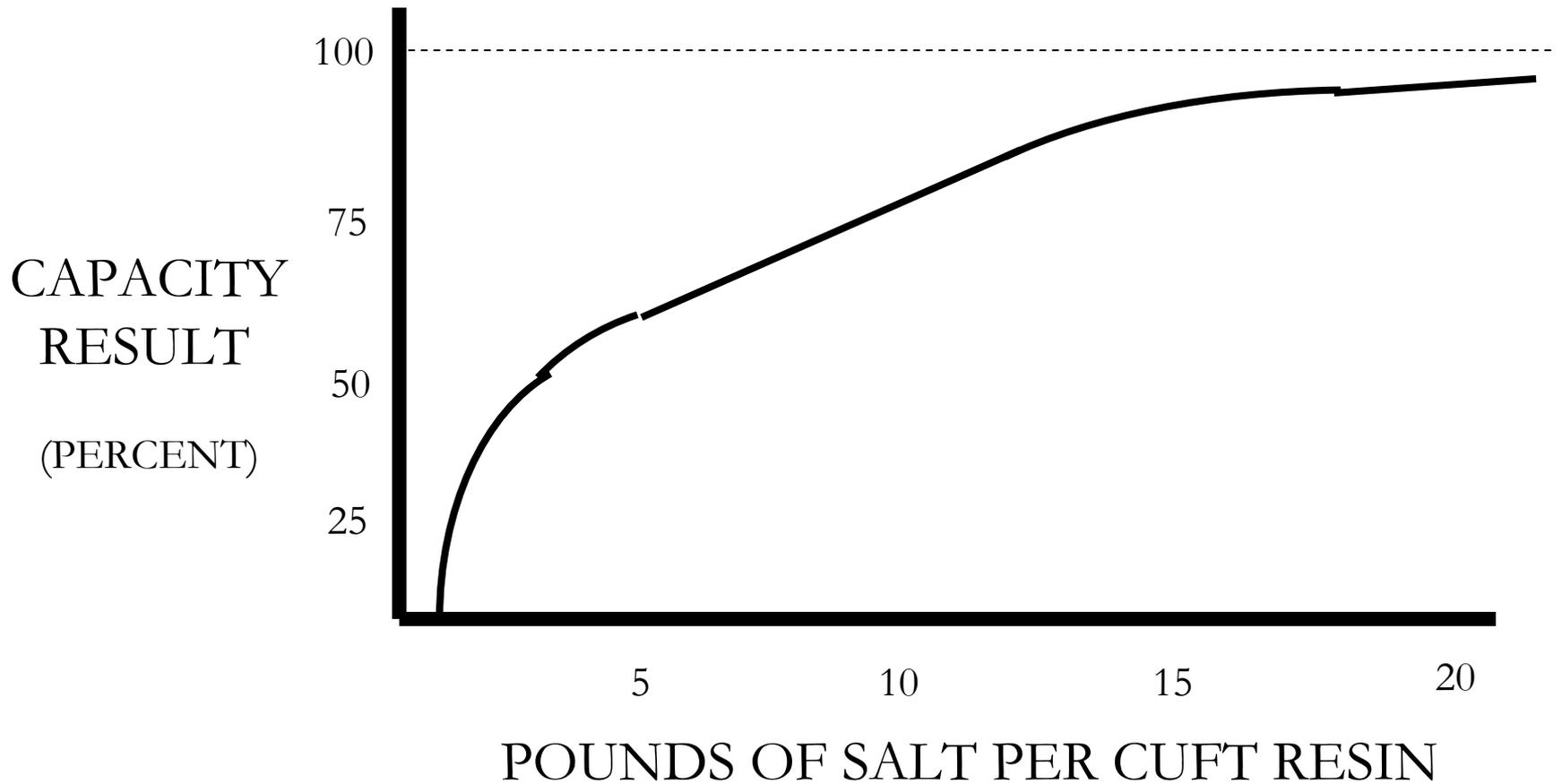


# EXPLORING THE BRINE ENVELOPE

MARYLAND GROUND WATER SYMPOSIUM  
SEPTEMBER, 2009

# THE BRINE ENVELOPE



WHY?

WEST COAST WATER AND TDS CONCERNS

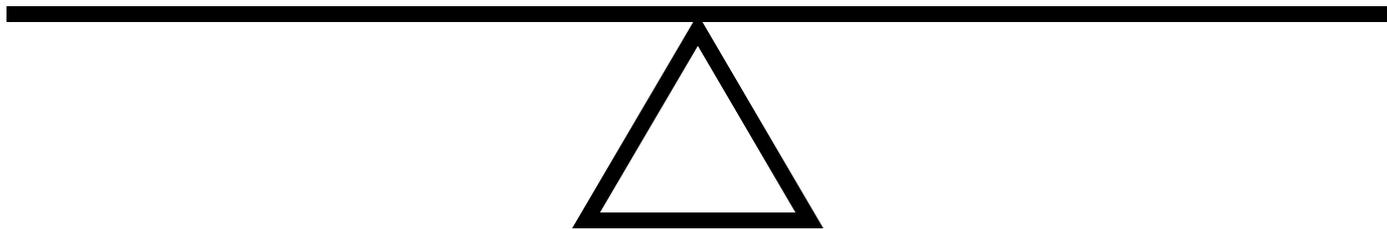
EAST COAST ON-SITE BRINE CONCERNS

WATERSENSE PROGRAM

# STRATEGY SELECTION

BRINE

WATER



PER CAPACITY

DECREASE SALT DOSE:

INCREASE EFFICIENCY (CAPACITY PER SALT)

DECREASE CAPACITY PER REGENERATION

INCREASE FREQUENCY OF REGENERATION (WATER USE)

RECLAIM SALT:

REUSE SELECTED PORTION OF BRINE DRAIN

INCREASE HARDNESS IN BRINE

DECREASE CAPACITY PER REGENERATION

INCREASE FREQUENCY OF REGENERATION (WATER USE)

# **WATER SENSE EFFICIENCY STANDARDS FOR WATER SOFTENERS**

- DEMAND (METER) INITIATED
- SALT EFFICIENCY: NOT LESS THAN 3350 GRAINS CAPACITY  
PER POUND OF SALT
- WATER EFFICIENCY: NOT MORE THAN 5 GALLONS OF WATER  
PER 1000 GRAINS OF CAPACITY.

# **VARIABLES:**

RESIN TYPE

DISTRIBUTOR TYPE (KINETICS)

UPFLOW / DOWNFLOW BRINING

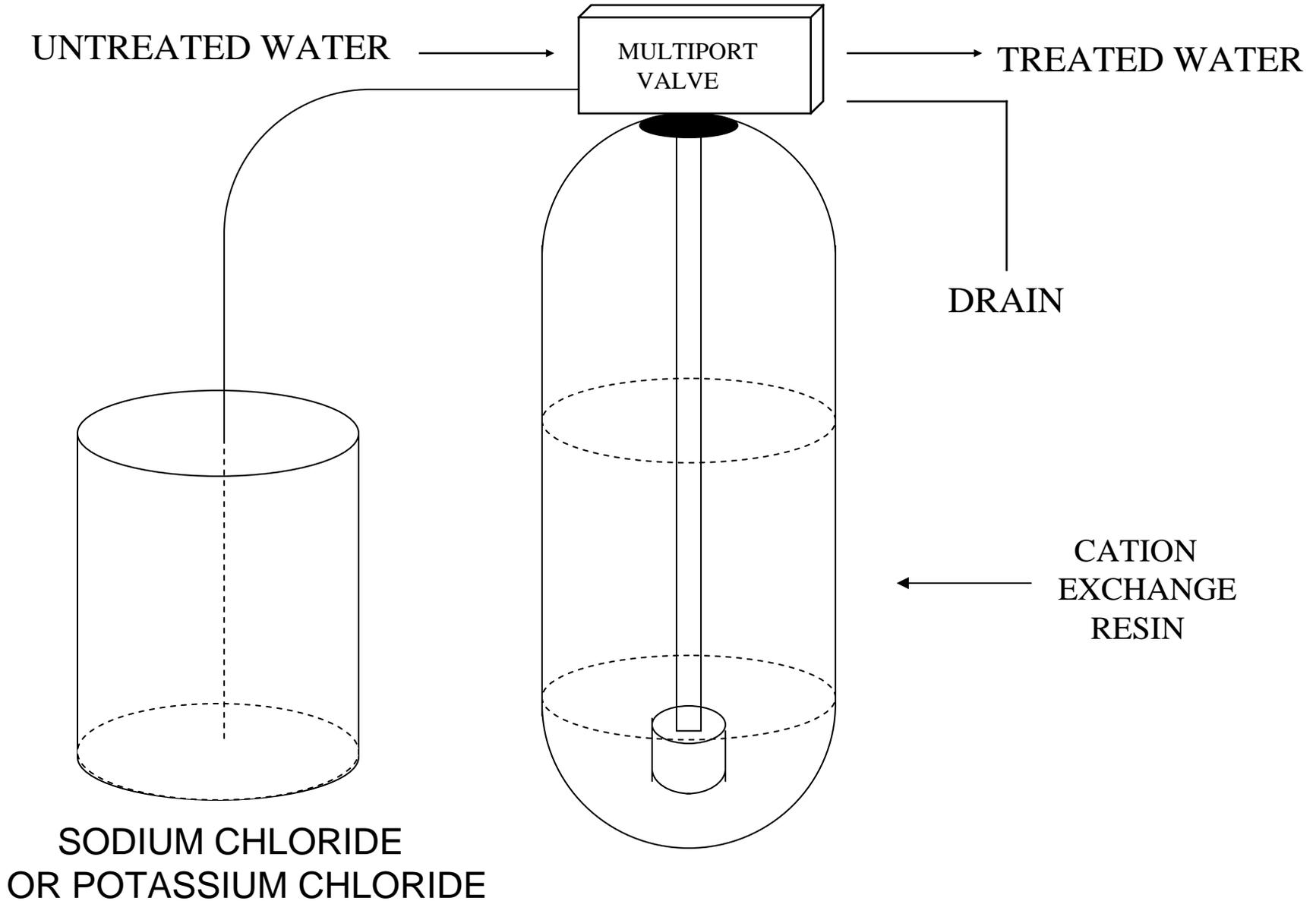
SALTING LEVEL (POUNDS PER CUFT)

INJECTOR RATES (KINETICS)

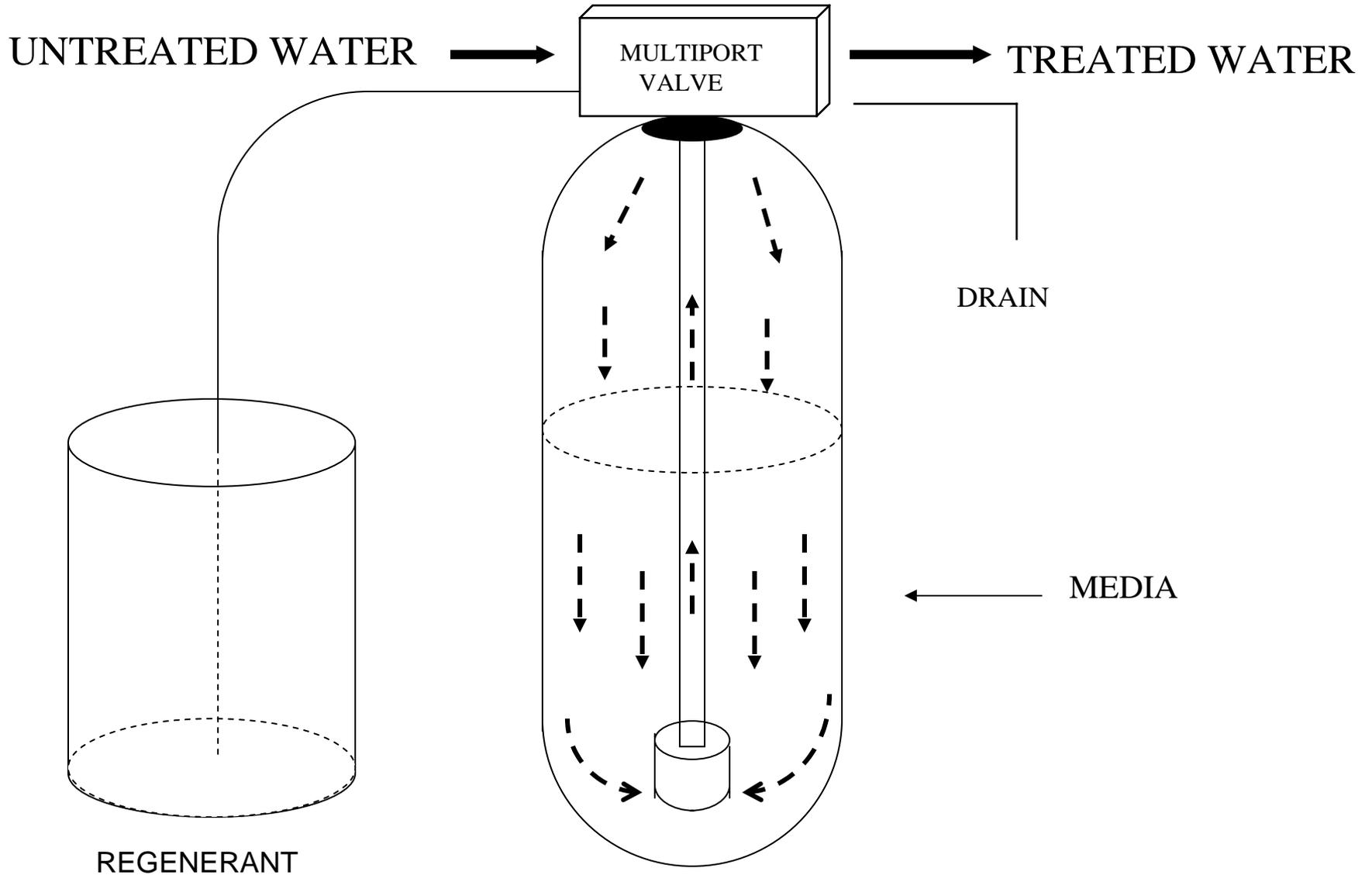
RECLAIM POTENTIAL

RAW WATER CHARACTER

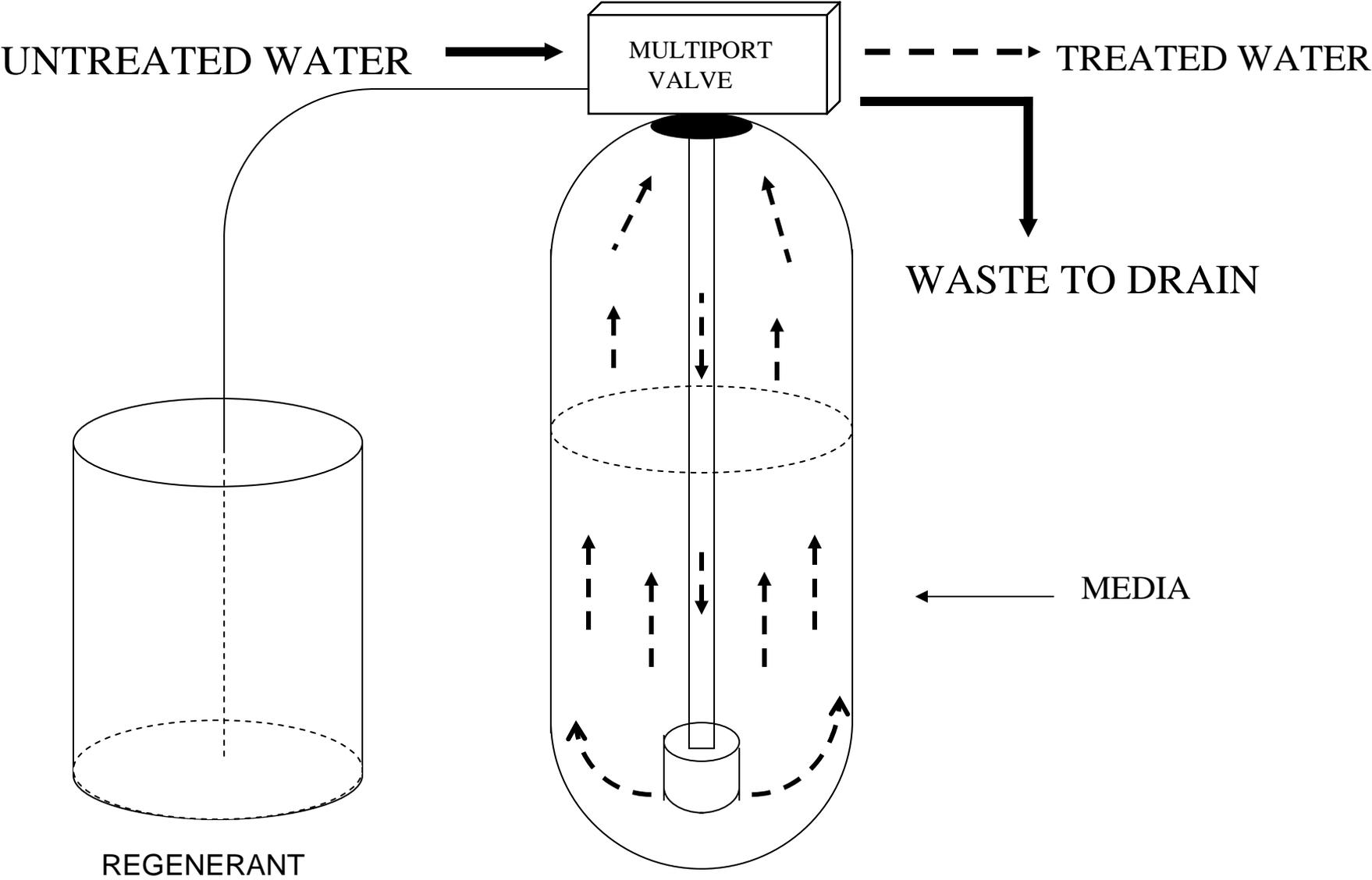
# WATER SOFTENER



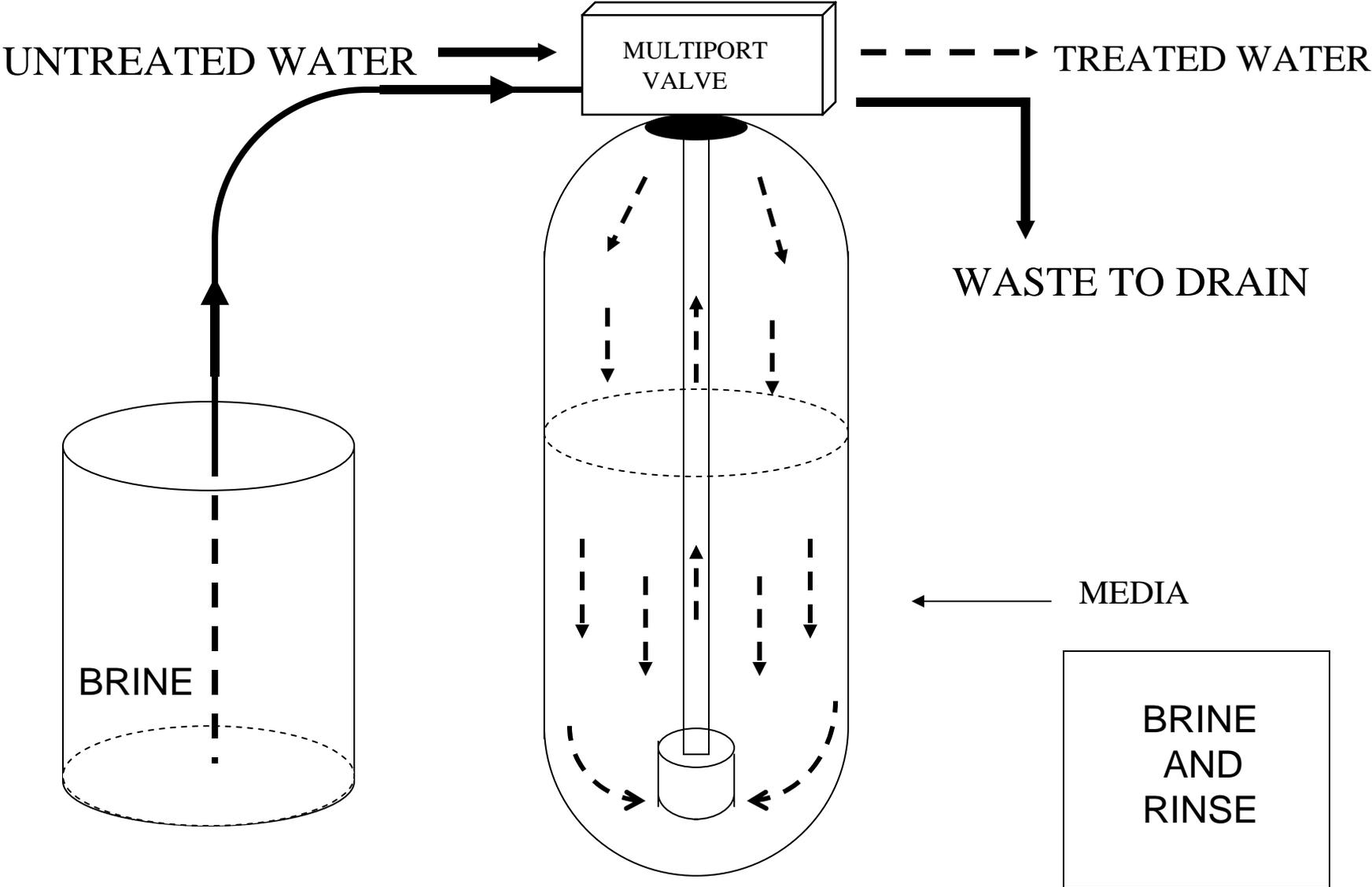
# SERVICE CYCLE



# BACKWASH CYCLE

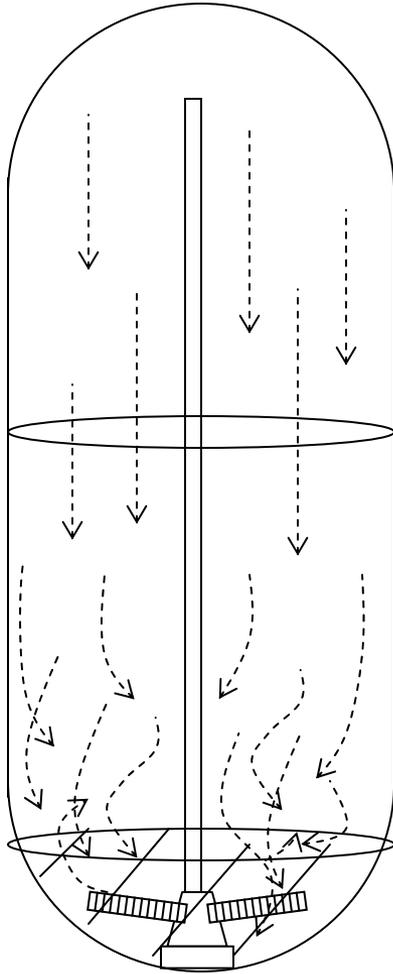


# REGENERATION CYCLE



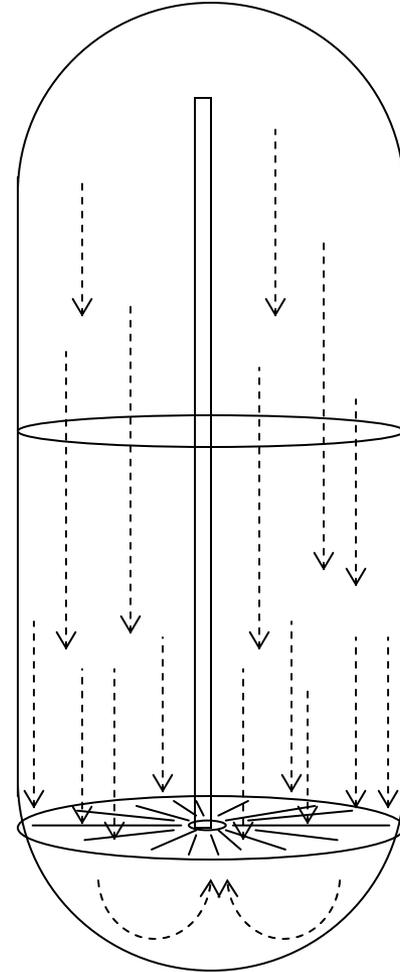
# **TANK DISTRIBUTOR**

# DISTRIBUTOR PLATE TECHNOLOGY



HUB & LATERAL WITH GRAVEL

REGENERATION  
KINETICS



DISTRIBUTOR PLATE

BACKWASH  
STANDARD VS VORTECH

FLOW  
RATE  
(GPM)

10

8

SAVINGS

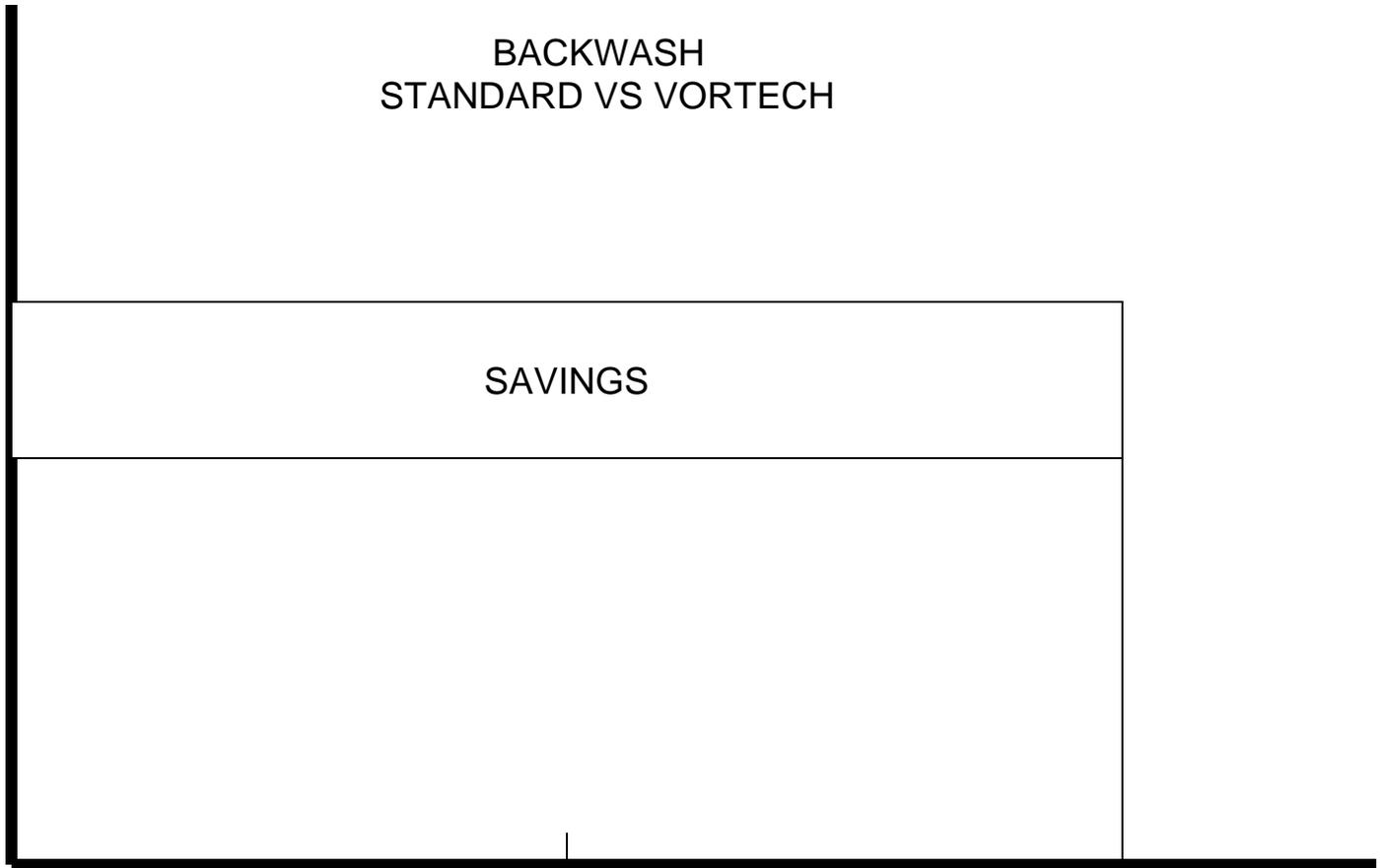
TIME

5

10

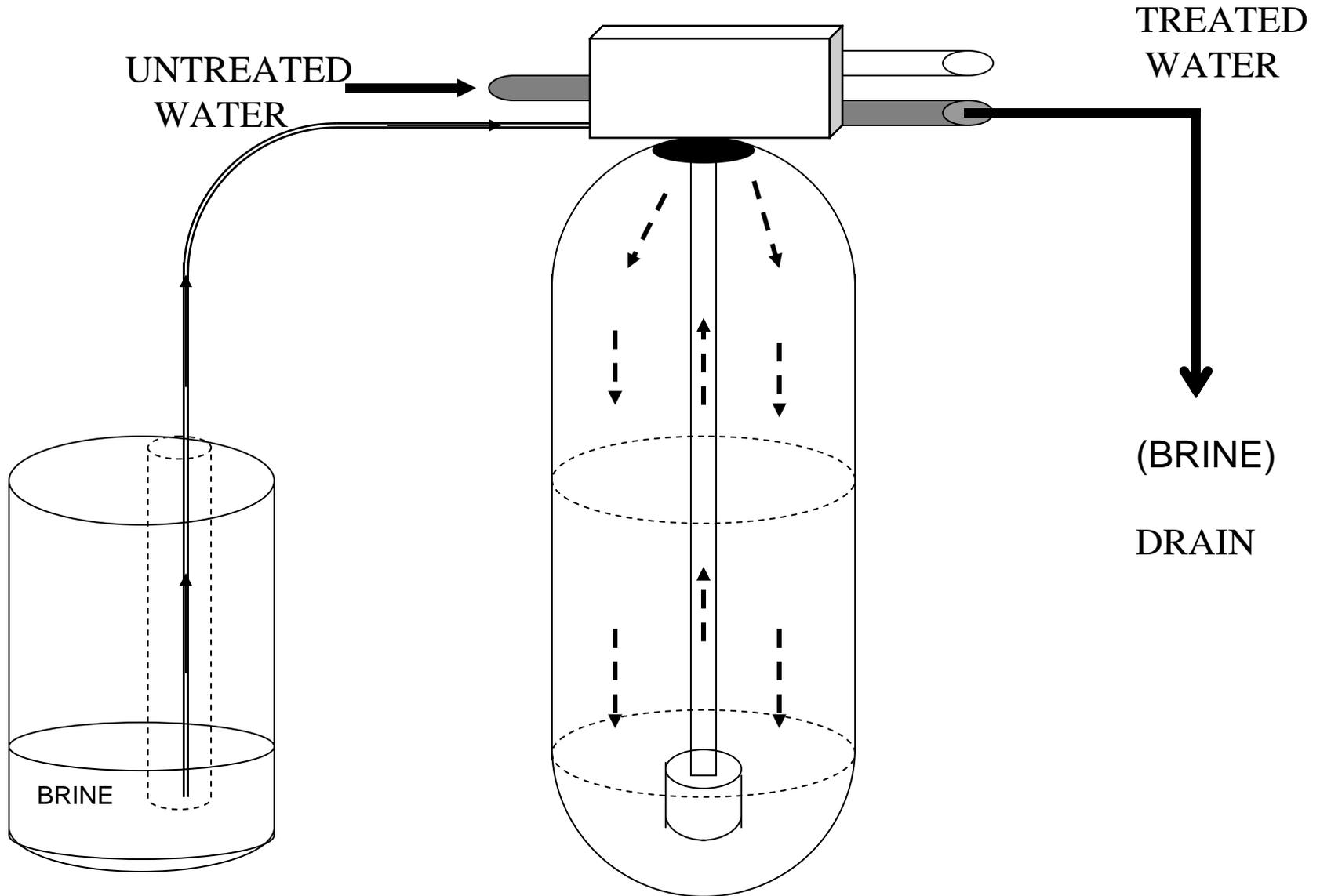
TYPICAL SAVINGS\* WITH VORTECH: 1800 GALLONS OF WATER PER YEAR

\*FAMILY OF 3 AND MEDIA FILTER

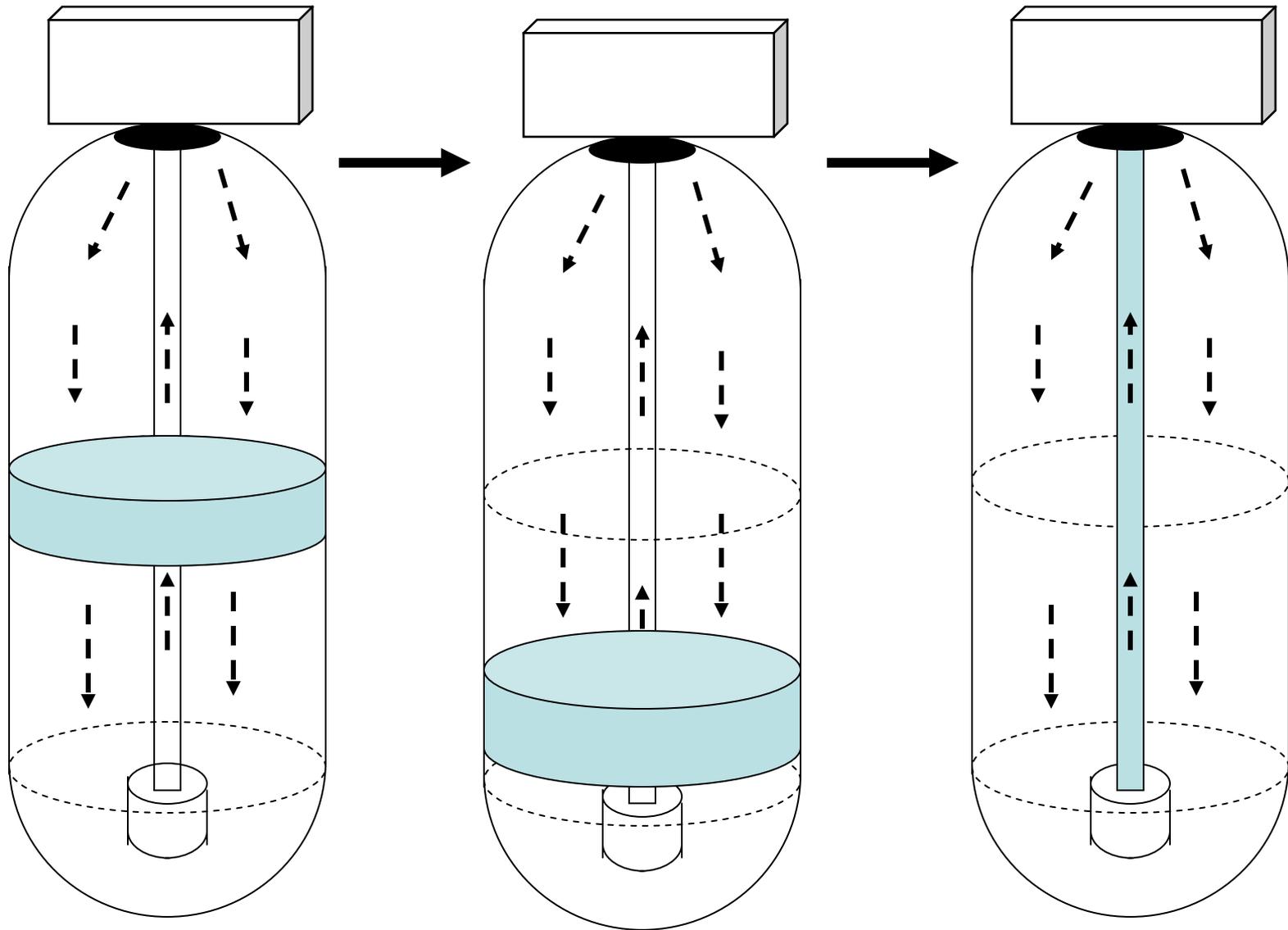


BRINING FLOW  
UP OR DOWN

# BRINE AND RINSE CYCLE

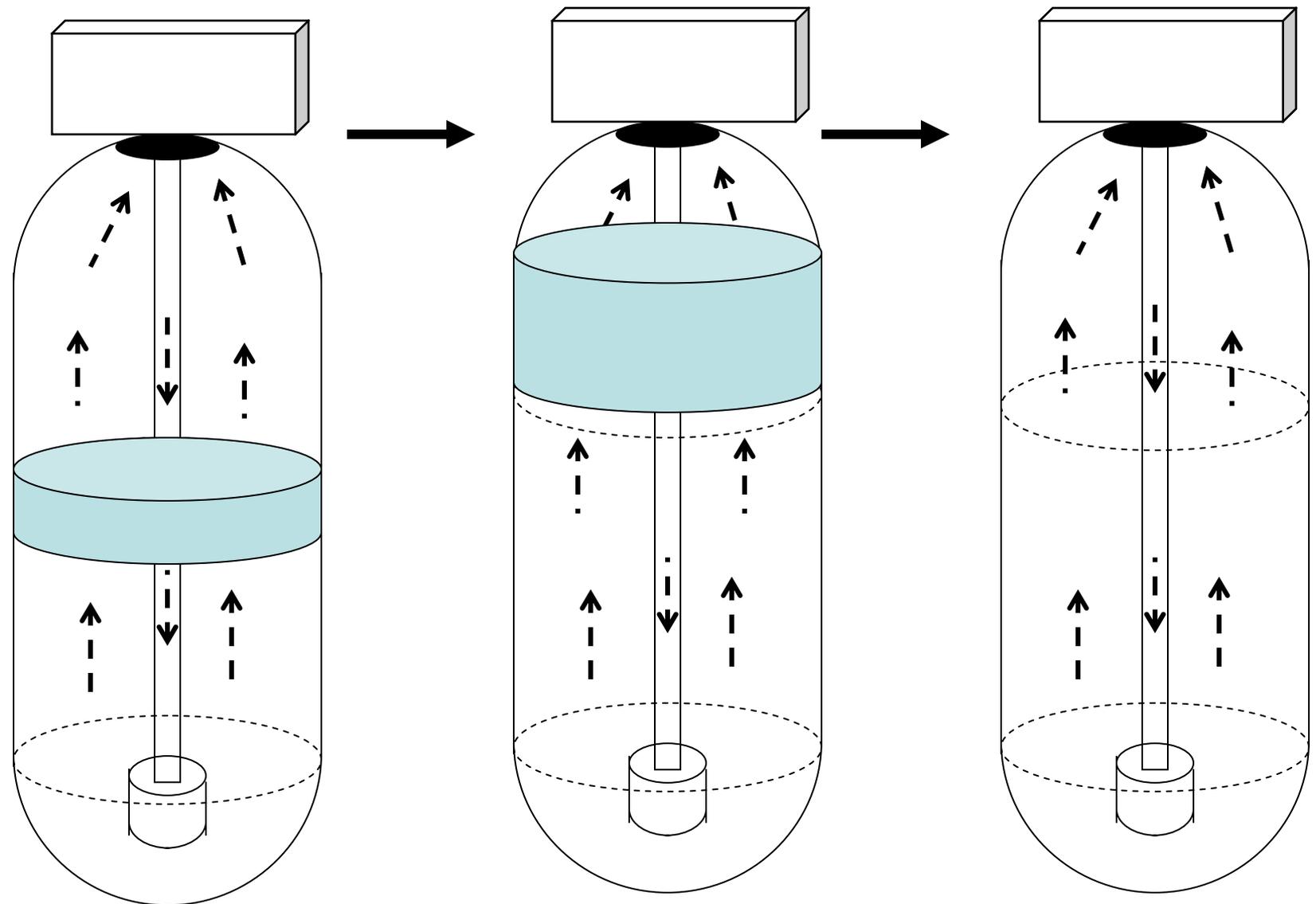


# STANDARD CO-CURRENT BRINE AND RINSE CYCLE



CONTAMINANTS PUSHED THROUGH ENTIRE BED

# COUNTER-CURRENT BRINE AND RINSE CYCLE



CONTAMINANTS LIFTED FROM BED

# **COUNTERCURRENT CAUTION!**

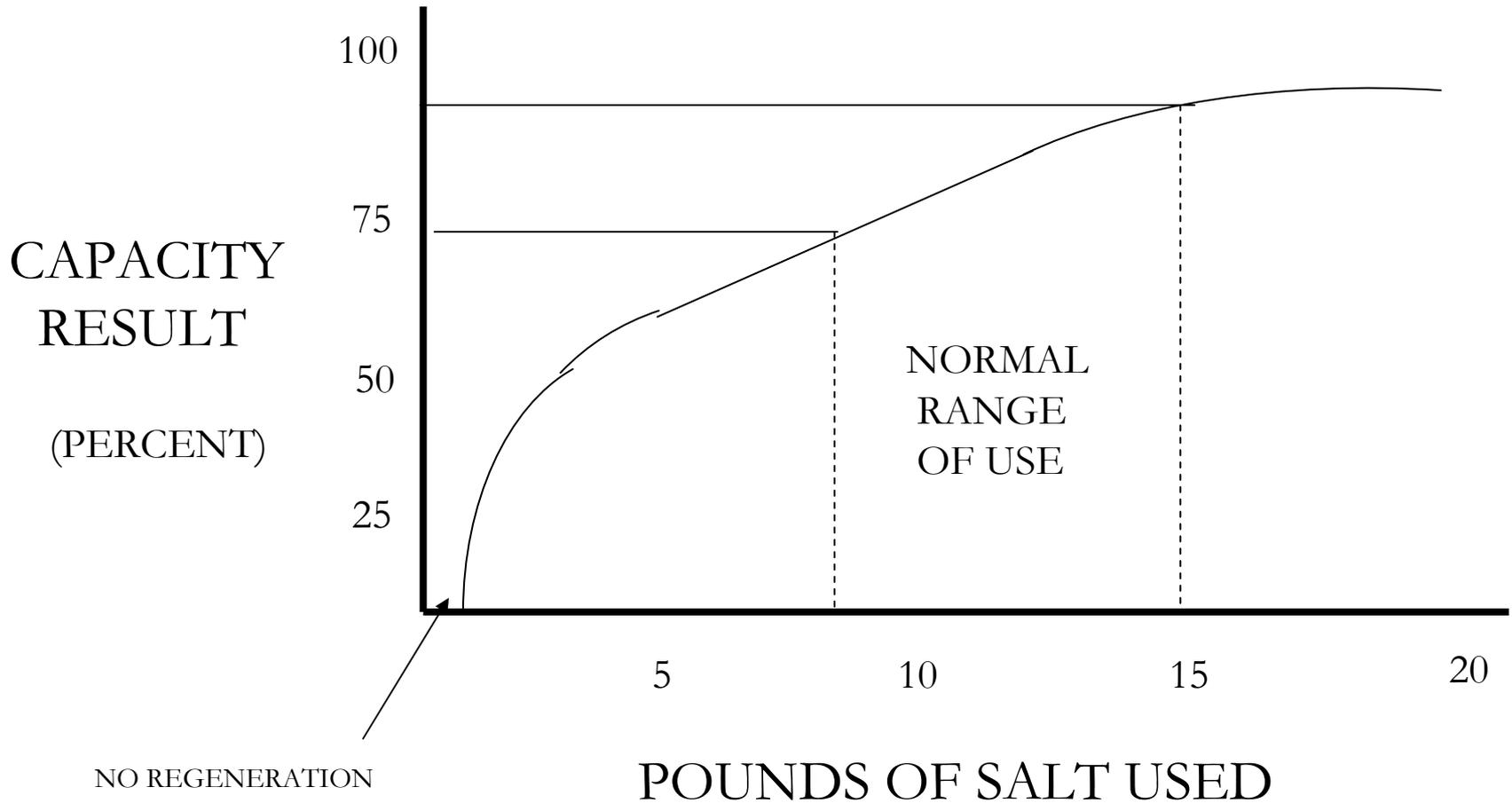
**KINETICS**

**FLUIDIZING THE BED**

**TOTAL SALT USED**

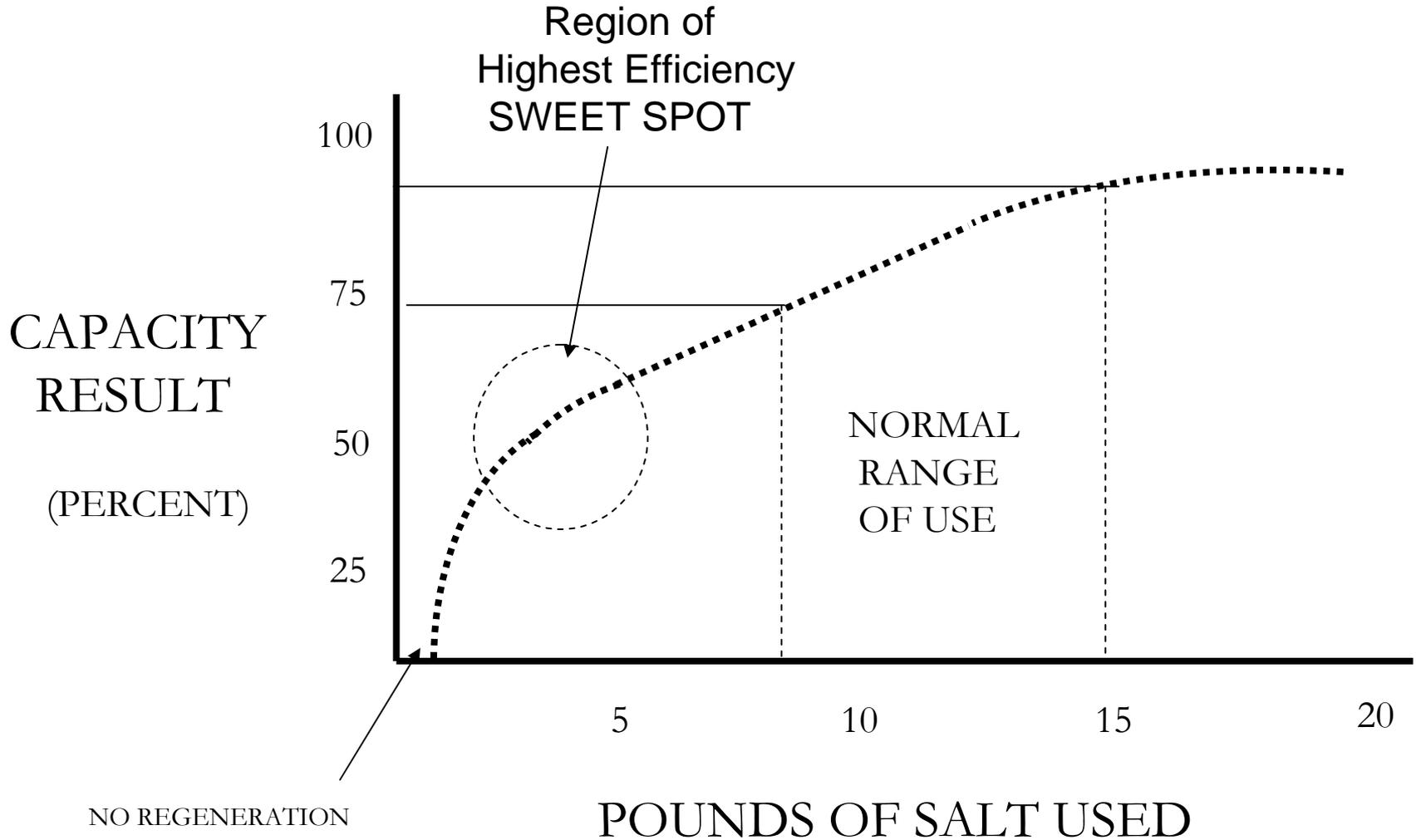
# DEGREE OF REGENERATION

BASED ON AMOUNT OF SALT PER CUBIC FOOT OF RESIN



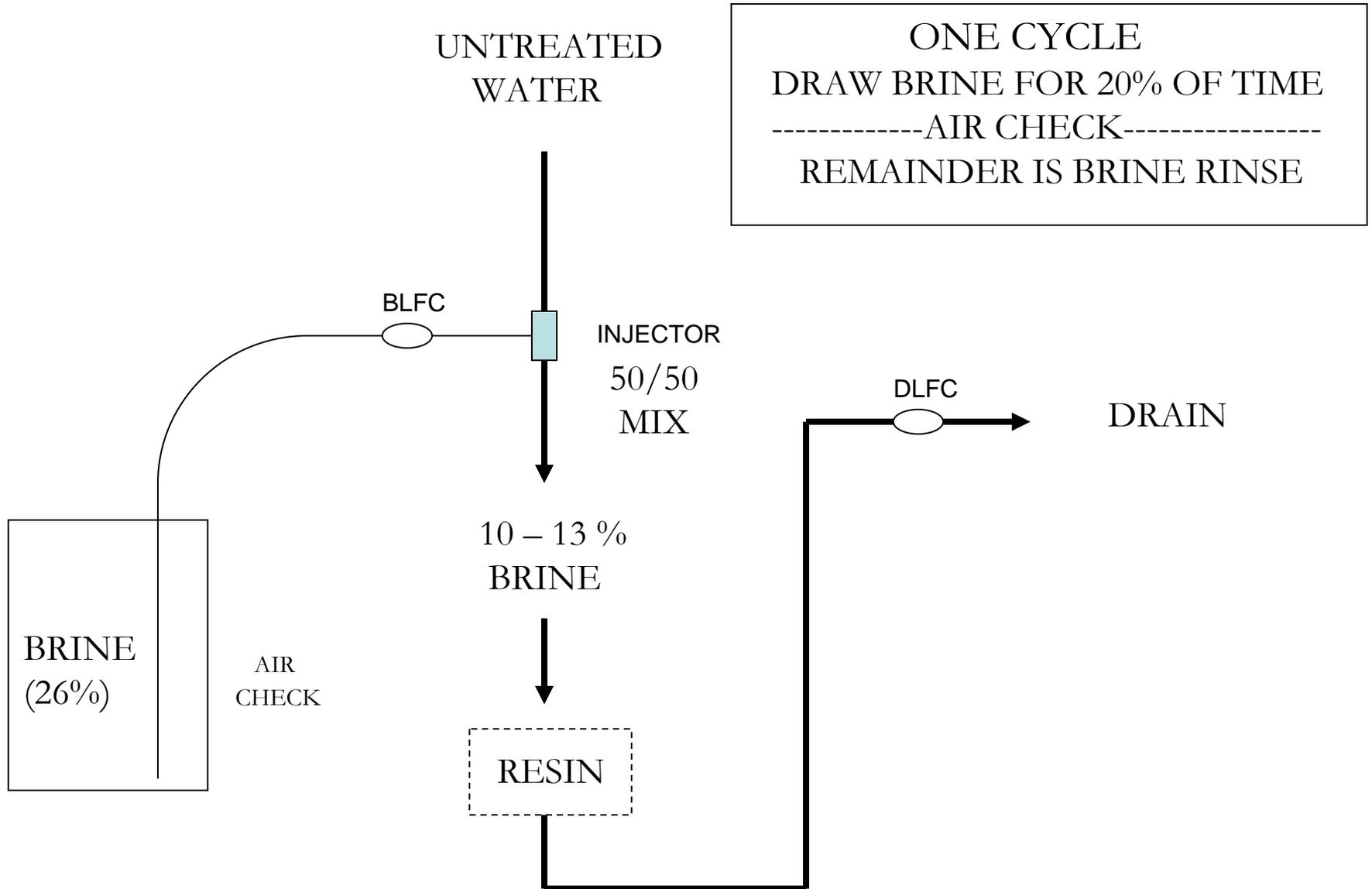
# DEGREE OF REGENERATION

BASED ON AMOUNT OF SALT PER CUBIC FOOT OF RESIN



# **BRINING (INJECTOR) FLOW RATE**

# BRINE AND RINSE



# INJECTOR SIZING

## BRINE FLOW PER SQFT

0.5 TO 0.63 GPM / SQFT FOR UPFLOW (Pentaire 7/23/08)  
BRINE DRAW FOR 15 to 30 MINUTES (Osmonics)  
BRINE DRAW FOR > 20 MINUTES (ResinTech)

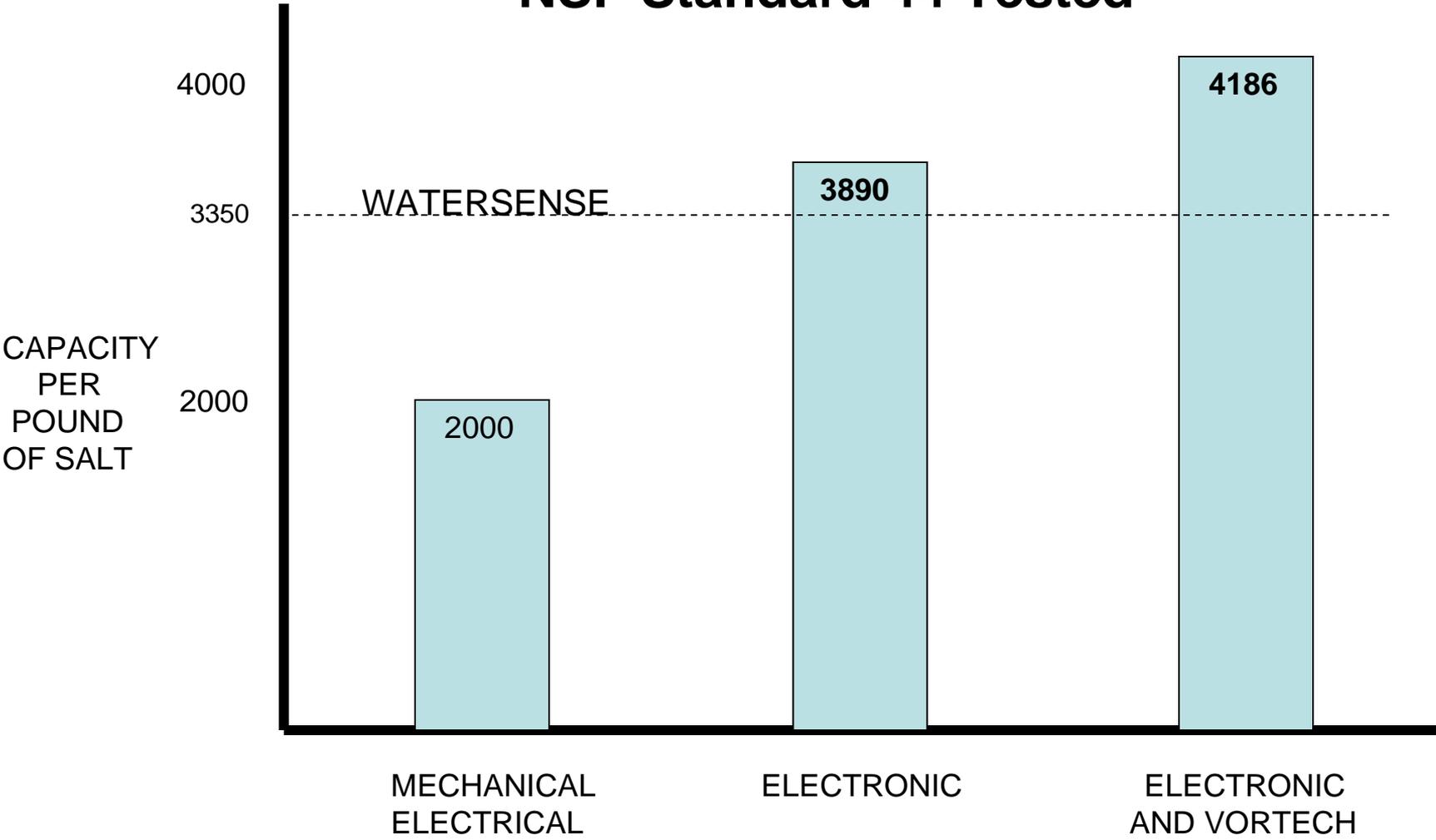
## BRINE FLOW PER CUFT

0.5 GPM / CUFT (Osmonics )  
➤ 1 GPM / CUFT (Bruner)  
0.5 TO 1.5 GPM / CUFT (ResinTech)  
0.25 TO 0.9 GPM / CUFT (Purolite)  
0.5 GPM / CUFT (Sybron)

# RESIN CAPACITY

## COMBINED ELECTRONIC AND VORTECH

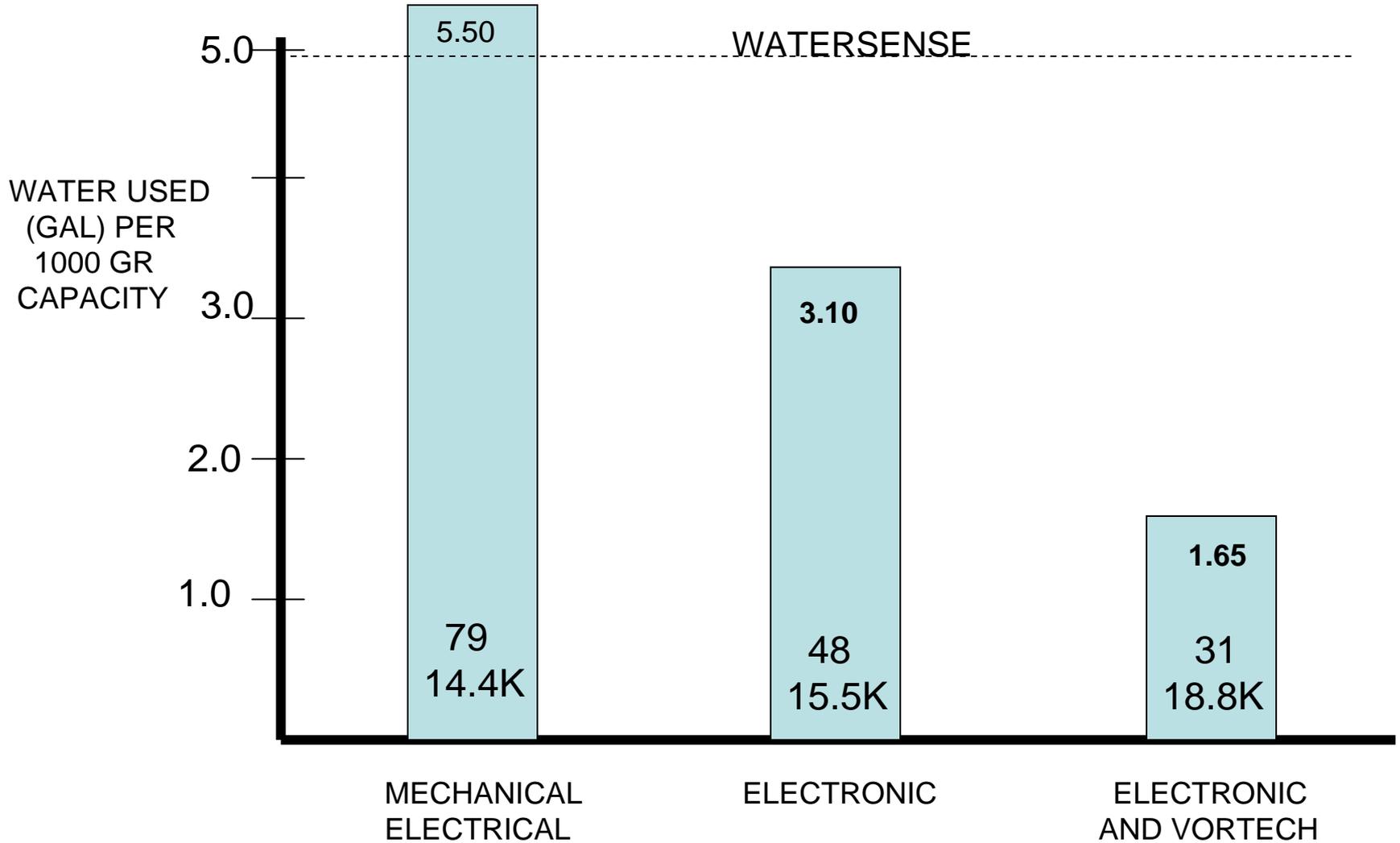
### NSF Standard 44 Tested



# WATER USAGE (3-5 lbs/cuft)

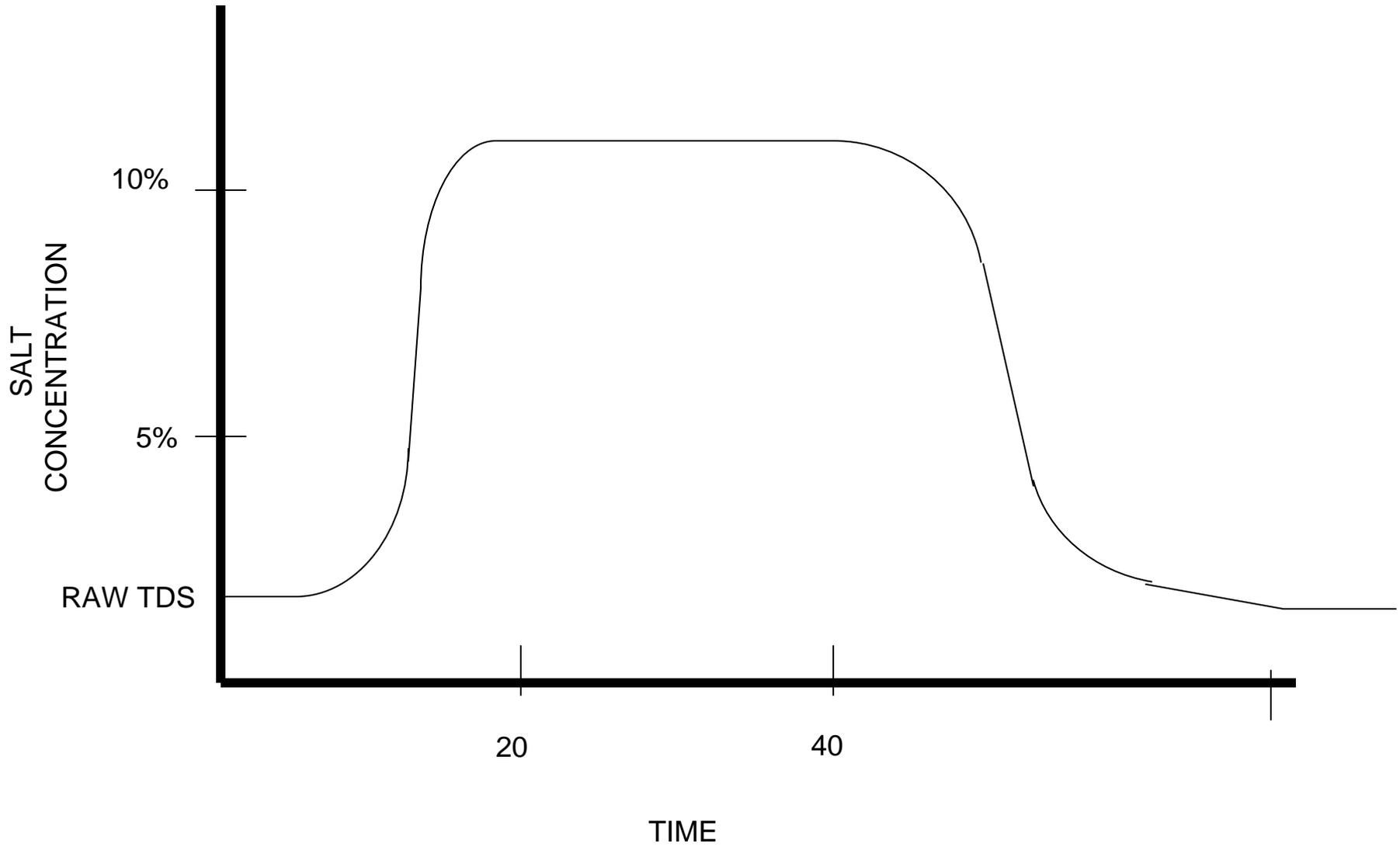
## COMBINED ELECTRONIC AND VORTECH

### NSF Standard 44 Tested

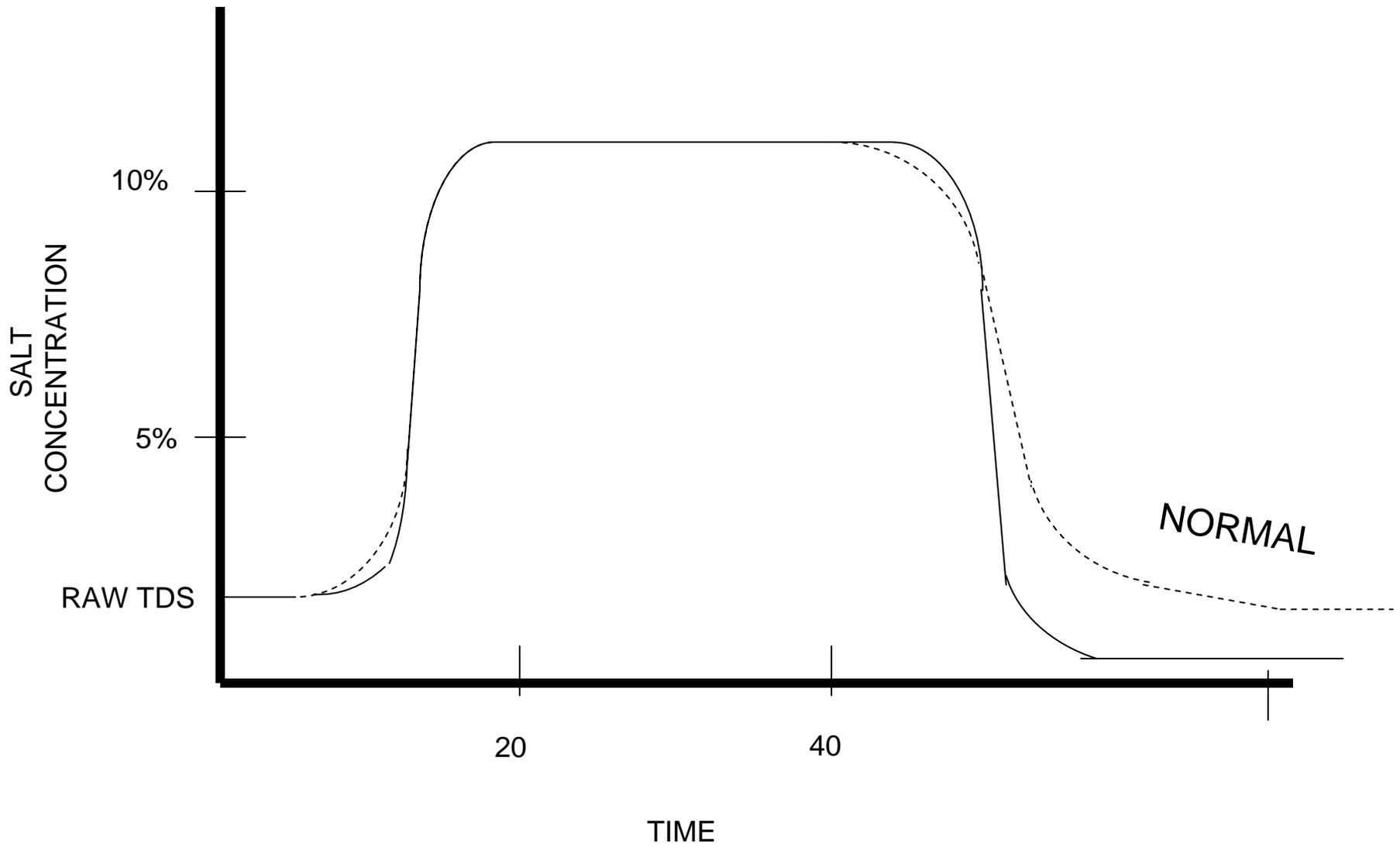


# **BRINE RECLAIM**

# “NORMAL” BRINE ELUTION CURVE

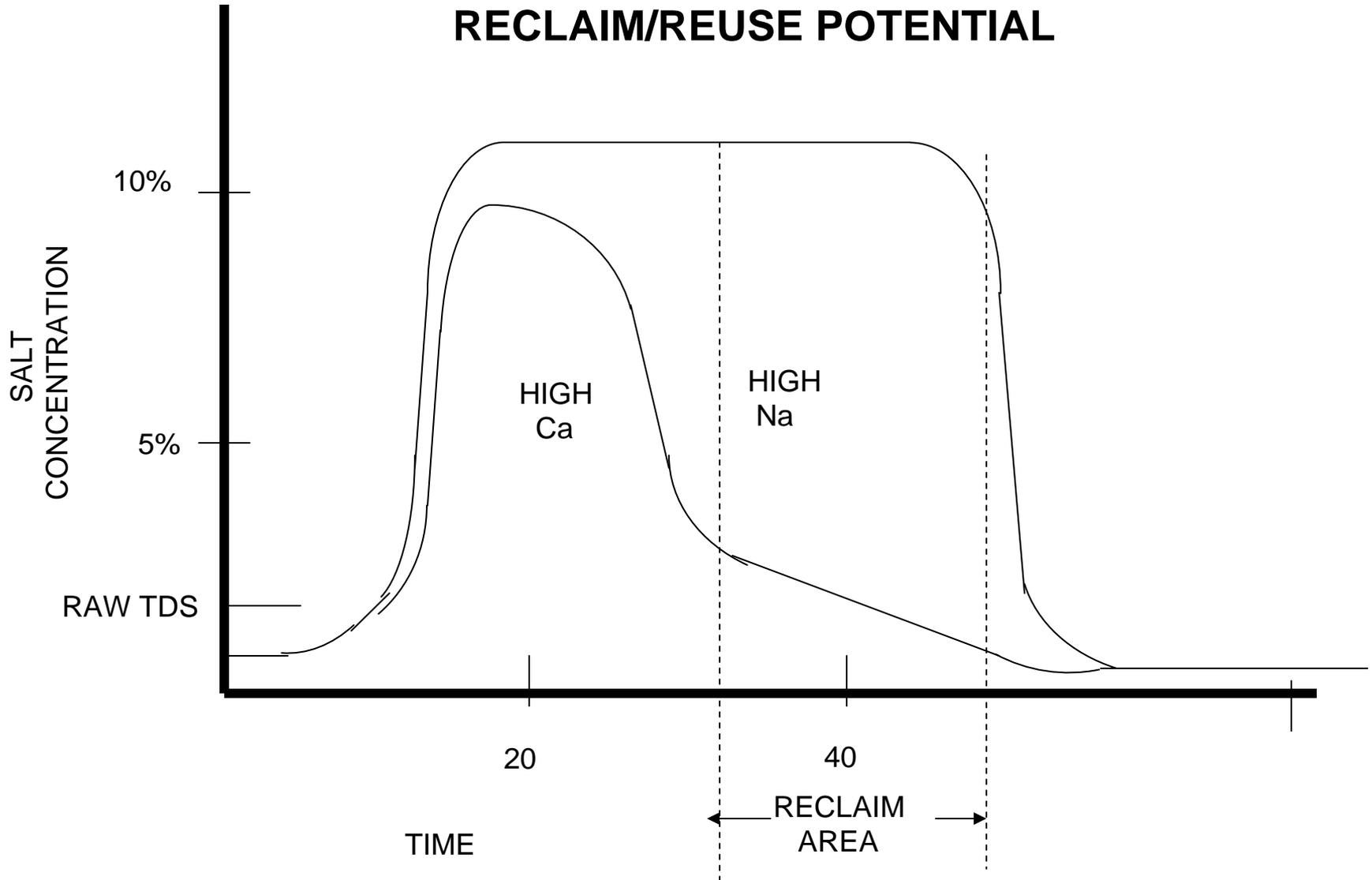


# VORTECH BRINE ELUTION CURVE



# THEORY

## VORTECH BRINE ELUTION CURVE RECLAIM/REUSE POTENTIAL



# TESTING PROTOCOL

## 3 CUFT RESIN W/VORTECH DISTRIBUTOR

### TEST #1 DECEMBER 2008:

15 LBS SALT/CUFT  
STANDARD INJECTOR

### TEST #2 MARCH, 2009

15 LBS SALT/CUFT  
YELLOW INJECTOR

### TEST #3 JULY, 2009

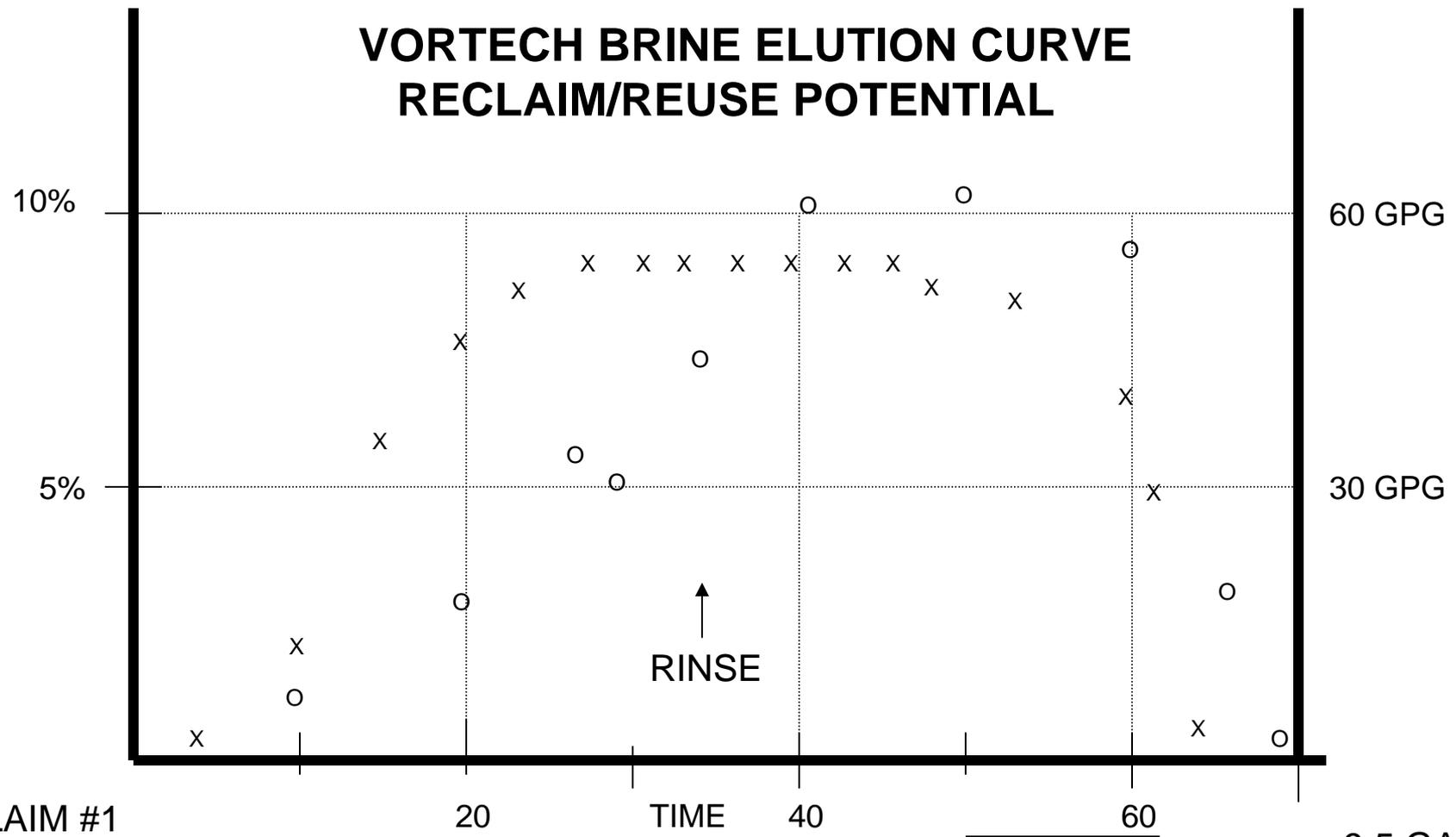
15 LBS SALT/CUFT  
YELLOW INJECTOR

# TESTING DECEMBER, 2008 (GREEN) 15 LBS SALT/CUFT RESIN

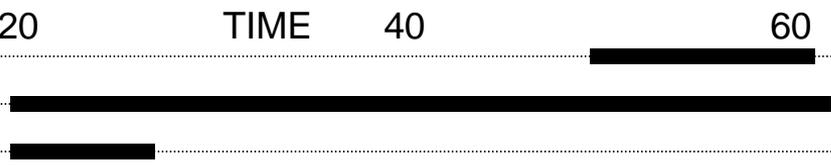
SALT  
CONCENTRATION  
(PERCENT)

HARDNESS  
CONCENTRATION  
(GPG)

## VORTECH BRINE ELUTION CURVE RECLAIM/REUSE POTENTIAL



CLAIM #1  
CLAIM #2  
CLAIM #3



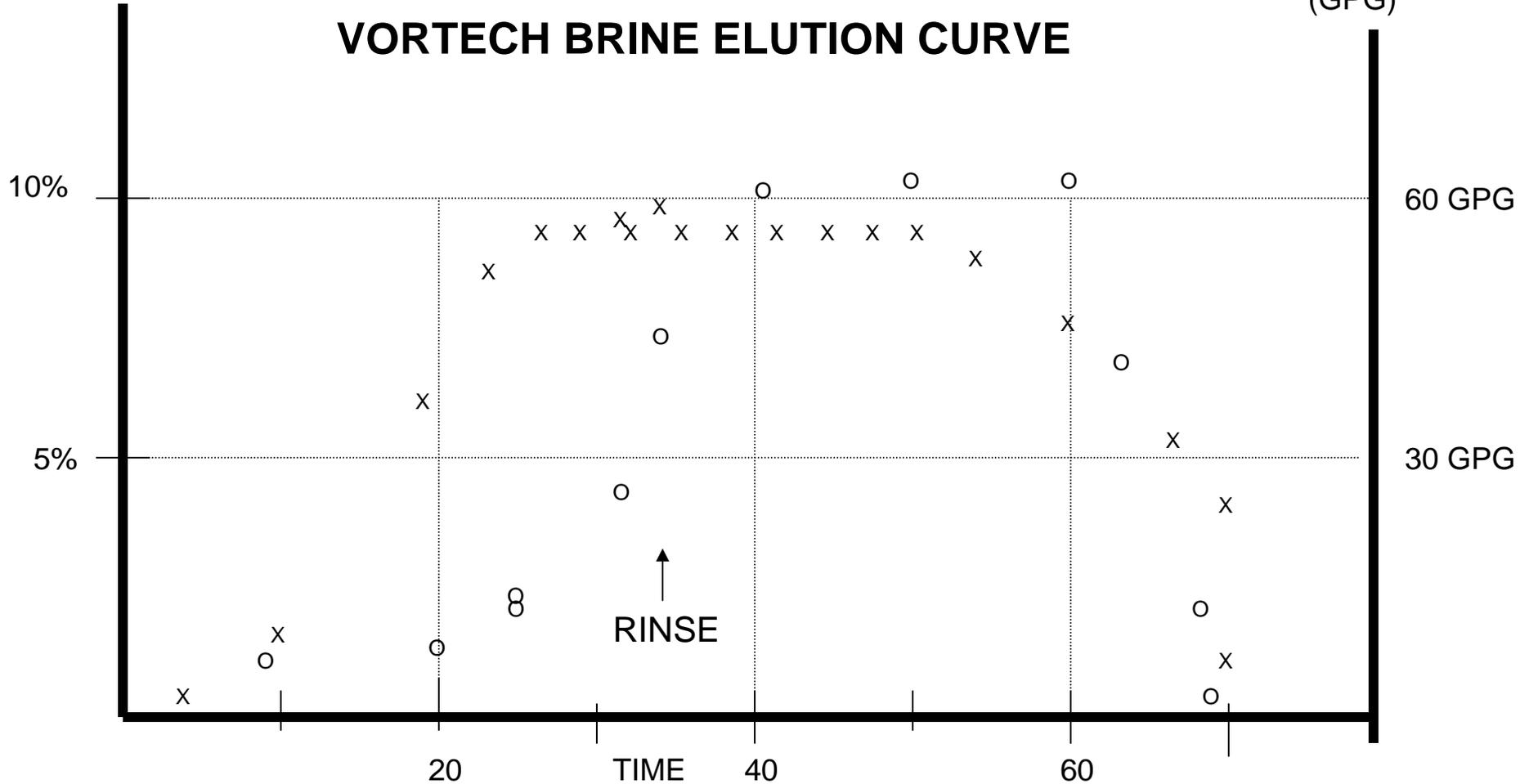
9.5 GAL  
44 GAL  
10 GAL

# TESTING MARCH, 2009 (YELLOW) 15 LBS SALT/CUFT RESIN

## VORTECH BRINE ELUTION CURVE

SALT  
CONCENTRATION  
(PERCENT)

HARDNESS  
CONCENTRATION  
(GPG)



CLAIM #1

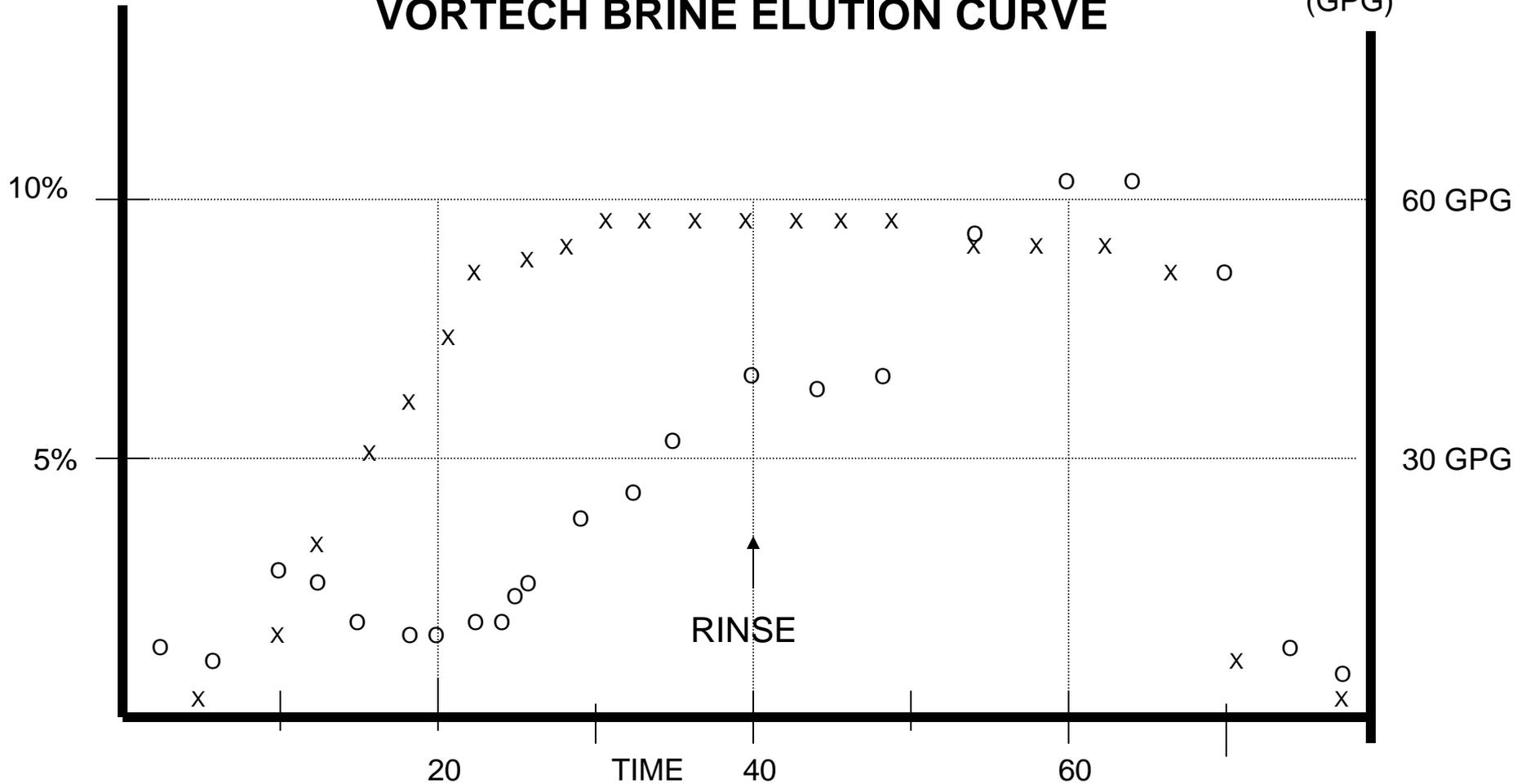
10.4 GAL  
6.9 LBS

# TESTING JULY, 2009 (YELLOW) 15 LBS SALT/CUFT RESIN

## VORTECH BRINE ELUTION CURVE

SALT  
CONCENTRATION  
(PERCENT)

HARDNESS  
CONCENTRATION  
(GPG)



CLAIM #1

10.4 GAL  
6.9 LBS

# RECLAIM POTENTIAL

| TEST<br>AREA | GALLONS<br>RECLAIM | POUNDS<br>NaCl<br><b>REUSED</b> | PPM<br>HARDNESS<br>CARRIED |
|--------------|--------------------|---------------------------------|----------------------------|
| 1            | 9.48               | 5.78                            | 68                         |
| 2            | 10.1               | 6.6                             | 24                         |
| 3            | 10.4               | 6.9                             | 10                         |

TOTAL BRINE: 15 GALLONS

# RAW WATER CHARACTER

IRON                      Higher Salt Dose Needed

TDS                      Less Capacity Achieved

# EFFECT OF TDS UPON CAPACITY

