
<td>Lubricant Oil - ¾ ounce tube</td>
<td>24704</td>
</tr>
<tr>
<td>Chlorine Slugs – Pail of 50 Slugs</td>
<td>94135</td>
</tr>
<tr>
<td>Toilet Seat</td>
<td>99070</td>
</tr>
<tr>
<td>Bleed Plug</td>
<td>30382-3</td>
</tr>
<tr>
<td>Chlorinator Blue UV</td>
<td>98115-9</td>
</tr>
<tr>
<td>Chlorinator Lid Blue UV</td>
<td>98925-3</td>
</tr>
<tr>
<td>MicroScrub – Case</td>
<td>24827</td>
</tr>
<tr>
<td>MicroClean – Case</td>
<td>24542</td>
</tr>
<tr>
<td>MicroCluture – One Gallon Liquid</td>
<td>24826</td>
</tr>
</tbody>
</table>

SERVICE & SALES

For help in diagnosing service problems, repairing a unit, purchase or lease of Waterloo toilets contact:

Don Gilstad
402-554-1466 or 402-681-9818
TROUBLESHOOTING

Your Microflush toilet is designed to give you years of trouble-free operation. Please check the following before beginning any service or repair.

Water Supply:
1. Is the water shut-off valve turned to “on” position?

Air System:
1. Is compressed air attached (on rail unit)?
2. Is air compressor turned on, fuse OK (solar unit)?
3. Is regulator set to 60-65 psi?
4. Do you have any air leaks or kinks in the air system?
5. Do you have water in the air system? This will cause irregular timing. Drain the air reservoir and check filter regulator for water. To check for water in the Air/Water Sequence Valve, remove bleed off plug, put finger over screw opening and flush. If water is present, it will squirt from sides of valve body. If water is detected, then air cylinder and airlines must also be drained.

Cycle Time:
1. Is bleed off plug blocked? Remove, clean and reinstall.

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Possible Cause</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flapper does not open. Water does not flow. Nothing happens.</td>
<td>1. No air supply to stool. 2. Water has accumulated in Air/Water Sequence Valve</td>
<td>1. Connect air supply or turn on compressor. 2. See “Air System” above</td>
</tr>
<tr>
<td>Flapper opens and closes 4-7 seconds after button is released, but no water enters bowl.</td>
<td>1. No water in tank. 2. Water turned off.</td>
<td>1. Re-fill water tank 2. Open “shut-off” valve</td>
</tr>
<tr>
<td>Flapper opens when flushed and closes immediately when button is released.</td>
<td>Debris in check valve at base of Air/Water Sequence Valve.</td>
<td>Clean Air/Water Sequence Valve</td>
</tr>
<tr>
<td>Flapper opens and will not close</td>
<td>Bleed-Off plug blocked</td>
<td>Remove, clean or replace, reinstall</td>
</tr>
<tr>
<td>Water continues to run when Microflush stool not in use.</td>
<td>1. “Flush” button stuck in down position. 2. Foreign object is under water valve in Air/Water Seq. Valve.</td>
<td>1. Remove, clean or replace, reinstall flush button. 2. Clean Air/Water Sequence Valve</td>
</tr>
<tr>
<td>Flush cycle is too long</td>
<td>Bleed-Off Plug blocked</td>
<td>Remove, clean or replace, reinstall</td>
</tr>
<tr>
<td>Flush cycle is too short</td>
<td>Bleed-Off Plug missing or related air lines leaking</td>
<td>Replace Bleed-Off plug and check air lines for leaks</td>
</tr>
<tr>
<td>Battery Discharged</td>
<td>1. Cloudy weather conditions for more than four days in a row 2. fuse blown on charge controller</td>
<td>1. Re-Charge battery with battery charger or position unit so that solar panel faces sunlight 2. check for blown fuse on charge controller, replace if blown</td>
</tr>
</tbody>
</table>
I - PRODUCT IDENTIFICATION
Product: Trichloroisocyanuric Acid
Chemical Family: Chloroisocyanurate
Synonym: Microphor Chlorinating Slugs
Formula: C3Cl3N3O3
CAS Number: 87-90-1
EPA Registration Number: 69681-5-50754
California EPA Registration Number: 69681-5-AA-50754

II - TRANSPORTATION DATA
U.S. DEPARTMENT OF TRANSPORTATION - 49 CFR
Proper Shipping Name: Trichloroisocyanuric Acid Dry
Hazard Class/Division Number: 5.1 – Oxidizing substances
ID Number: UN2468
Packing Group: II
Label Required: OXIDIZER (5.1)
Emergency Guide No.141
Emergency Telephone Number: Chemtrec 800-424-9300

INTERNATIONAL MARITIME ORGANIZATION - IMDG
Proper Shipping Name: Trichloroisocyanuric Acid Dry
Hazard Class/Division Number: 5.1 – Oxidizing substances
Packing Group: II
Label Required: OXIDIZING AGENT (5.1)
(IMDG CODE – page 5190, amdt. 29-98)
Emergency Telephone Number: Chemtrec 202-483-7616 [call collect]

ICAO/IATA
Label: OXIDIZER (5.1)
Class: 5.1
Packing group: II

III - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION
Exposure Limits
CHEMICAL OR COMMON NAME: OSHA PEL: ACGIH TLV:
Trichloro-s-triazinetrione: 96-100% Not established Not established
Dichloroisocyanuric Acid: 0-4%

IV - PHYSICAL/CHEMICAL CHARACTERISTICS
Boiling Point: Not applicable
Vapor Pressure (mm Hg): Not applicable under standard conditions.
Vapor Density (Air=1): Not applicable under standard conditions.
Solubility in Water: 1.2g/100ml at 25°C
Appearance and odor: White granular solid or tablet form, sharp, chlorine-like, bleach odor.
Specific Gravity (H2O=1): >1
Melting Point: Not applicable
Evaporation Rate: Not applicable under standard conditions.
Molecular Weight: 232.5
Bulk Density: Tablets – 1.16-1.9 g/cc, Granular – 0.89-1.1 g/cc.
PH: 2.7-2.9 (1% solution)
Thermal decomposition: 225°C (437°F)

V - FIRE AND EXPLOSION HAZARD DATA
Flash Point: Not applicable
Auto-Ignition Temperature: Not applicable
Extinguishing Media: Water. Do not use dry chemical extinguisher containing ammonia compounds.
Special Fire-fighting Procedures: Fire fighters should wear full protective clothing and self-contained breathing apparatus (SCBA) in positive pressure mode. Cool containers with water spray. On small fires, use water spray or fog. On large fires, use heavy deluge or fog streams. Flooding amounts of water may be required before extinguishment can be accomplished.

Unusual Fire and Explosion Hazards: When heated to decomposition, may release poisonous and corrosive fumes of nitrogen trichloride, chlorine, nitrous oxides, cyanates, carbon monoxide and carbon dioxide.

VI - REACTIVITY DATA
Stability: () Unstable (X) Stable under normal conditions
Conditions to Avoid: Do not package in paper or cardboard. Note: Contact with small amounts of water may result in an exothermic reaction with the liberation to toxic fumes. Heating above 225°C.
Incompatibility: Organic materials, reducing agents, nitrogen containing materials, other oxidizers, acids, bases, oils, grease, sawdust, dry fire extinguishers containing monoammonium compounds.
Hazardous Decomposition or By-Products: Nitrogen trichloride, chlorine, nitrous oxides, cyanates, carbon monoxide, carbon dioxide.
Hazardous Polymerization: () May Occur (X) Will Not Occur

VII - HEALTH HAZARD DATA
Primary Health Hazards:
Acute: Corrosive to eyes, skin and mucous membranes. Harmful by inhalation and if swallowed.
Chronic: Prolonged exposure may cause damage to the respiratory system. Chronic inhalation exposure may cause impairment of lung function and permanent lung damage.
Signs & Symptoms of Exposure:
Ingestion: Irritation and/or burns can occur to the entire gastrointestinal tract, including the stomach and intestines, characterized by nausea, vomiting, diarrhea, abdominal pain, bleeding and/or tissue ulceration. Ingestion causes severe damage to the gastrointestinal tract with the potential to cause perforation.
Inhalation: Irritating to the nose, mouth, throat and lungs. IT may also cause burns to the respiratory tract with the production of lung edema that can result in shortness of breath, wheezing, choking, chest pain, and impairment of lung function. Inhalation of high concentrations can result in permanent lung damage from the corrosive action of the lung.
Skin Contact: Dermal exposure can cause severe irritation and/or burns characterized by redness, swelling and scab formation. Repeated skin exposure may cause tissue destruction due to the corrosive nature of the product.
Eye Contact: Severe irritation and/or burns can occur following eye exposure. Contact may cause impairment of vision and corneal damage.
This product is corrosive to all tissues contacted and upon inhalation, may cause irritation to mucous membranes and respiratory tract. There are no known or reported effects from repeated exposure. Toxicological investigation indicated it does not produce significant effects from chronic exposure.
Medical Conditions Aggravated By Exposure: Asthma, respiratory and cardiovascular disease.

Emergency and First Aid Procedures:
Have the product container or label with you when calling a poison control center or doctor, or going for treatment.
IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call poison control center or doctor for treatment advice.
IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.
IF SWALLOWED: Call 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 poison control center or doctor. Do not give anything by mouth to an unconscious person.
IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call poison control center or doctor for treatment advice.
NOTE TO PHYSICIAN: Probable mucosal damage may contraindicate the use of gastric lavage. Corrosive. In case of ingestion do not induce vomiting. No specific antidote. Treat symptomatically and supportively.

VIII - PRECAUTIONS FOR SAFE HANDLING AND USE
Steps To Be Taken In Case Material Is Spilled Or Released:
Personal Precautions: For small spills in a well-ventilated area, wear a NIOSH approved half-face or full face tight fitting respirator or a loose fitting powered air-purifying respirator equipped with chlorine cartridges.
After Spillage/Leakage: Hazardous concentrations in air may be found in local spill area and immediately downwind. If spill material is still dry, do not put water on this product as a gas evolution may occur.
On Soil: Do not contaminate spill material with any organic materials, ammonia, ammonium salts or urea.
On water: This material is heavier than and soluble in water. Stop flow of material into water as soon as possible.
Begin monitoring for available chlorine and pH immediately.
In air: Vapors may be suppressed by the use of water fog.
Waste Disposal Method: Observe all federal, state and local environmental regulations when disposing of this material. If this product becomes waste, it will be a hazardous waste that is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly. Care must be taken to prevent environmental contamination from the use of this material.
Precautions to Be Taken in Handling and Storage:
Handling: Avoid bodily contact. Do not take internally. Upon contact with skin and eyes, wash off with water.
Storage: Store in a dry, cool, well-ventilated area away from incompatible materials (see "materials to avoid").
Product has an indefinite shelf-life limitation. Do not store at temperatures above 60°C/140°F. Available chlorine loss can be as little as 0.1% per year at ambient temperatures.
Other Precautions: This information in this Material Safety Data Sheet should be provided to all who will use, handle, store, transport, or otherwise be exposed to this product. This information has been prepared for the guidance of plant engineering, operations and management, and for persons working with or handling this product.
Type of product and use: For formulation into end-use products intended for disinfectants, sanitizers, fungicides, bactericides and algacides for pools, spas, hot tubs, industrial recirculating water cooling towers, air washers and evaporative condensers, sewage treatments, food contact surfaces, laundry and egg sanitizing.

IX - CONTROL MEASURES
Respiratory Protection: When dusty conditions are encountered, wear a NIOSH/OSHA full-respirator with chlorine cartridges for protection against chlorine gas and dust/mist pre-filter. A respiratory protection program meeting OSHA 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.
Ventilation: Use local exhaust ventilation to minimize dust and chlorine levels where industrial use occurs. Otherwise, ensure good general ventilation.
Other Protective Clothing or Equipment: Use Neoprene gloves, Use chemical safety glasses to avoid eye contact. Where industrial use occurs, chemical goggles may be required. Use body covering clothes and boots.
Work/ Hygienic Practices: Safety shower and eye bath should be provided. Do not eat, drink or smoke until after-work, showering and changing clothes.

X- TOXICOLOGICAL INFORMATION:
Acute Toxicity:
Rat oral LD50: 490 mg/kg
Rabbit dermal LD50: >2000 mg/kg
Rat inhalation LC50: Approx.0.68 mg/1/4 hour – (nose only)
Eye irritation (rabbit): Corrosive
Dermal irritation (rabbit): Corrosive
Target Organ Toxicity:
Reproductive and Development Toxicity: There are no known effects on reproductive function or fetal development. Toxicological investigation indicated it does not affect reproductive function of fetal development.
Carcinogenicity: Not known to be a carcinogen. Not included in NTP 8th Report on Carcinogens. Not classified by IARC, OSHA, and EPA.
Mutagenicity: Not mutagenic in five Salmonella strains and one E.coli strain with or without mammalian microsomal activation.

XI – ECOLOGICAL INFORMATION:
Aquatic Toxicity:
96 Hour LC50 Fish: 0.32 mg/l (Rainbow trout), 0.30 mg/l (bluegill sunfish).
48 hour LC50, Daphnia magna: 0.21 mg/l
Avian Toxicity:
Mallard Duck, acute oral LD50: 1600 mg/kg
Mallard Duck, dietary LC50: >10,000 ppm
Bobwhite Quail, dietary LC: 7422 ppm

XII - REGULATORY INFORMATION
(X) SARA: Section 311/312 Categorization (40CFR 370.2) this product is categorized as an immediate health hazard, and fire and reactivity physical hazard.
Section 313 information (40 CFR 372) this product does not contain a chemical listed at or above de minimis concentrations.
(X) TSCA
(X) EPA
(X) OSHA: This product is considered hazardous under the OSHA Hazard Communication Standard (29CFR 1910.1200).
Waste Classifications: If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following EPA hazardous waster number: D001.
Hazardous Per 29 CFR 1910.1200: Yes
NFPA Ratings (Scale 0-4): Health=3, Fire=o, Reactivity=2.
Special Hazard Warning: OXIDIZER
HMIS Ratings (Scale 0-4): Health=3, Fire=0, Reactivity=2.

XIII – ENVIRONMENTAL HAZARDS (PR Notice 93-10)
This product is toxic to fish and aquatic organisms. Do not contaminate water by cleaning of equipment or disposal of wastes. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance, contact your State Water board or Regional Office of the EPA.

**XIV - ADDITIONAL INFORMATION**

ALWAYS COMPLY WITH ALL APPLICABLE INTERNATIONAL, FEDERAL, STATE AND LOCAL REGULATIONS REGARDING THE TRANSPORTATION, STORAGE, USE AND DISPOSAL OF THIS CHEMICAL.

Due to the changing nature of regulatory requirements, the REGULATORY INFORMATION listed in Section XII of this document should NOT be considered all-inclusive or authoritative. International, Federal, State and Local regulations should be consulted to determine compliance with all required reporting requirements.

The information in this MSDS was obtained from sources, which we believe are reliable. HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, REGARDING ITS CORRECTNESS. The conditions or methods of handling, storage, use, and disposal of the product are beyond our control and may be beyond our knowledge. FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT. This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS information may not be applicable.

Revised: 06/22/2000

**MATERIAL SAFETY DATA SHEET**  
Propylene Glycol

**I - PRODUCT IDENTIFICATION**

**Synonyms:** 1,2-propanediol; 1,2-dihydroxypropane; methyl glycol; methylethylene glycol  
**CAS No.:** 57-55-6  
**Molecular Weight:** 76.09  
**Chemical Formula:** CH₃CHOHCH₂OH  
**Product Codes:**  
J.T. Baker: 9402, 9403, U510  
Mallinckrodt: 1925, 6263

**II - COMPOSITION/INFORMATION ON INGREDIENTS**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No</th>
<th>Percent</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene Glycol</td>
<td>57-55-6</td>
<td>99 - 100%</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**III - HAZARDS IDENTIFICATION**

**Emergency Overview**

**CAUTION! MAY CAUSE IRRITATION TO SKIN AND EYES.**

**J.T. Baker SAF-T-DATA** Ratings (Provided here for your convenience)

- **Health Rating:** 0 - None  
- **Flammability Rating:** 1 - Slight  
- **Reactivity Rating:** 1 - Slight  
- **Contact Rating:** 1 - Slight  

**Lab Protective Equip:** GOGGLES; LAB COAT  
**Storage Color Code:** Orange (General Storage)

**Potential Health Effects**

**Inhalation:**

No adverse health effects via inhalation.

**Ingestion:**

Relatively non-toxic. Ingestion of sizable amount (over 100ml) may cause some gastrointestinal upset and temporary central nervous system depression. Effects appear more severe in individuals with kidney problems.

**Skin Contact:**

Mild irritant and defatting agent, especially on prolonged contact.

**Eye Contact:**

May cause transitory stinging and tearing.

**Chronic Exposure:**

Lactic acidosis, stupor and seizures have been reported following chronic ingestion.
Aggravation of Pre-existing Conditions:
Kidney disorders.

IV - FIRST AID MEASURES

Inhalation:
Remove to fresh air. Not expected to require first aid measures.

Ingestion:
Not expected to require first aid measures. Give several glasses of water to drink to dilute. If large amounts were swallowed, get medical advice.

Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Contact:
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Call a physician if irritation persists.

Note to Physician:
In case of ingestion, monitor for acidosis and central nervous system changes. Exposed persons with previous kidney dysfunction may require special treatment.

V - FIRE FIGHTING MEASURES

Fire:
Flash point: 99°C (210°F) CC
Autoignition temperature: 371°C (700°F)
Flammable limits in air % by volume:
lel: 2.6; uel: 12.5
Material can support combustion.

Explosion:
Containers may explode in heat or fire.

Fire Extinguishing Media:
Dry chemical, foam, water or carbon dioxide.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Move exposed containers from fire area, if it can be done without risk. Use water to keep fire-exposed containers cool.

VI - ACCIDENTAL RELEASE MEASURES

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e.g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

VII - HANDLING AND STORAGE

Protect container from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture, and incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

VIII - EXPOSURE CONTROLS/PERSOAL PROTECTION

Airborne Exposure Limits:
AIHA Workplace Environmental Exposure Level (WEEL): Vapor and Aerosol = 50ppm; Aerosol, only = 10mg/m3.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, Industrial Ventilation, A Manual of Recommended Practices, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type P95 or R95 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear protective gloves and clean body-covering clothing.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

IX - PHYSICAL AND CHEMICAL PROPERTIES

Appearance:
Clear oily liquid.

Odor:
Odorless.

Solubility:
Miscible in water.

Specific Gravity:
1.0361 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
No information found.

Boiling Point:
188.2C (370F)

Melting Point:
-59C (-74F)

Vapor Density (Air=1): 2.6

Vapor Pressure (mm Hg):
0.129 @ 25C (77F)

Evaporation Rate (BuAc=1):
0.01

X - STABILITY AND REACTIVITY

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. Aldehydes or lactic, pyruvic or acetic acids may also be formed.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizing agents.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

XI - TOXICOLOGICAL INFORMATION

Oral rat LD50: 20g/kg. Skin rabbit LD50: 20.8g/kg.

Irritation: Eye rabbit/Draize, 500 mg/24H mild.

Investigated as a mutagen and reproductive effector.

---NTP Carcinogen---

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Ingredient                        Known  Anticipated  IARC Category
---------
Propylene Glycol (57-55-6)        No      No          None

XII - ECOLOGICAL INFORMATION

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into water, this material is expected to readily biodegrade. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:
No information found.

XIII - DISPOSAL CONSIDERATIONS

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.
XIV - TRANSPORT INFORMATION
Not regulated.

XV - REGULATORY INFORMATION

----------\Chemical Inventory Status - Part 1\----------------------------------
Ingredient                                             TSCA    EC    Japan    Australia
--------------------------------------------------------   ----    ---    -----    ---------
Propylene Glycol (57-55-6)                                     Yes    Yes    Yes      Yes
----------\Chemical Inventory Status - Part 2\----------------------------------
Ingredient                                             Korea    DSL    NDSL    Phil.
---------------------------------------------------------------------------
Propylene Glycol (57-55-6)                                     Yes    Yes    No     Yes
----------\Federal, State & International Regulations - Part 1\-------------------
Ingredient                                 RQ    TPQ     List  Chemical Catg.
-----------------------------------------  ---    -----   ----  --------------
Propylene Glycol (57-55-6)                 No    No      No         No
----------\Federal, State & International Regulations - Part 2\-------------------
Ingredient                                 CERCLA    261.33    8(d)
-----------------------------------------  ------     ------    ----
Propylene Glycol (57-55-6)                 No         No         No

Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: No  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the
MSDS contains all of the information required by the CPR.

XVI - OTHER INFORMATION

NFPA Ratings:
Health: 0    Flammability: 1    Reactivity: 0

Label Hazard Warning:
CAUTION! MAY CAUSE IRRITATION TO SKIN AND EYES.

Label Precautions:
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.

Label First Aid:
In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Call a physician if irritation
develops or persists.

Product Use:
Laboratory Reagent.

Revision Information:
MSDS Section(s) changed since last revision of document include: VIII.

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