



# ORS Interface Probe™

Installation and Operation Manual



Rev. 2 8/27/03 Part # ORS999006010

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# DOCUMENTATION CONVENTIONS

This manual uses the following conventions to present information:



An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.

## **WARNING**



A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.

## **CAUTION**



A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

## **NOTE**

# Chapter 1: System Description

## Function and Theory

The ORS Interface Probe™ is a hand held, battery powered device for measuring depth to water or oil in tanks or wells. The ORS Interface Probe™ can be used in numerous applications including measuring oil and water levels in monitoring wells, and obtaining accurate measurements of water levels in cascading wells. The system is Factory Mutual Approved for Class 1, Division 1, Group D applications.

This manual applies to ORS Interface Probes™ with part numbers 1068013, 1068015, 1068017, 1068018, and 1068021. These models differ only in tape length and in the graduations on the front and back of the measuring tapes. Measuring tape alternatives are as follows: 1068013 (100' Engineering/Metric), 1068015 (200' Engineering) 1068017 (30m Metric/Engineering), 1068018 (60m Metric), and 1068021 (300' Engineering). Engineering scales are in decimal feet and Metric scales are in millimeters.

The ORS Interface Probe™ consists of a hydrocarbon/water sensing probe, a measuring tape/probe cable and a housing into which the tape and probe can be withdrawn when not in use. See pages 4 and 5 for a more detailed explanation of these components, and see figure 1, for a picture of the entire assembly.

# System Components

## Probe

The standard probe is a 1" (25.4 mm) diameter cylinder which can be used in wells as small as 1-1/8" (28.575 mm) in diameter. The small diameter probe is a 5/8" (.625 mm) diameter cylinder which can be used in wells as small as 1" (25.4 mm) in diameter. The probe contains two different sensor units, one for detecting the liquid/air interface, and one for distinguishing between water and hydrocarbon. The liquid sensor is an optical prism located on the end of the probe. This sensor detects liquid by reacting to the differences in the indices of refraction of air and liquids. An infrared light source is internally reflected to an infrared detector by a prism on the face of the sensor. When the prism becomes immersed in liquid, the light beam is refracted away from the detector. To determine if the liquid is conductive (water) or non conductive (hydrocarbon), a small Intrinsically Safe electrical current is passed between two electrodes on the sensor. Current flow will occur only in conductive fluids such as water. The ORS Interface Probe™ is capable of measuring oil slicks less than 1/16 of an inch (1.5875 mm in thickness).

## Measuring Tape

The specially coated measuring tape connects the probe with the housing assembly and provides an accurate means of measuring the distance from the well head or tank port to the air/water, air/oil or oil/water interface. The tape contains all the wires running between the probe and the circuitry in the housing assembly.

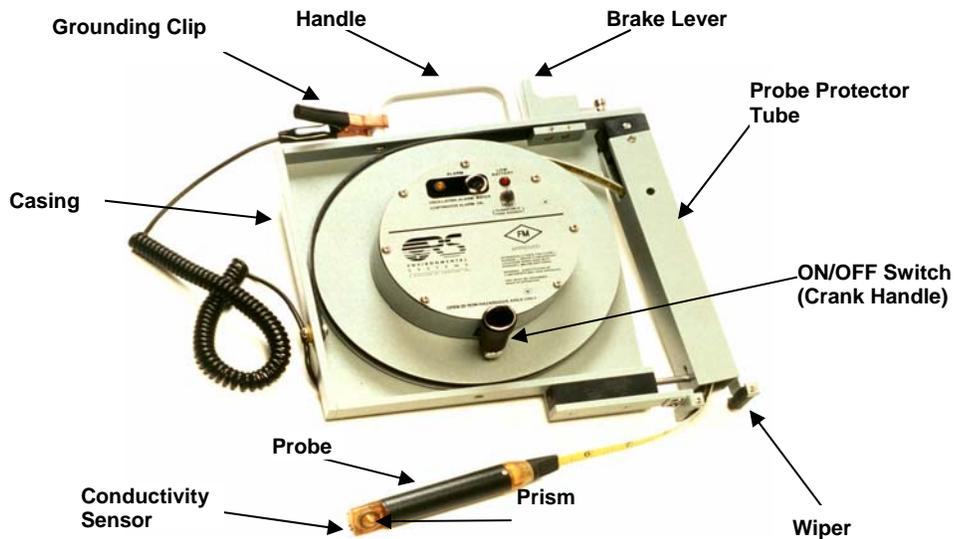


Figure 1

## Housing Assembly

The components of the weatherproof NEMA 3 housing assembly are shown in figure 1. The housing includes a casing and reel to protect and deploy the measuring tape and probe. The housing also has a Low Battery indicator, a visual/audible alarm and a test button for the alarm. A grounding clip is attached to the housing.

## Intrinsic Safety & Approval



The intrinsic safety and approval of the ORS Interface Probe™ is subject to the following requirements.

Batteries must be changed only in a non-hazardous location.

Batteries must be Duracell Type MN1500 (size AA). Substitution will impair intrinsic safety and void approval.

When in operation, the unit must be grounded with the grounding clip provided.

Substitution of components and/or improper use will impair intrinsic safety and void approval.

## Chapter 2: System Installation

Attach a grounding clip to a confirmed ground before lowering the probe. No further preparation is required.

## Chapter 3: System Operation

### Taking a Measurement

To turn the unit on, unfold the crank handle away from the reel housing (see figure 1). This activates a power switch inside the reel.



**Before activating the probe, attach the grounding clip to a suitable earth ground.**

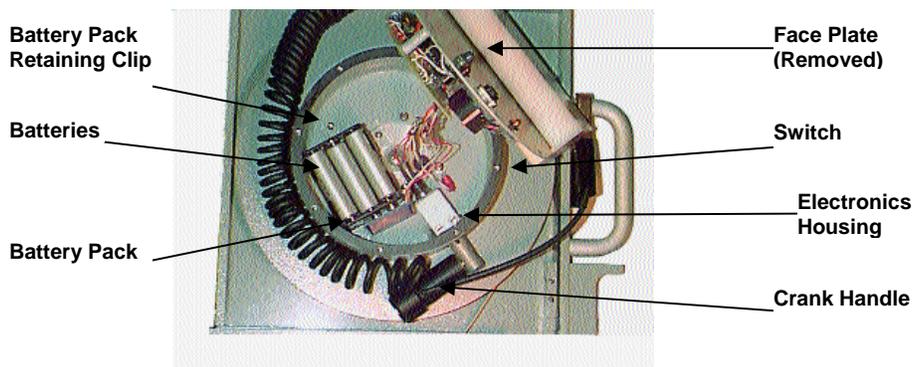
To verify that the unit is operational, press the test button on the face plate. If the power is ON, the visual/audible alarm will be activated. A low battery condition will cause the Low Battery indicator to be illuminated.



**BEFORE REPLACING BATTERIES,  
READ SECTION ON INTRINSIC SAFETY AND APPROVAL.**

To release the probe, pull the protector tube outward from the reel casing. To lower the probe, tilt the front of the reel housing forward and press the brake release. The brake release is located just forward of the handle. The tape will reel out as long as the brake release is pressed. Lower the probe into the well taking care not to allow the probe or tape to rub against the well casing. Refer to Appendix B for an alternative means of probe deployment.

When the probe contacts liquid, the visual/audible alarm on the reel will be activated. An oscillating alarm indicates water, a continuous alarm indicates hydrocarbon. To determine the exact thickness of a hydrocarbon layer, the probe should be slowly lowered to the air/hydrocarbon interface until the alarm is activated. With the probe at the exact point where the alarm comes on, read the numbers on the tape to determine the distance from the top of the well head to the air/hydrocarbon interface.



Next, lower the probe through the hydrocarbon layer and well into the water. An oscillating alarm will be obtained. The probe should then be raised slowly to the hydrocarbon/water interface until the point is reached where the alarm changes from oscillating to continuous. The thickness of the hydrocarbon layer is determined by subtracting the first reading from the second reading.



The most accurate results are obtained by moving the probe as slowly as possible.

It is important that the probe be removed from the fluid slowly. If not, drops of fluid may remain on the probe tip giving a false indication of liquid after it has been removed.

After taking a measurement, snap the protector tube shut so the wiper rests against the tape. Release the brake and slowly reel in the tape until the probe is just below the wiper. Do not allow the probe to bottom out against the wiper, as this will apply stress to the tape and possibly damage connections at the probe. Next, open the protector tube and gently reel the probe 2/3 of the way into the tube. Forcibly reeling the probe all the way into the tube may stress or break the measuring tape. Now, turn the entire ORS Interface Probe™ assembly upside down so that the probe falls the rest of the way into the protector tube. Make sure that the probe is entirely within the protector tube. Finally, close the protector tube.

The ORS Interface Probe™ is equipped with an automatic shutoff circuit. If the probe has not sensed liquid within 4 minutes from the time power is applied, the unit will automatically switch to a low power mode. This prevents battery drain in the event the power is left on accidentally. To restore power, place the handle in the OFF position and then back to the ON position.

## Chapter 4: System Maintenance

The ORS Interface Probe™ is designed to be virtually maintenance free. The only maintenance required is cleaning off the reel and probe and periodic replacement of the batteries.

After every measurement, the probe should be washed in Alconox detergent, rinsed in distilled water, washed again in Alconox and rinsed for a final time in distilled water. Also clean all accessible parts of the reel assembly. Under some circumstances, a more aggressive cleaner may be required to prevent cross-contamination of wells. Before replacing the batteries, read section on intrinsic safety and approval.

## Chapter 5: System Troubleshooting

The ORS Interface Probe™ is a sealed unit and is not easily repaired in the field. With the exception of replacing a damaged prism, any major malfunction should be referred to the Customer Service Department at Geotech Environmental Equipment Inc. (800) 833 - 7958 or (303) 320 - 4764.

To remove a damaged prism, use a  $\frac{3}{4}$ " (19 mm) wrench (hex socket 6 point) and unthread the prism assembly from the probe bottom. A replacement prism assembly is available by ordering Part Number 2060010.



To prevent water from entering the prism cavity, carefully dry the probe before removing the old prism. Throughout the prism removal and replacement procedure, hold the probe with the prism pointed downward.

### Installing the new prism assembly

Simply thread the prism into place and secure finger tight. Then use a  $\frac{3}{4}$ " (19 mm) wrench to firmly seat the o-ring. Be careful not to over tighten.

## Chapter 6: System Specifications

### Probe

Material:	304 Stainless Steel, Radel
Weight:	4.6 oz / 130 grams
Diameter:	1 inch / 25 mm
Length:	6 ½" inches / 165 mm
Probe waterproof to:	100 psi / 6.9bar
Maximum probe shock:	10 G
Conductivity sense range:	> .78µS
Minimum detectable hydrocarbon thickness:	.0312" / <.8 mm

### Tape

Material:	Kynar® coated Stainless Steel		
Length/Weight:	100' / 30 m	7.7 lbs (3.5 kg)	w/case 15.2 lbs (6.9 kg)
	200' / 60 m	11.9 lbs (5.4 kg)	w/case 22.0 lbs (10 kg)
	300' / 90 m	15.8 lbs (7.2 kg)	w/case 27.8 lbs (12.6 kg)

Accuracy:	100 <sup>th</sup> of a foot/100'
	Per Federal Specification GGG-T-106E

### Reel/Frame

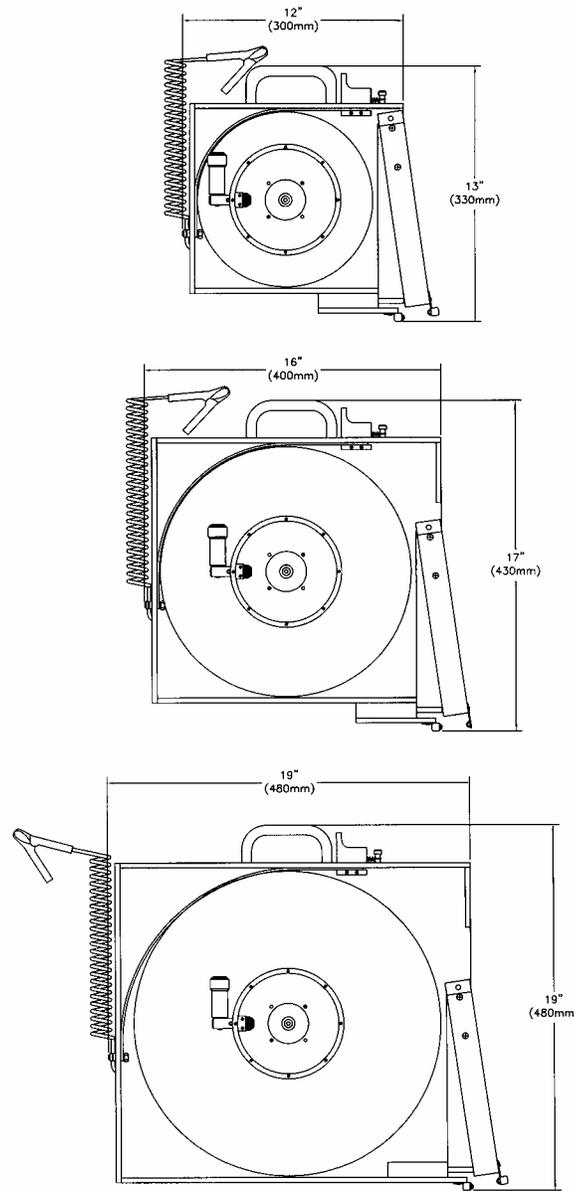
Size:	100'/30m	13" H x 12" W x 3 ¼" D 330mm H x 300mm W x 80mm D
	w/Case	20" H x 14" W x 8" D 510mm H x 360mm W x 205mm
	200'/60m	17" H x 16" W x 3 ¼" D 430mm H x 400mm W x 80mm D
	w/Case	25" H x 20" W x 8" D 630mm H x 510mm W x 205mm
	300'/90m	19" H x 19" W x 3 ¼" D 480mm H x 480mm W x 80mm D
	w/Case	29" H x 22" W x 8 ½" D 730mm H x 560mm W x 210mm

Battery:	9 VDC (Six, Duracell Type MN1500 size AA)
Self shut off time:	4 minutes
Output tone (hydrocarbons):	500 Hz typ
Output modulation tone (water):	3.5 Hz typ

### Unit

Operating temperature range:	32°F / 0°C to 140°F / 60°C
Storage temperature range:	-40° to 170°F / 75°C
Humidity:	5-95% non-condensing

# Chapter 7: System Schematic



## Chapter 8: Replacement Parts List

This unit contains no field replaceable components. If the unit fails to operate, contact your Geotech Sales Representative to troubleshoot further, or return the unit for repair.

### Carrying Case

100'/30m	PPM132002
200'/60m	PPM132004
300'	PPM132006

### Unit w/o Carrying Case

100'	2068009
200'	2068060
300'	2068005
30m	2068013
60m	2068021
Prism	2060010
Manual	ORS999006010

## APPENDIX A

### ORS INTERFACE PROBE™ CHEMICAL RESISTANCE CHART

The compatibility of the ORS Interface Probe™ with various chemicals is listed in the table on the following pages. For chemicals not listed, please consult the factory.

Chemical resistance is rated as follows:

A: Good: at 20 degrees C.

B: Fair: Slight attack and absorption. Inspect and rinse after use.

C: Poor: Use the ORS Chemical Interface Probe™.

\* Indicates that the probe material has not yet been tested specifically with that chemical but the results can be predicted from tests with similar chemicals.

A summary of the resistance of the sensing head to water, organic chemicals is given below.

#### **WATER**

The probe is not attacked chemically by water.

#### **INORGANIC CHEMICALS**

The probe is unaffected by most inorganic reagents. Aqueous solutions do not generally damage the prism, although it may be temporarily softened by absorbed water. The prism is attacked by concentrated oxidizing mineral acids (nitric, sulfuric, and hydrochloric) at room temperature but is not affected by more dilute acids. Resistance to alkalis is good.

#### **ORGANIC CHEMICALS**

In general, aliphatic hydrocarbons, alcohols, benzene, petroleum spirits, aliphatic organic acids, oils and fats do not attack the prism. Slight absorption may occur but does not usually cause degradation. The prism is attacked by highly polar organic solvents such as dimethylsulphoxide, aromatic amines, nitrobenzene, and certain chlorinated hydrocarbons such as dichloromethane and chloroform.

<b>Chemical</b>	<b>Results</b>	<b>Chemical</b>	<b>Results</b>
Acetaldehyde	C	Cresols	C
Acetic Acid-glacial	A	Cyclohexane	A
Acetic Acid-10%	A	Cyclohexanol	A
Acetone	C	Cyclohexanone	C
Aluminum Salts	A*	Detergent Solutions	A
Ammonia- 880	A	Dibutyl phthalate	A
Ammonium hydroxide-10%	A	Dichlorobenze	C
Ammonium chloride-10%	A	Dichloroethane	C
Amyl Acetate	B	Dichloroethelyne	B
Aniline	C	Diesel Oil	A
“Arcton” propellants	A*	Diethylamine	A
Aviation hydraulic fluid	B	Dimethyl Formamide	C
Aviation spirit	A	Diocyl phthalate	A
Barium Salts	A*	Dioxane	B*
Benzaldehyde	C	Edible fats & oils	A
Benzene	A	Ethanol	A
Benzoic Acid	A	Ethyl Acetate	C
Benzen Sulfonic Acid	A*	Ethyl Alcohol	A
Bleach	A	Ethylene glycol	A
Boric Acid	A*	Ferric chloride	A
Brake Fluid	B	Formaldehyde	A
Brine	A	Formic Acid	A
Butane	A	Gasoline (premium)	A
Butanol	A	Glycerol	A
Butyl Acetate	B*	Heptane	A
Calcium nitrate	A	Hexane	A
Calcium hypochlorite	A	Hydrochloric acid-10%	A
Carbon disulphide	B*	Hydrochloric acid (conc.)	A
Carbon tetrachloride	A	Hydrogen Peroxide	A
Chlorine	C	Hydrogen sulfide	A
Chlorobenzene	C	Iodine	B
Chloroform	C	Isopropanol	B
Chlorosulfonic acid	C*	Iso-octane	A
Chromic Acid	A	Kerosene	A
Citric Acid	A	Lactic Acid	A*
Cooking oil	A	Lead Acetate	A*
Copper sulfate	A	Linseed Oil	A
Creosote	A	Magnesium Sulfate	A

<b>Chemical</b>	<b>Results</b>	<b>Chemical</b>	<b>Results</b>
Mercuric chloride	A*	Sulfurous acid	C*
Mercurous chloride	A*	Tar	A*
Mercury	A*	Tartaric acid	A*
Methanol	A	Tetrahydrofuran	C
Methyl Ethyl Ketone	C	Toluene	C
Methyl Chloride	C	Transformer oil	A
Milk	A	Trichloroethylene	B
Motor Oil	A	Turpentine	A
Nickel Salts	A*	Vaseline	A*
Nitric Acid-10%	A	Varnish	A
Nitric Acid (conc.)	C	Water	A
Nitrobenzene	C	Wax	A*
Oils (Vegetable)	A	White spirit	A
Oleic acid	A*	Wines and spirits	A*
Oleum	C	Xylene	B
Oxalic acid	A	Zinc salts	A*
Perchloroethylene	C		
Petrol	A		
Petroleum Ether	A		
Phenols	C		
Potassium hydroxide-10%	A		
Potassium hydroxide-50%	A		
Propane	A*		
Pyridine	C		
Silicon fluids	A		
Silver nitrate	A		
Soap solution	A		
Sodium chloride	A		
Sodium hydroxide-10%	A		
Sodium hydroxide-50%	A		
Sodium hypochloride	A*		
Sulfur dioxide	B		
Sulfuric Acid-10%	A		
Sulfuric acid (conc.)	C		

## APPENDIX B

### INTERFACE PROBE TRIPOD MOUNT

This Interface Probe is equipped with a 1/4-20 threaded hole (on bottom of frame assembly) for mounting on a standard photo or video tripod. This feature allows the probe to be centered in the well and prevents the probe or measuring tape from sustaining damage during deployment or recovery.



# Notes

## Notes

## Notes

**Some common decontamination solutions are listed below along with the contaminants they are effective against:**

Solution	Effective Against
Water	Short-chain hydrocarbons, inorganic compounds, salts, some organic acids, other polar compounds.
Dilute Acids	Basic (caustic or alkaline) compounds, amines, hydrazines.
Dilute Bases	Acidic compounds, phenols thiols, some nitro- and sulfonic compounds.
Organic solvents	Nonpolar compounds (such as some organic compounds)

The use of organic solvents is not recommended because:

- 1) Organic solvents can permeate and/or degrade the protective clothing and
- 2) They are generally toxic and may result in unnecessary employee exposure to hazardous chemicals.

When in doubt, use a dish washing liquid detergent. As a decontamination solution, it is readily available, is the safest of all the above, and is usually strong enough if used generously.

The use of steam can also be effective for decontamination. A water-lazer (pressurized water) is exceptionally valuable.

The following substances are noted for their particular efficiency in removing certain contaminants or for decontaminating certain types of equipment.

Solution	Effective Against
Penetone	PCB Contamination (since penetone may also remove paint, it is a good idea to spot-test before use)
Liquinox	Contaminated pumps
Ivory liquid	Oils
Diluted HTH	Cyanides
Radiac	Low level radioactivity
Isopropanol	Biological agents (should not be used on rubber products since it will break down rubber)
Hexane	Certain types of lab or sampling equipment (use of hexane is discouraged due to its flammability and toxicity)
Zep	General purpose cleaning
Alconox	General purpose cleaning

## **Recommended Supplies for Decontamination of Personnel, Clothing and Equipment**

The list below contains recommendations for supplies which would be on hand for the decontamination of personnel, clothing and equipment. Depending on the site activities, not all of these items may be needed. Alternatively, some additional items not listed here may be required.

- Drop cloths of plastic or other suitable material, such as visqueen, for heavily contaminated equipment.
- Disposal collection containers, such as drums or suitably lined trash cans for disposable clothing and heavily contaminated personal protective clothing or equipment to be discarded.
- Lined box with adsorbent for wiping or rinsing off gross contaminants and liquid contaminants.
- Wash tubs of sufficient size to enable workers to place booted foot in and wash off contaminants (without a drain or with a drain connected to a collection tank or appropriate treatment system).
- Rinse tubs of sufficient size to enable workers to place booted foot in and wash off contaminants (without a drain or with a drain connected to a collection tank or appropriate treatment system).
- Wash solutions selected to wash off and reduce the hazards associated with the contaminated wash and rinse solutions.
- Rinse solution (usually water) to remove contaminants and contaminated wash solutions
- Long-handled, soft-bristled brushes to help wash and rinse off contaminants.
- Lockers and cabinets for storage of decontaminated clothing and equipment.
- Storage containers for contaminated wash and rinse solutions.
- Plastic sheeting, sealed pads with drains, or other appropriate method for containing and collecting contaminated wash and rinse water spilled during decontamination.
- Shower facilities for full body wash or at a minimum, personal wash sinks (with drains connected to a collection tank or appropriate treatment system).
- Soap or wash solution, wash cloths and towels.
- Clean clothing and personal item storage lockers and/or closets.

## **Decontamination Solutions to Avoid**

Some decontamination solutions should be avoided because of their toxicity, flammability, or harmful effects to the environment.

Halogenated hydrocarbons, such as carbon tetrachloride, should not be used because of their toxicity, possible incompatibility, and some because of their flammability.

Organic decontamination solutions should not be used on personal protective equipment (PPE) because they may degrade the rubber or other materials comprising the PPE.

Mercurials are sometimes used for sterilization. They should be avoided because of their toxicity.

Chemical leaching, polymerization, and halogen stripping should all be avoided because of possible complications during decontamination.

Sand-blasting, a method of physical removal, should be avoided because the sand used on the contaminated object usually needs to be disposed of as hazardous waste, a very costly proposition. Also, sand-blasting exposes personnel to silica, a carcinogen.

Freon is known to be particularly effective for the cleansing of PCB's but its effect on the ozone layer is extremely harmful. Its use is discouraged.

Strong acids or bases should not be used when cleaning metals and gaskets or tools or other equipment because of the possibility of corrosion.

## **Disposal of Decontamination Solutions and Waste Water**

All solutions and water used for decontamination must be collected. If lab analysis indicates that the water and/or solutions exceed allowable contamination levels, they must be treated as hazardous waste. Alternatively, the solutions and water may be treated on-site to lower the contamination levels and render them non hazardous.

Containers such as 55-gallon drums should be available for storage of wastes.

Spent decontamination solutions can be collected by using heavy-duty plastic sheets, visqueen sheets, kiddie pools, or if needed, a larger containment basin. The decontamination of equipment must be performed on the sheets or in the basins. They could be placed on a slight angle so that the spent decontamination solutions drain into a collection basin or drum.

## The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

## Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR SERVICE DEPARTMENT AT 1-800-833-7958 OR 1-800-275-5325.

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

Date: \_\_\_\_\_

## Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used.

Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate equipment for a fee, which will be applied to the repair order invoice.

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