

# **Tri Nuclear Corp.**

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## **Radwaste Filter**

### **Assembly & Operating Instructions**

*Model RWF-50*

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Date

Prepared By: \_\_\_\_\_ 02/01/08  
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Approved By: \_\_\_\_\_ 02/01/08  
James Warden, President      Date

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### **Attachments:**

- A. Brochure BR092A, Radwaste Filter Model RWF-50
- B. Drawing B-009, Radwaste Filter Housing Model RWF-50
- C. OI-6, Rope Filter Lift Tool Operating Instructions
- D. Brochure BR-110A, Filter Cartridge

**RADWASTE FILTER**  
*(Model RWF-50)*  
**Assembly and Operating Instructions**

**1.0 INTRODUCTION**

This document specifies the requirements and instructions for operating the Tri Nuclear Radwaste Filter Model RWF-50. This procedure is very general in nature due to the many different options and applications of the RWF-50.

It is expected that trained and qualified personnel will operate the RWF-50. Radiological considerations and requirements are not included in this document and should be specifically addressed by the end user organization.

**2.0 EQUIPMENT DESCRIPTION**

**2.1 RADWASTE FILTER**

The Radwaste Filter is constructed of 304 stainless steel and is designed to hold one standard Tri Nuclear 6"x 30" filter cartridge. Flow enters near the top of the filter housing and exits at the bottom of the filter housing.

Options and optional equipment for the RWF-50 may include choice of inlet/outlet nozzle size, inlet & outlet shut-off valves, nozzle end fittings, differential pressure gage and ASME code vessel stamping.

**2.2 GENERAL SPECIFICATIONS (Actual may vary depending on customer requirements)**

Height:	44"
Weight:	120 lbs
Base:	24" x 24"
System Flow Rate:	65 GPM
Design Pressure:	150 psi
Material:	304L Stainless Steel

**3.0 EQUIPMENT AS SHIPPED**

(This is a general description of how the equipment is shipped; actual may differ depending on customer shipping requirements)

The RWF-50 is shipped on a standard wooden pallet. Take care not to damage the unit during un-packaging.

## 4.0 UNPACKAGE AND EQUIPMENT SET-UP

- 4.1 RADWASTE FILTER - This unit is fully assembled and ready to be connected to the customer's system.
- 4.2 FILTER INSTALLATION - Install a new filter cartridge prior to initial start-up as follows:
  - 4.2.1 Swing back the three cam arm levers to the fully open position. This will loosen the three tee bolts. Swing back the three tee bolts from their locked position. Open the pressure housing closure and swing back out of position.
  - 4.2.2 Inspect the filter tube sheet O-ring and the filter closure O-ring for any apparent damage.
  - 4.2.3 Check for and clear any debris on the bottom of the filter housing. Install a new filter cartridge.
  - 4.2.4 Close the filter housing closure head. Swing the three tee bolts into their locked position. Note that each bolt has a nut and locking nut that has been preset for proper bolt torque setting. Should the nuts loosen, they will need to be preset. Swing the three cam arms into their closed position. Cam arm actuation should be performed by partially swinging the actuating arm and then repeat this operation on the next two bolts. This operation should be repeated several times by alternating from one bolt to the next until the three cam arms have been swung to their fully locked positions. Care should be taken to confirm the closure head aligns properly and is fully seated to its mating head. Caution: Do not fully swing one cam arm to its locked position since this can misalign the head and cause damage to the o-ring seal.

## 5.0 SYSTEM OPERATION

### **CAUTION:**

Do not exceed design pressure of 150 psi during normal operation.

- 5.1 Install a clean filter per section 4.2
- 5.2 FILLING THE RWF-50

Normally, in an open system it is not necessary to fill and vent the system. In a closed system, to eliminate residual air, the following steps can be taken to fill and vent the system. While running the system, open the top 1/4" vent valve and gradually fill the vessel by opening the inlet valve slowly. This will avoid a sudden surge of fluid or pressure shock to the filter cartridge. Close the vent valve when water emerges.

### 5.3 FILTER CARTRIDGE CHANGE CRITERIA

Continue operation of the filter until it is considered depleted. This should be determined from experience, either by reaching a predetermined maximum dose rate on the filter or by a differential pressure of 12 to 15 psid as read on the installed differential pressure gage (if installed).

### 5.4 FILTER REPLACEMENT

5.4.1 Secure flow through the RWF-50 usually by closing inlet and outlet isolation valves.

5.4.2 Vent any pressure from the filter housing using the 1/4" vent valve prior to opening the lid.

5.4.3 Open the drain valve and verify that the water level in the housing is below the bottom end cap to prevent any cross contamination.

5.4.4 Loosen the filter housing closure cam/bolts and swing back. Open the housing closure and swing out of position.

5.4.4 Remove the filter cartridge either manually or remotely using a UT-9 Rope Filter Lift Tool (See attached OI-6 Operating Instructions for the UT-9)

5.4.5 Inspect the filter tube sheet O-ring and the filter closure O-ring for any apparent damage.

5.4.6 Check for and clear any debris on the bottom of the filter housing. Install a new filter cartridge.

5.4.7 Close the filter housing closure per section 4.2.4.

## 6.0 STORAGE REQUIREMENTS

6.1 Caution should be taken to **NOT** store any plastic components (eg. filters or hoses) near high radiation fields associated with equipment such as fuel bundles, LPRM's or items near the reactor core. Breakdown of such components can occur with accumulated exposures of  $10^6$ R. For this reason, precautions should be taken to minimize accumulative dose for the following components: suction hose, filter cartridges, power and instrument cable, flow sensor, and electric motor.

6.2 If the unit is to be stored in an unheated storeroom after use, ensure all residual water is drained from housing to prevent freezing and subsequent damage.

## 7.0 PRECAUTIONS AND WARNINGS

### CAUTION:

Do not exceed design pressure of 150psi during normal operation.

## 8.0 REPLACEMENT PARTS

### Recommended Spare Parts

Qty	Part No.	Description
1	RWF-O Ring	Radwaste filter closure o-ring
1	O-Ring	O-ring for filter tube sheet
<b>Filter Cartridges</b>		
	VCPH-0.1G	Filter Cartridge 0.1 micron, 6"dia x 30" lg, 6/case
	VCPH-0.3PE	Filter Cartridge 0.3 micron, 6"dia x 30" lg, 6/case
	VCPH-1PE	Filter Cartridge 1 micron, 6"dia x 30" lg, 6/case
	VCPH-5PE	Filter Cartridge 5 micron, 6"dia x 30" lg, 6/case
	VCPH-10PE	Filter Cartridge 10 micron, 6"dia x 30" lg, 6/case

## 9.0 ADDITIONAL INFORMATION

For additional information, or if special problems develop, please call James Warden, (518)-399-1389.

We also have a CD-Rom that contains all the operating procedures/drawings/brochures for this system and all other Tri Nuclear equipment. Please call, fax, or e-mail to request your copy.



## Radwaste Filter Housing

*Model RWF-50*

### Technical Data



In nuclear power plants it is necessary to minimize radiation levels by periodically cleaning out settled sludge from sumps, tanks and drain lines. *Tri Nuclear Corp.* has developed a versatile filter housing, the RWF-50, to help meet this need.

- Radwaste processing
- Filter housing designed for 65 GPM and 150 psi
- Filter housing quick access cover requires no tools for opening
- Uses standard *Tri Nuclear Corp.* filters
- *Tri Nuclear* filter cartridges (inside to outside flow) contain all filtered crud inside the cartridge
- Filter cartridges can be removed remotely using special tools

### Nuclear Applications

- Portable radwaste liquid processing
- Low point drain flushing
- BWR Suppression Pool vacuuming
- Condensate Storage Pool vacuuming
- Fuel Transfer Canal vacuuming
- Reactor Cavity Pool drain down to storage tank

### Available Options

- Differential pressure gauge
- Variety of hose and pipe fittings available
- Vent and/or drain valves
- Quick opening head

### RWF-50 Specifications

**Height:** 44"

**Weight:** 120 lbs

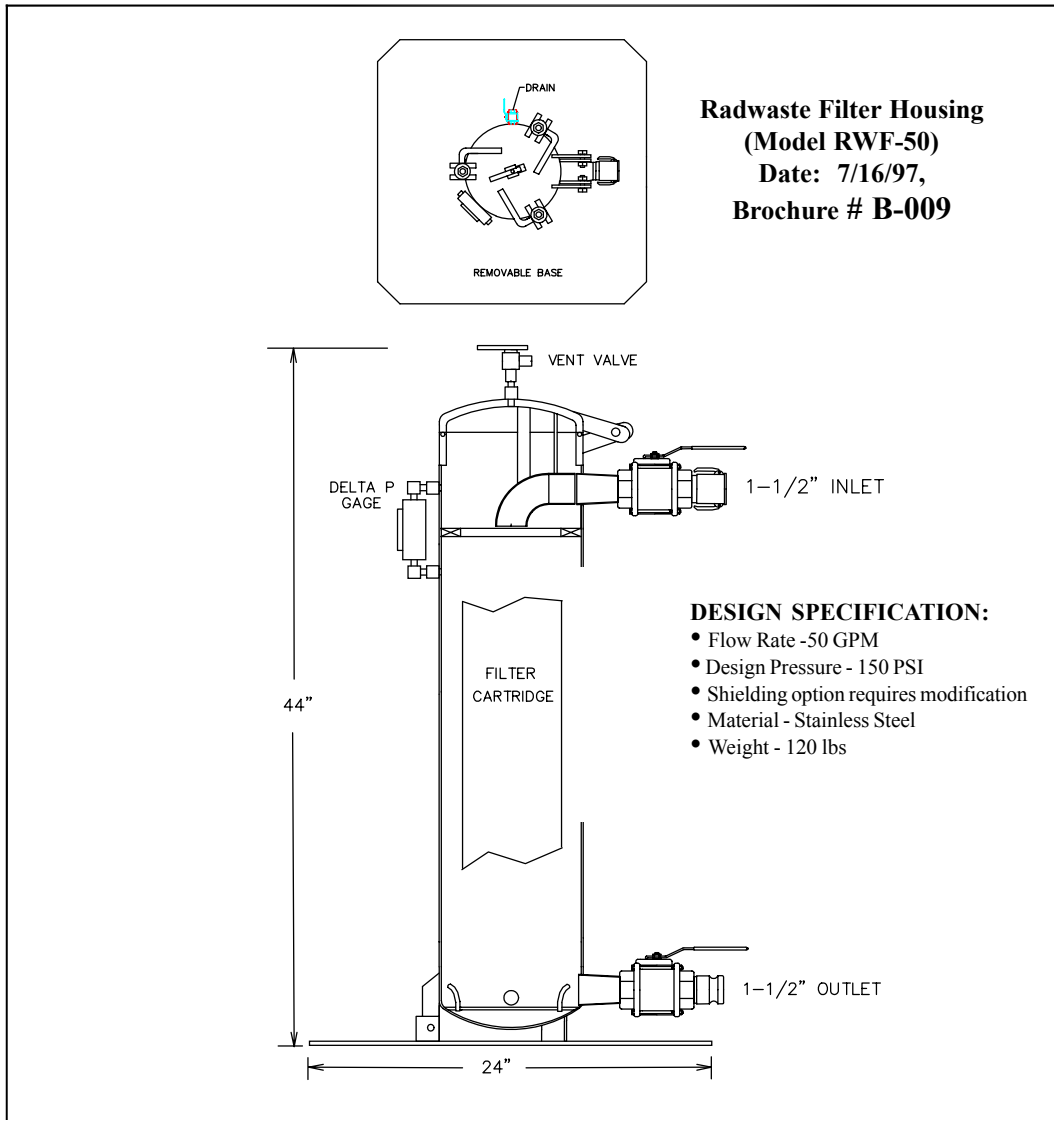
**Base:** 24" x 24" (Removable)

**System flow rate:** 65 GPM

**Design pressure:** 150 psi

**Material for filter housing:** Stainless steel





## RWF-50

### Engineering Detail Showing Design Specifications

#### Filter Cartridge Options:

*(See "Filter Cartridge" brochure, BR110 for details)*

*High Dirt Holding Polyester Cartridge*

*Bag filters available on request*

For Technical Questions, Pricing and Availability, Contact: **James L. Warden, President**

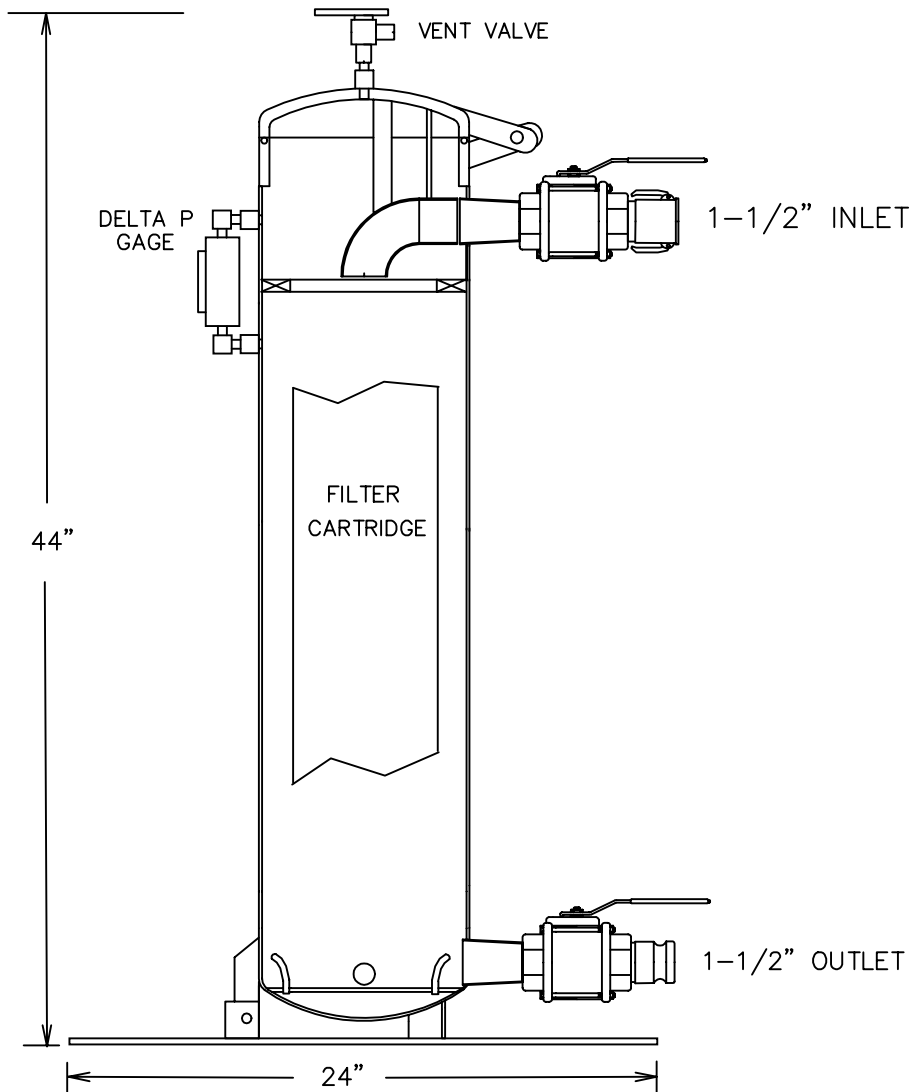
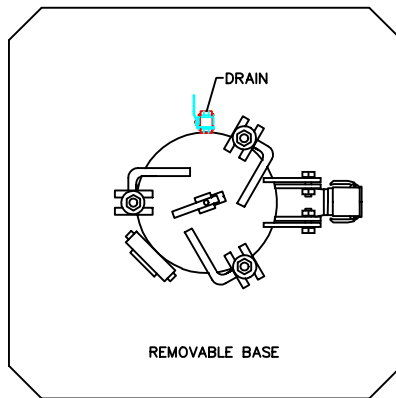
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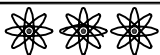
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BR092A



DESIGN SPECIFICATIONS:

- FLOW RATE - 50 GPM
- DESIGN PRESSURE - 150 PSI
- DESIGNED TO ASME BOILER AND PRESSURE VESSEL CODE SECTION VIII, DIV I.
- WELDING TO ASME BOILER AND PRESSURE VESSEL CODE SECTION IX.
- SHIELDING OPTION REQUIRES MODIFICATION
- MATERIAL - STAINLESS STEEL
- WEIGHT - 120 LBS.



Tri Nuclear Corp

RADWASTE FILTER HOUSING (MODEL RWF-50)

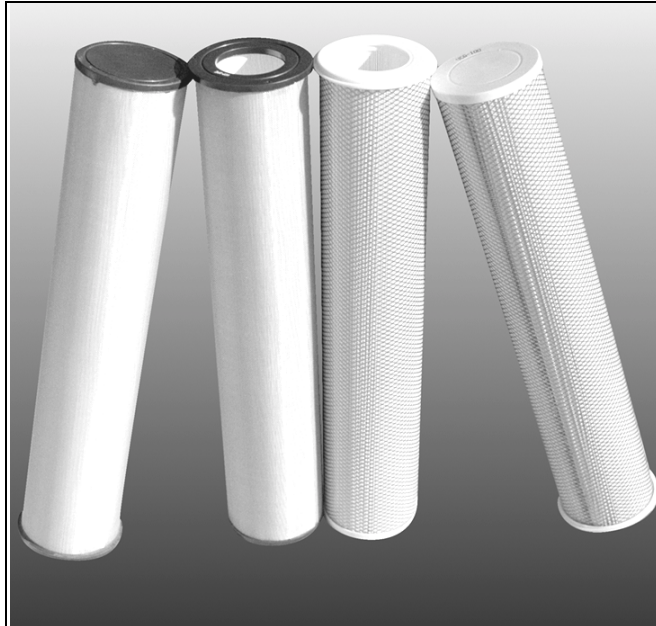
DATE: JULY 16, 1997

BROCHURE NO: B-009



## Filter Cartridges

### Technical Data



In order to meet the continually changing demand for filtration in the nuclear power industry, **Tri Nuclear Corp.** has developed a wide range of filter cartridges for our equipment that will meet the needs of the nuclear operations environment. Among some of the beneficial design characteristics of these filters are:

- Physically and chemically suited to all nuclear pool environments for long term storage
- Inside to outside flow with solid bottom end caps to contain filtered crud inside the cartridge and prevent the spread of contamination during filter draining and disposal
- High dirt loading with high flow rates
- Remote underwater handling capability
- Lead shielding available for filters and equipment
- Negative buoyancy to prevent filter floatation
- Easily compacted for volume reduction

### Nuclear Applications

- Reactor Cavity and Spent Fuel Pool turbidity control
- Torus/Suppression Pool cleanup projects
- Condensate/Reactor Water Storage Tank cleanup projects
- Reactor Vessel Internal and Component underwater cleaning
- Underwater Plasma Cutting/EDM Machining filtration
- Underwater Loose Parts retrieval
- Fuel Pool surface skimming
- Low Point Drain flushing and clean out
- **Radioactive Waste Processing filtration**

### Filter Product Specifications:

*Filter cartridge dimensions:*

**Outside diameter: 6 inches**

**Inside diameter: 3.5 inches**

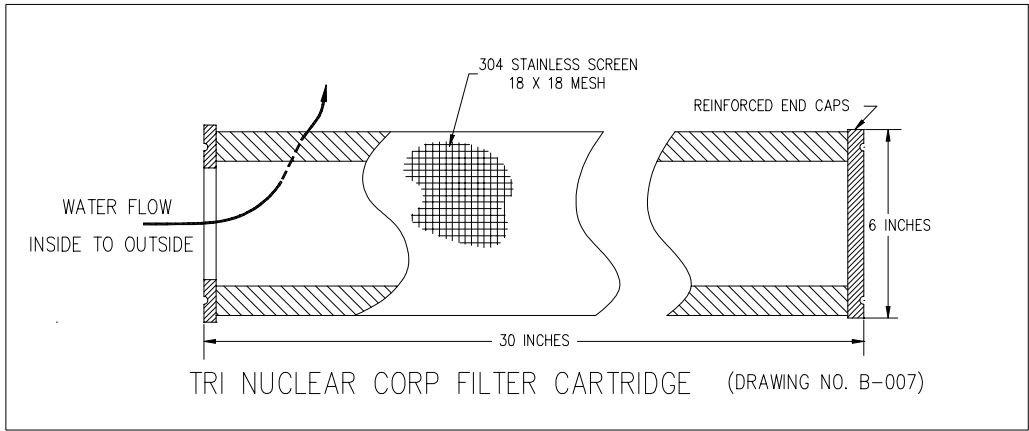
**Length: 30 inches**

*Filter media: Polyester, fiberglass*

*Maximum operating temperature: 140°F*

*Maximum flow rate: 150 GPM*

*Maximum differential pressure: 25 psid*



### Standard Filter Cartridge

Engineering detail showing design specifications. This detail applies specifically to all VCPH-\*PE filter cartridges.

### Filter Cartridge Options:

***Standard High Dirt Holding Polyester Cartridge***

- Model: VCPH-0.3PE Type: 0.3 micron, 60 sq. ft
- Model: VCPH-1PE Type: 1 micron, 62 sq. ft.
- Model: VCPH-5PE Type: 5 micron, 85 sq. ft.
- Model: VCPH-10PE Type: 10 micron, 64 sq. ft
- Model: VCPH-20PE Type: 20 micron, 64 sq. ft.

***OPTIONAL Polyester Cartridge***

- Model: VCP- (micron size)PE
- Micron size: 1, and 50 nominal
- Filter effective surface area: 43 sq. ft.
- Bag filters available on request*

### Equipment Using Tri Nuclear Filter Cartridges

Underwater Filter/Vacuum Units:

- UFV-100 Filter/Pump/Shield on Dolly: FPS-65
- UFV-260 Strainer Housing: ST-65
- UFV-600 Radwaste Filter and Shield: RWFS-1
- Skimmer/Filter/pump: SFP-100

*For Technical Questions, Pricing and Availability, Contact: James L. Warden, President*

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# Rope Filter Lift Tool

## Operating Instructions

*Model UT-9*



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Date

Prepared By: \_\_\_\_\_ 06/26/02  
John J. Flynn, Technical Support Services Date

Approved By: \_\_\_\_\_ 06/26/02  
James Warden, President Date

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Rev. 0	6/26/02	Original Issue	-----	

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# **ROPE FILTER LIFT TOOL**

*(Model UT-9)*

## **Operating Instructions**

### **1.0 PURPOSE**

One of the advantages of TRI NUCLEAR Underwater Filter/Vacuum Units is the ability to change-out depleted filter cartridges while the unit is still submerged on the bottom of the pool.

TRI NUCLEAR has designed a special “Rope Filter Lift Tool” Model UT-9, to change out filters underwater. A single nylon line (or equivalent) is attached to the Rope Filter Lift Tool to allow for fast and easy filter change outs.

### **2.0 DESCRIPTION**

The Rope Filter Lift Tool is shown on Dwg. TN-1687. The left view shows one of the two openings in the side of the housing allowing the fingers to extend out to catch under the top cap of the filter cartridge for lifting. The center view describes the key parts of the tool. The right view is a picture of the tool suspended over a filter cartridge, ready to be lowered into the cartridge for remote transferal.

As the top pull rod is operated up or down in the tool housing, the hinged arms rotating on an internal cam will extend either in or out through the two open slots. The hinged arms will capture the filter for lifting, or release it for withdrawal of the tool.

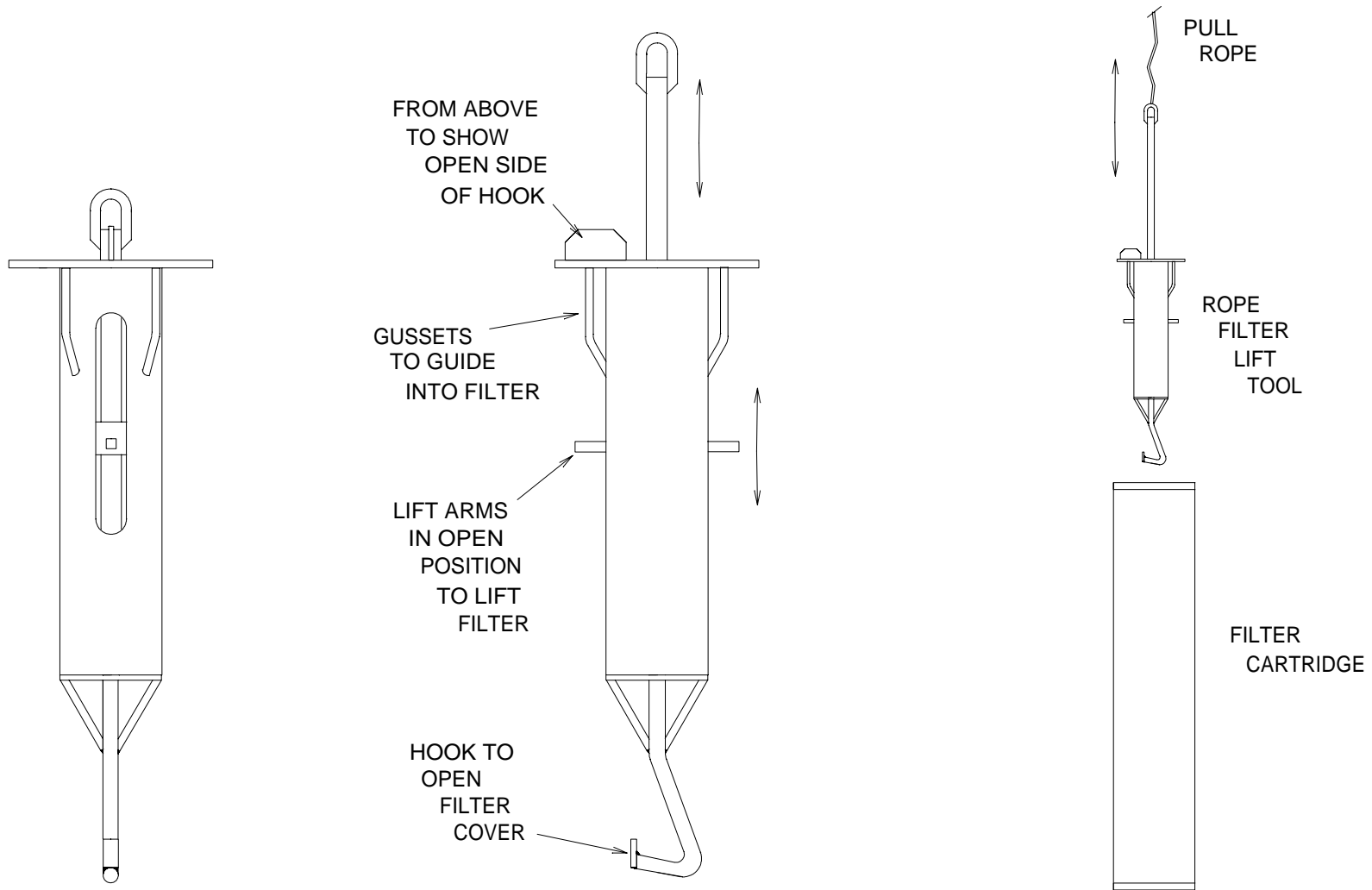
### **3.0 OPERATION**

- 3.1 To change-out an expended filter cartridge from an Underwater Filter/Vacuum Unit, first lower the Underwater Filter Storage Rack with new filter cartridges down to the bottom of the pool adjacent to the Underwater Filter/Vacuum Unit. Allow the filters to fill with water before lowering quickly into the pool.
- 3.2 Attach a nylon line to the top lifting eye of the Rope Filter Lift Tool, and lower it down until it lands on the top cover of the filter housing.
- 3.3 Rotate and move the tool until the bottom J-hook engages the lift handle on the filter housing top cover. Note that the hook locator tab welded on the top of the tool indicates from a top view the orientation of the open side of the hook
- 3.4 Raise the nylon rope with tool to open and lay back the top cover and disengage the tool from the cover.

- 3.5 Next, lower the tool down into the open top of the expended filter cartridge until the top plate of the rope tool seats on the top of the filter cartridge. This is determined by a sudden decrease in the weight of the tool on the nylon line.
- 3.6 Continue to partially lower the nylon line ONLY another 4 or 5 inches. This will allow the side arms of the tool to extend out through the open slots on the side of the tool housing and engage the underside of the filter top cap.
- 3.7 Pull up on the tool to raise the filter out of the filter housing, and lower it into one of the open tubes in the Underwater Filter Storage Rack.
- 3.8 Slack-off the nylon line until the rope tool slide rod hits the bottom and all of the weight of the rope tool is transferred to the filter cartridge. This will rotate the internal cam fitting so the hinged arms will no longer extend out through the side slots in the tool housing.
- 3.9 Next, raise the nylon line and lift the rope tool out of the filter cartridge.
- 3.10 Lower the rope tool down into a new filter cartridge, and repeat the steps to install a new filter into the housing.
- 3.11 Finally, re-engage the bottom J-hook of the rope tool onto the lift handle on the filter housing top cover, lift up to close the filter housing cover, and then disengage the hook. This will complete the filter change-out operation.

End





ROPE FILTER LIFT TOOL  
MODEL UT-9

TN-1687  
REV:  
7/28/95

TRI NUCLEAR CORP  
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NEW YORK 12019

APV'D

