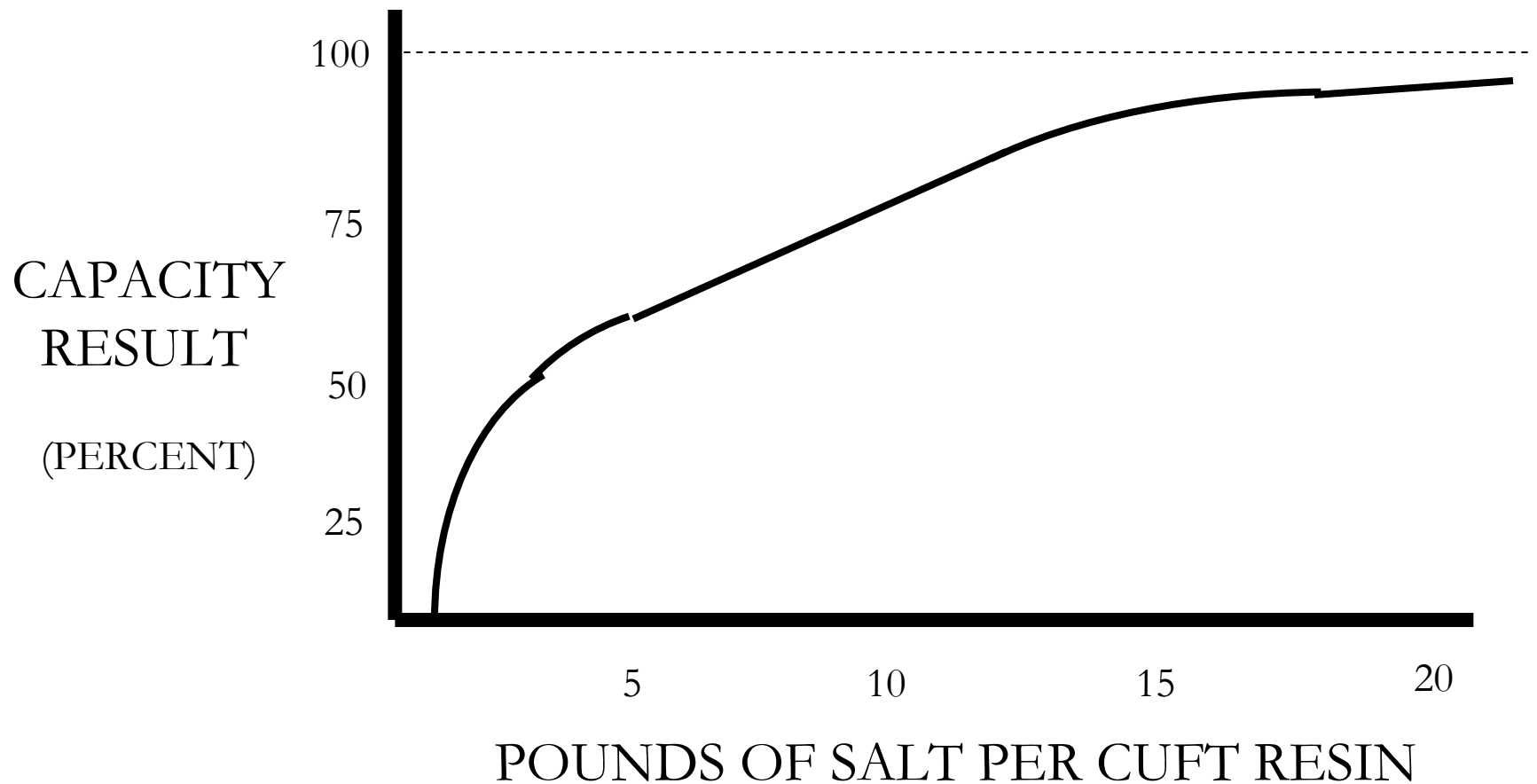


EXPLORING THE BRINE ENVELOPE

MARYLAND GROUND WATER SYMPOSIUM
SEPTEMBER, 2009

THE BRINE ENVELOPE



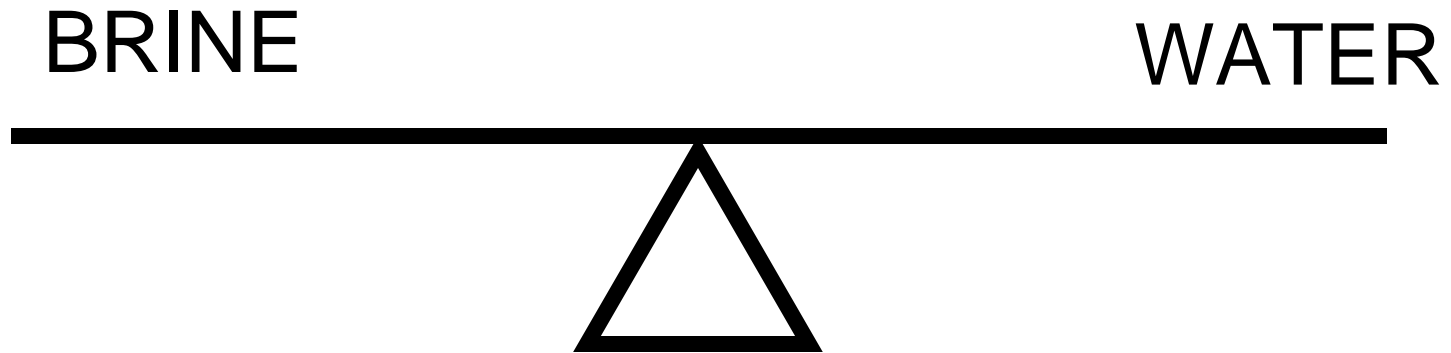
WHY?

WEST COAST WATER AND TDS CONCERNS

EAST COAST ON-SITE BRINE CONCERNS

WATERSENSE PROGRAM

STRATEGY SELECTION



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 EFFIEIENCY: NOT MORE THAN 5 GALLONS OF WATER
PER 1000 GRAINS OF CAPACITY.

VARIABLES:

RESIN TYPE

DISTRIBUTOR TYPE (KINETICS)

UPFLOW / DOWNFLOW BRINING

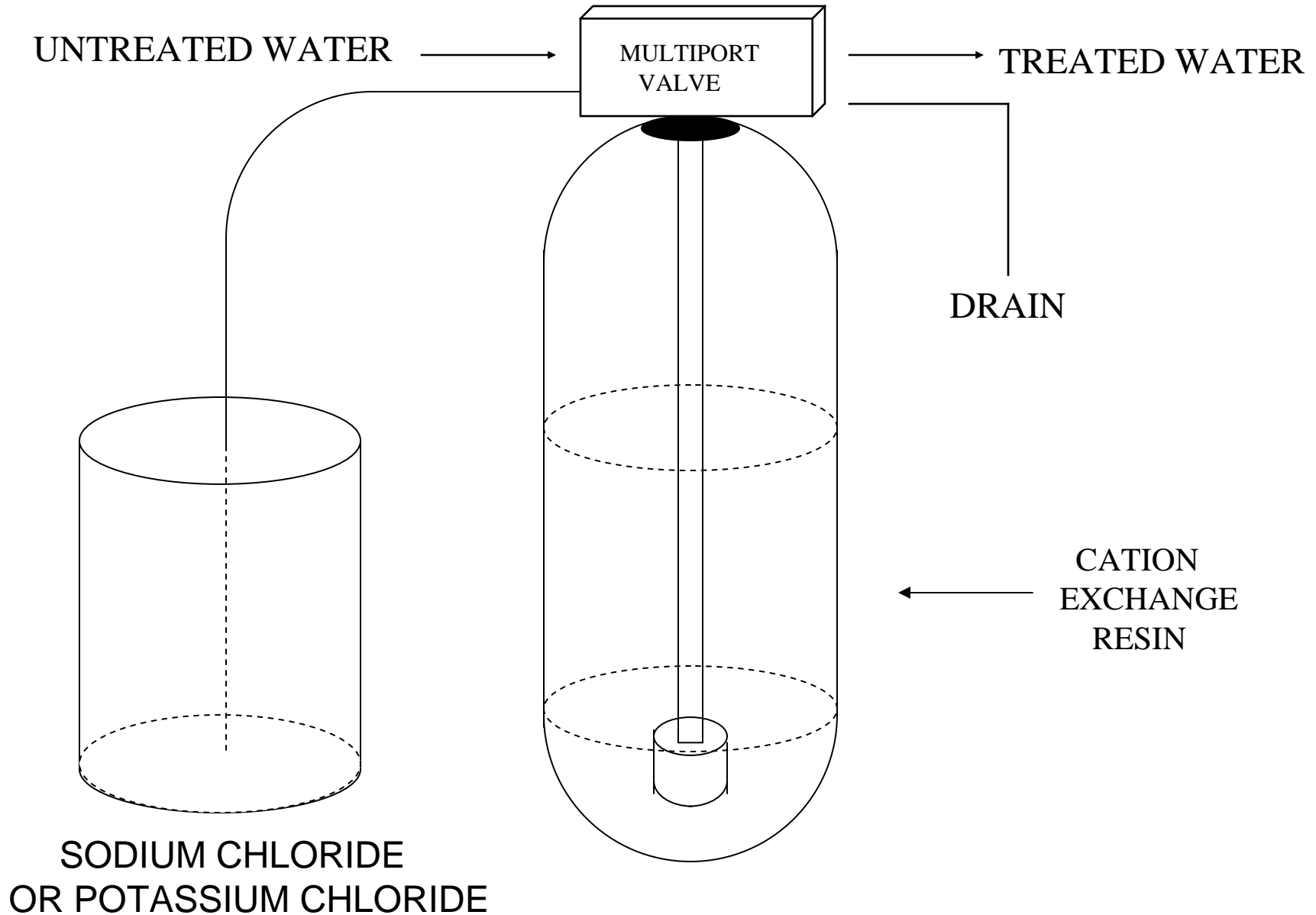
SALTING LEVEL (POUNDS PER CUFT)

INJECTOR RATES (KINETICS)

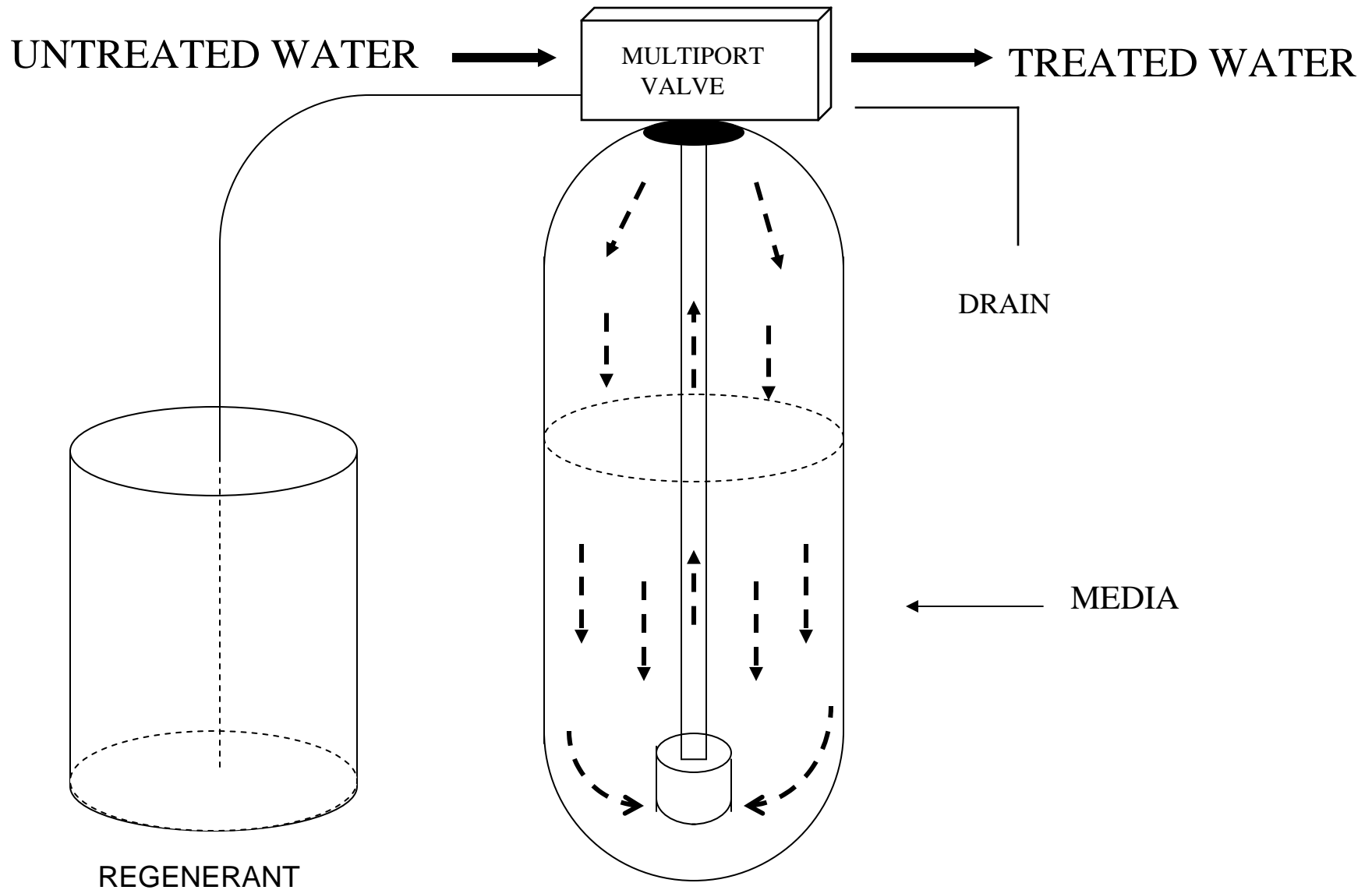
RECLAIM POTENTIAL

RAW WATER CHARACTER

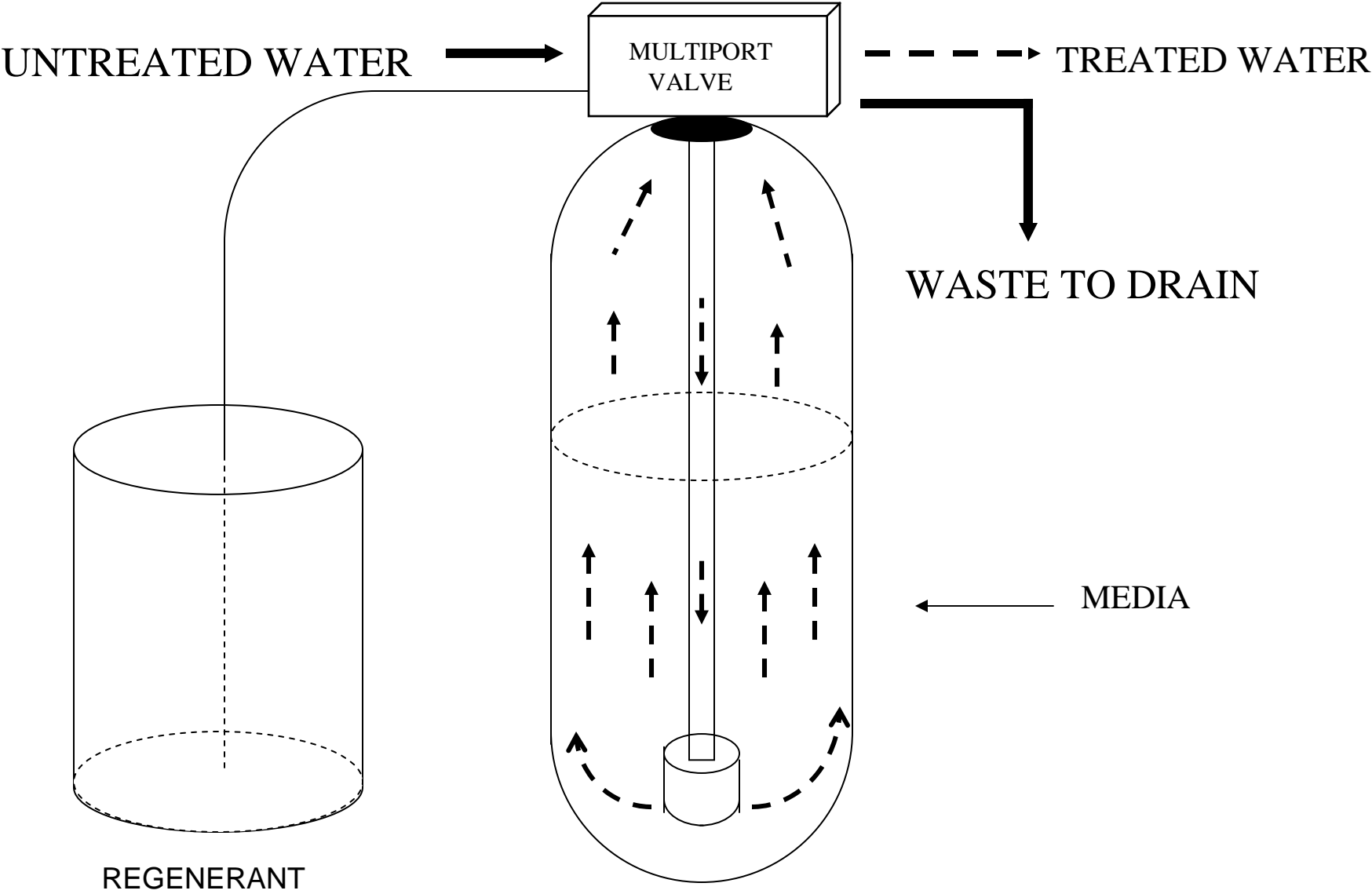
WATER SOFTENER



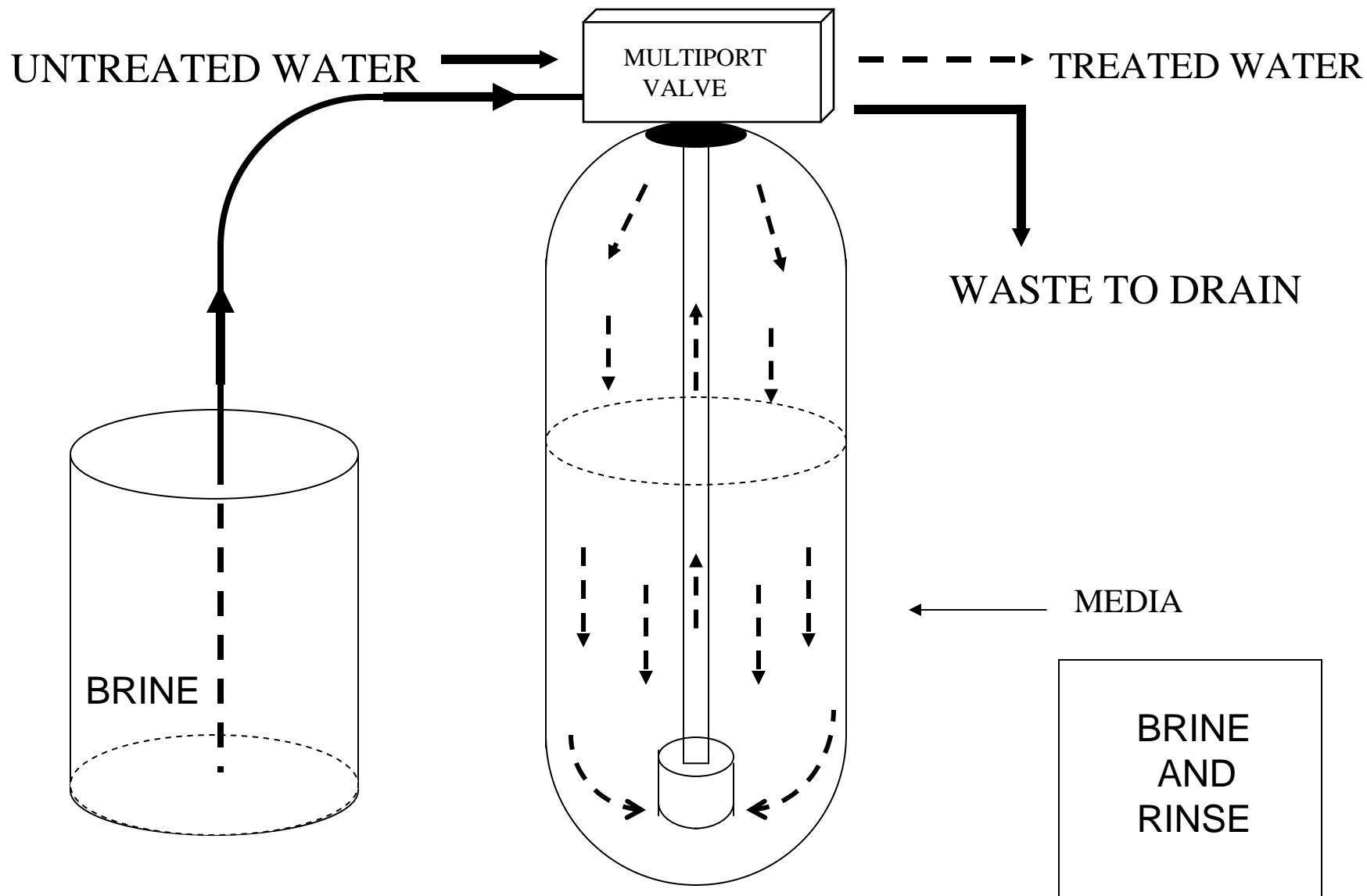
SERVICE CYCLE



BACKWASH CYCLE

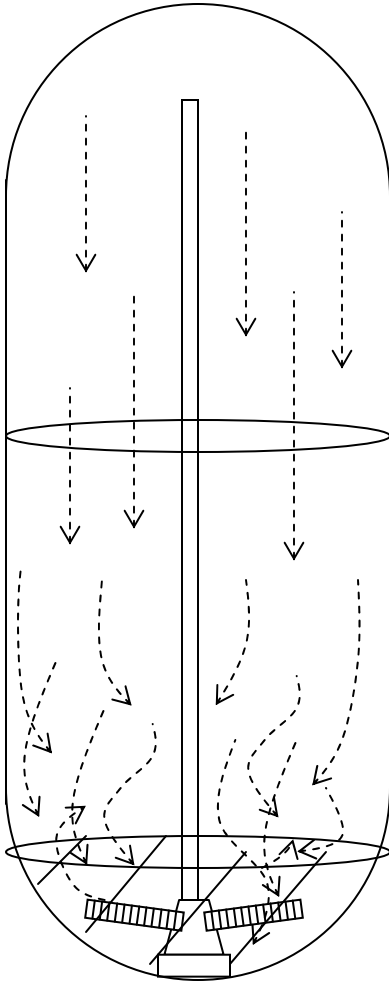


REGENERATION CYCLE



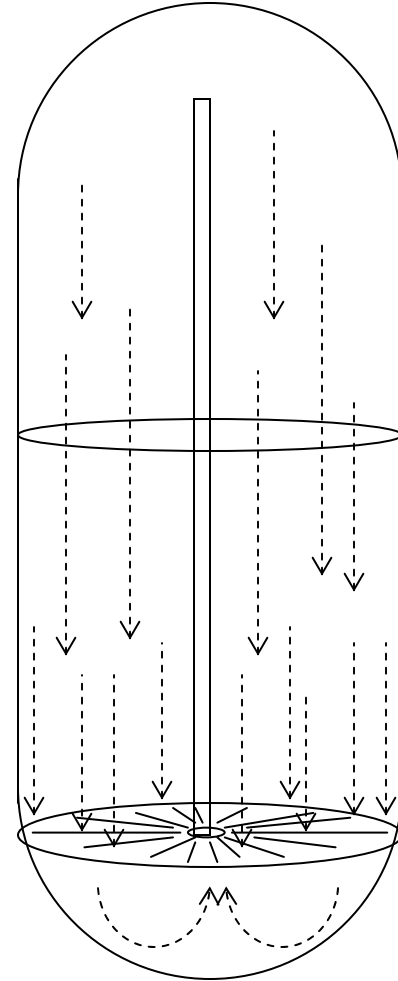
TANK DISTRIBUTOR

DISTRIBUTOR PLATE TECHNOLOGY



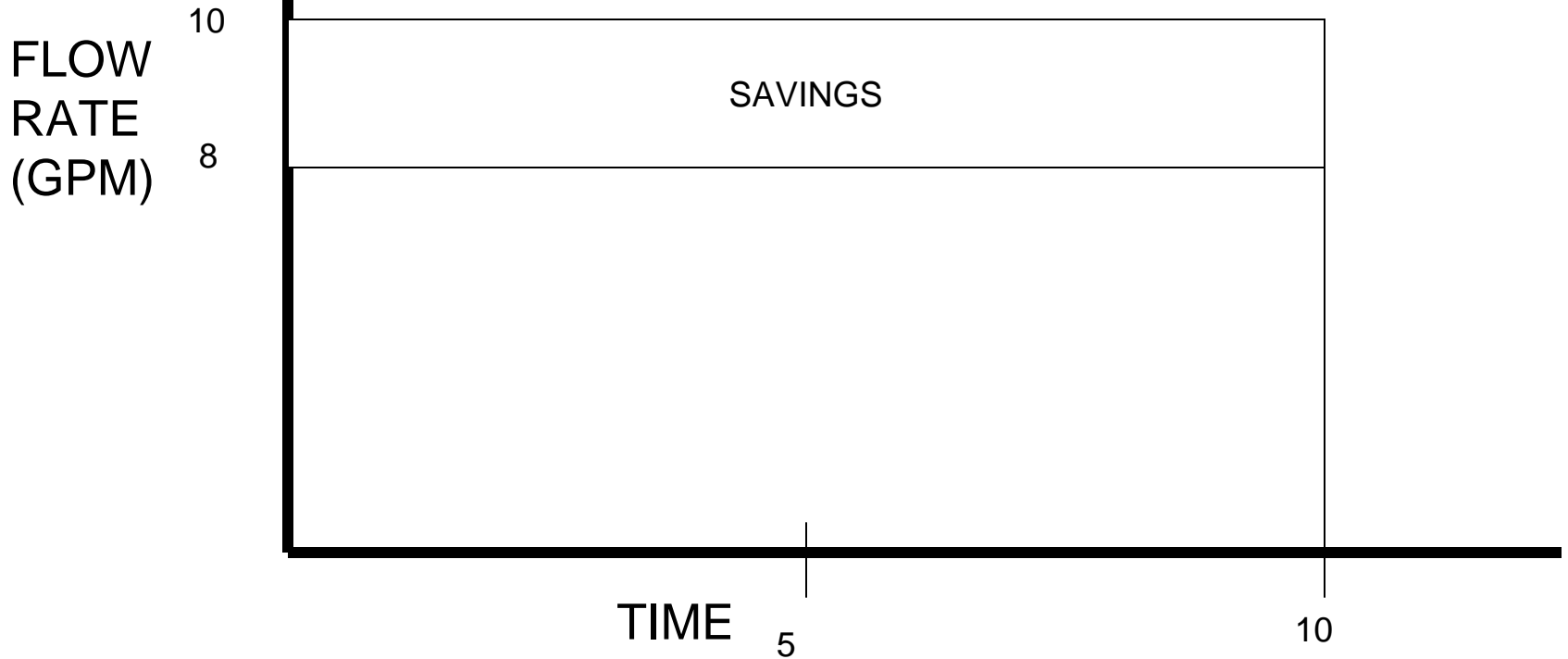
HUB & LATERAL WITH GRAVEL

REGENERATION
KINETICS



DISTRIBUTOR PLATE

BACKWASH STANDARD VS VORTECH

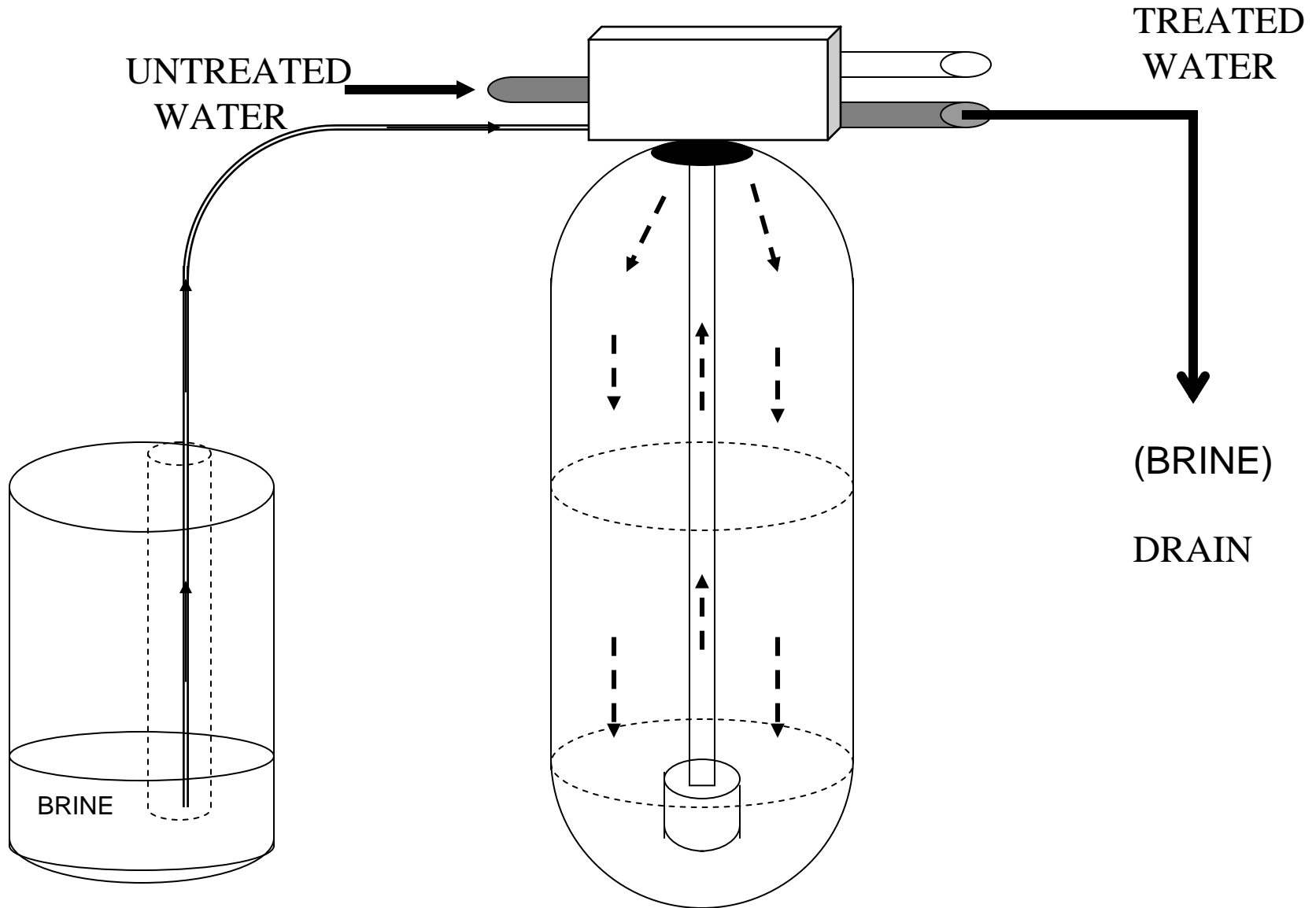


TYPICAL SAVINGS* WITH VORTECH: 1800 GALLONS OF WATER PER YEAR

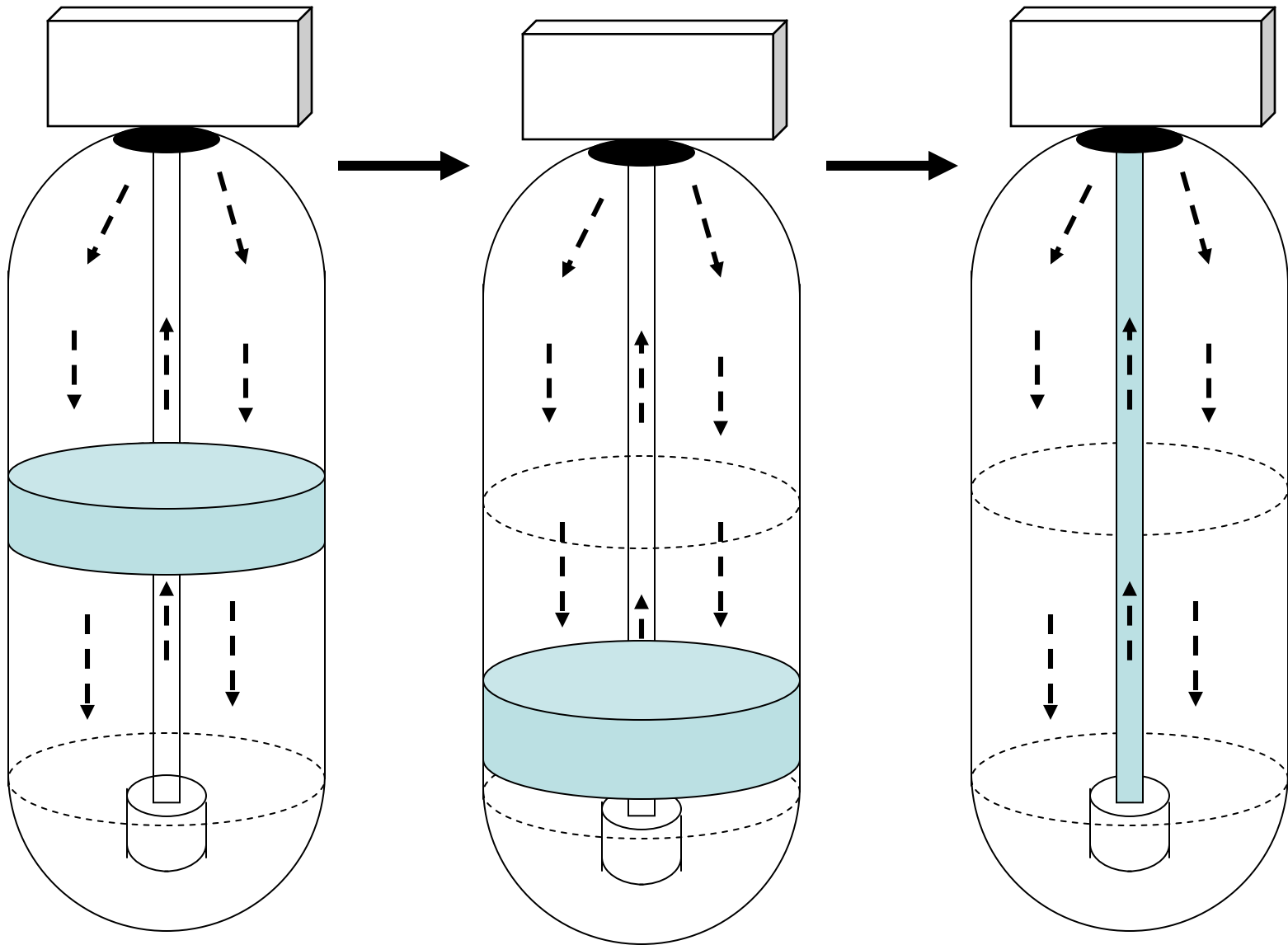
*FAMILY OF 3 AND MEDIA FILTER

BRINING FLOW
UP OR DOWN

BRINE AND RINSE CYCLE

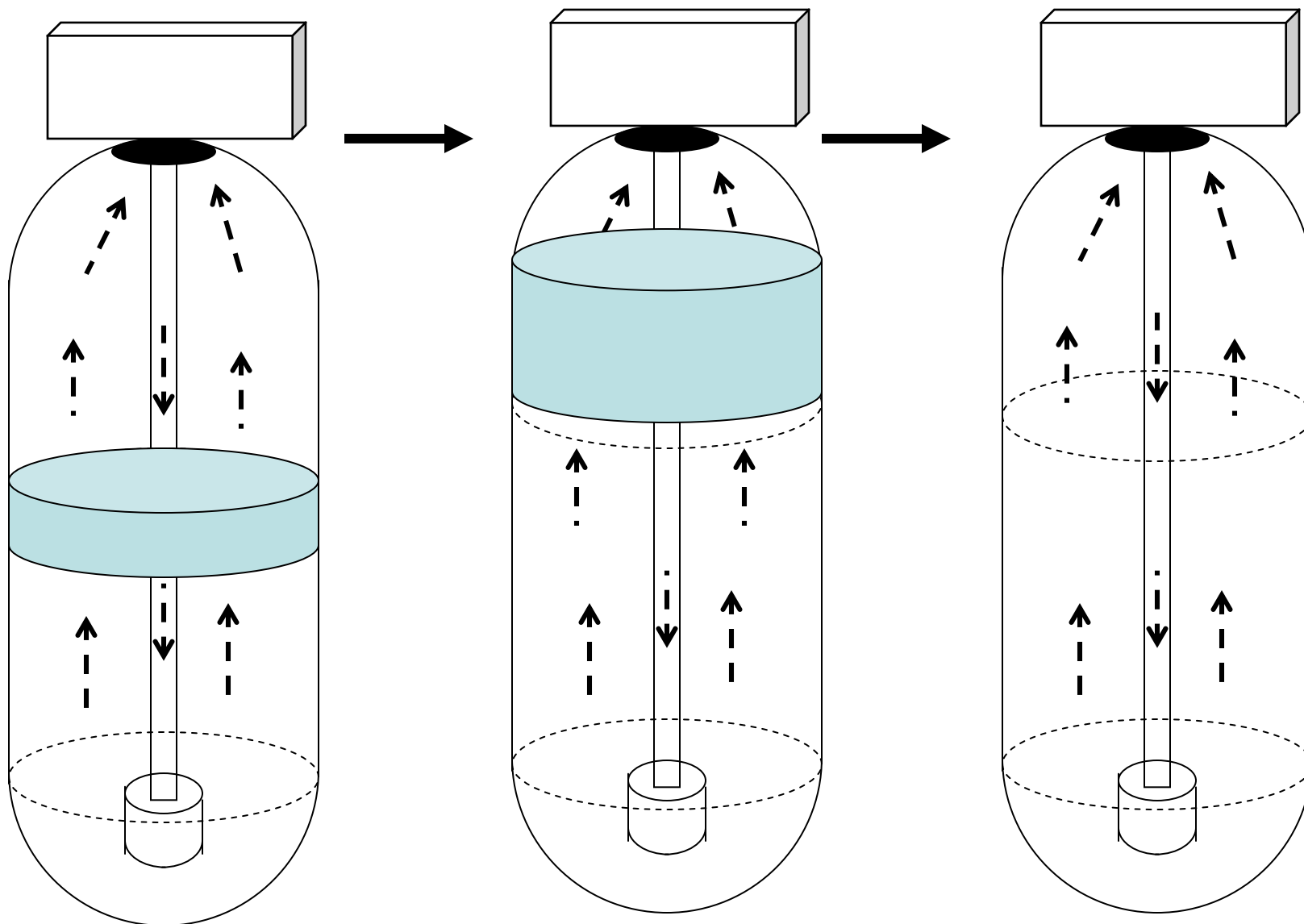


STANDARD CO-CURRENT BRINE AND RINSE CYCLE



CONTAMINANTS PUSHED THROUGH ENTIRE BED

COUNTER-CURRENT BRINE AND RINSE CYCLE



CONTAMINANTS LIFTED FROM BED

COUNTERCURRENT CAUTION!

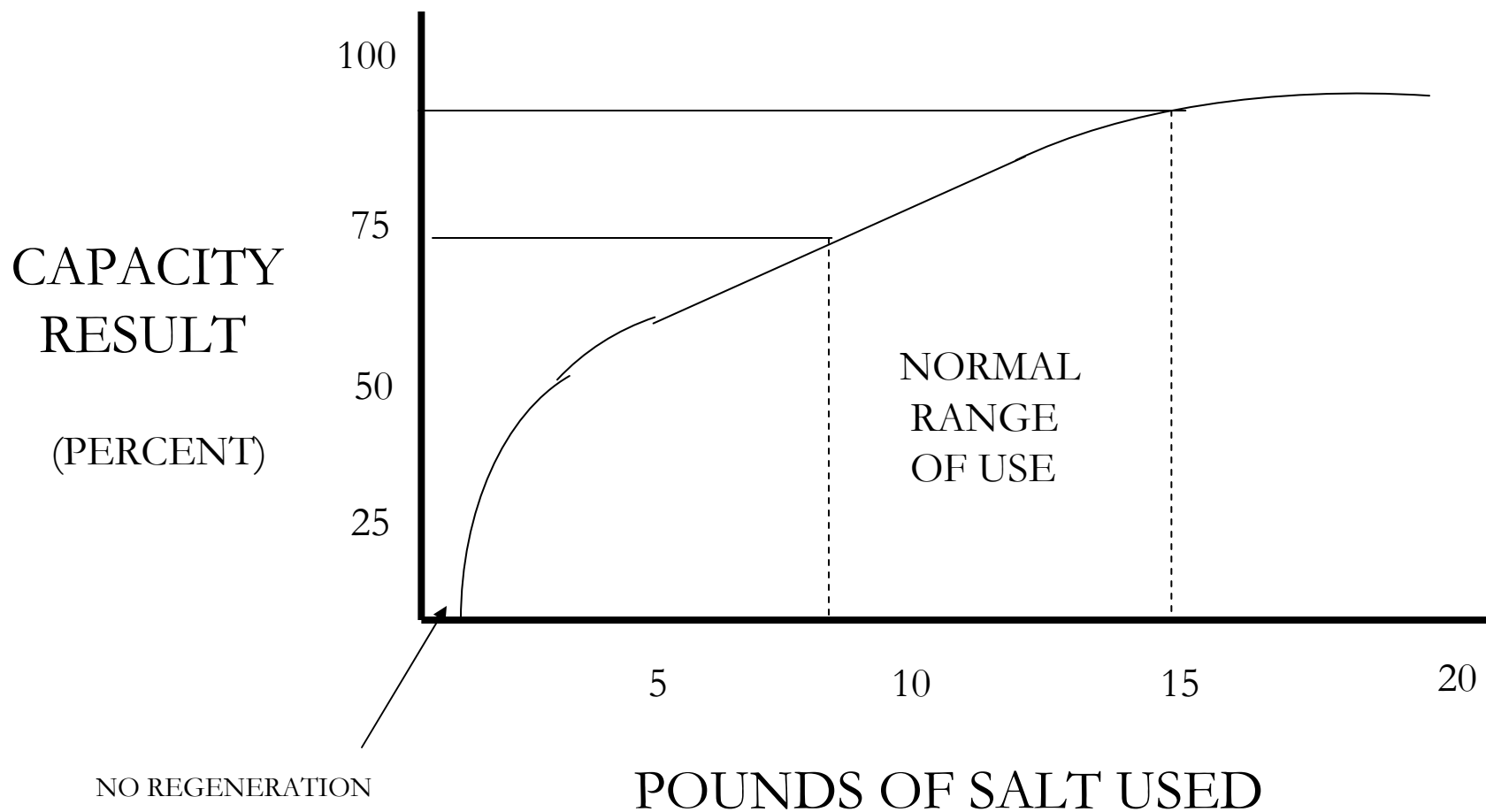
KINETICS

FLUIDIZING THE BED

TOTAL SALT USED

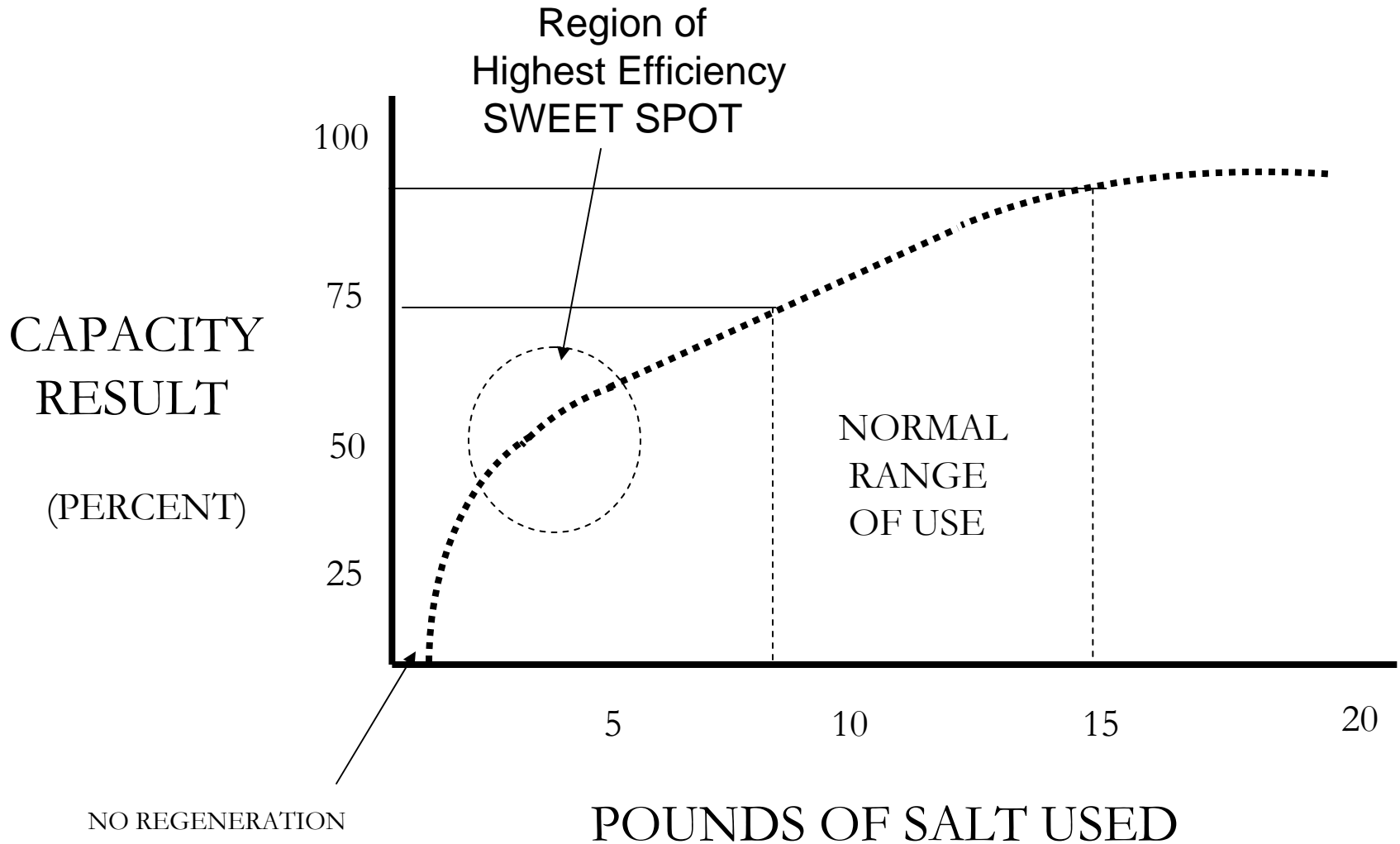
DEGREE OF REGENERATION

BASED ON AMOUNT OF SALT PER CUBIC FOOT OF RESIN



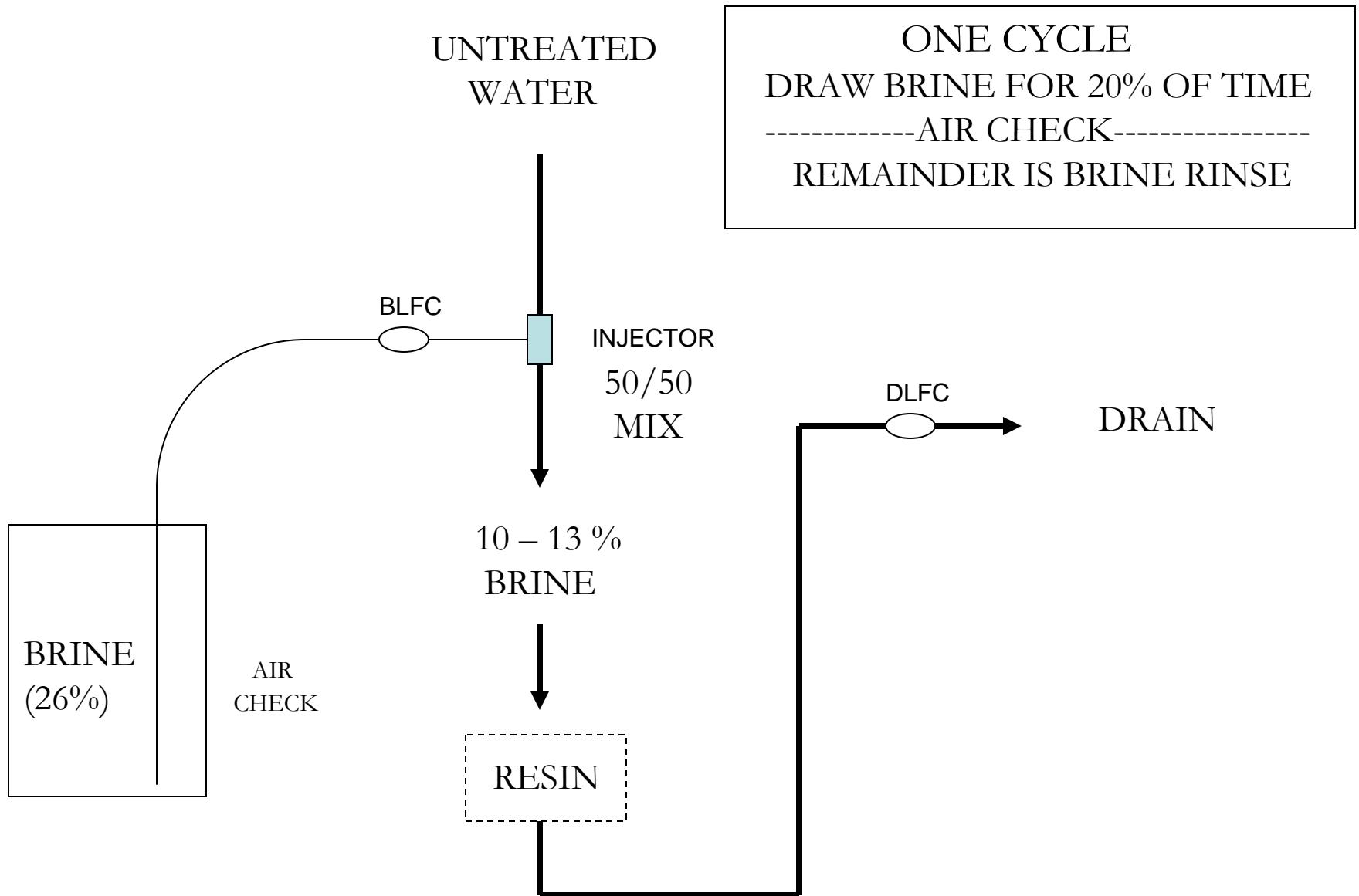
DEGREE OF REGENERATION

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)

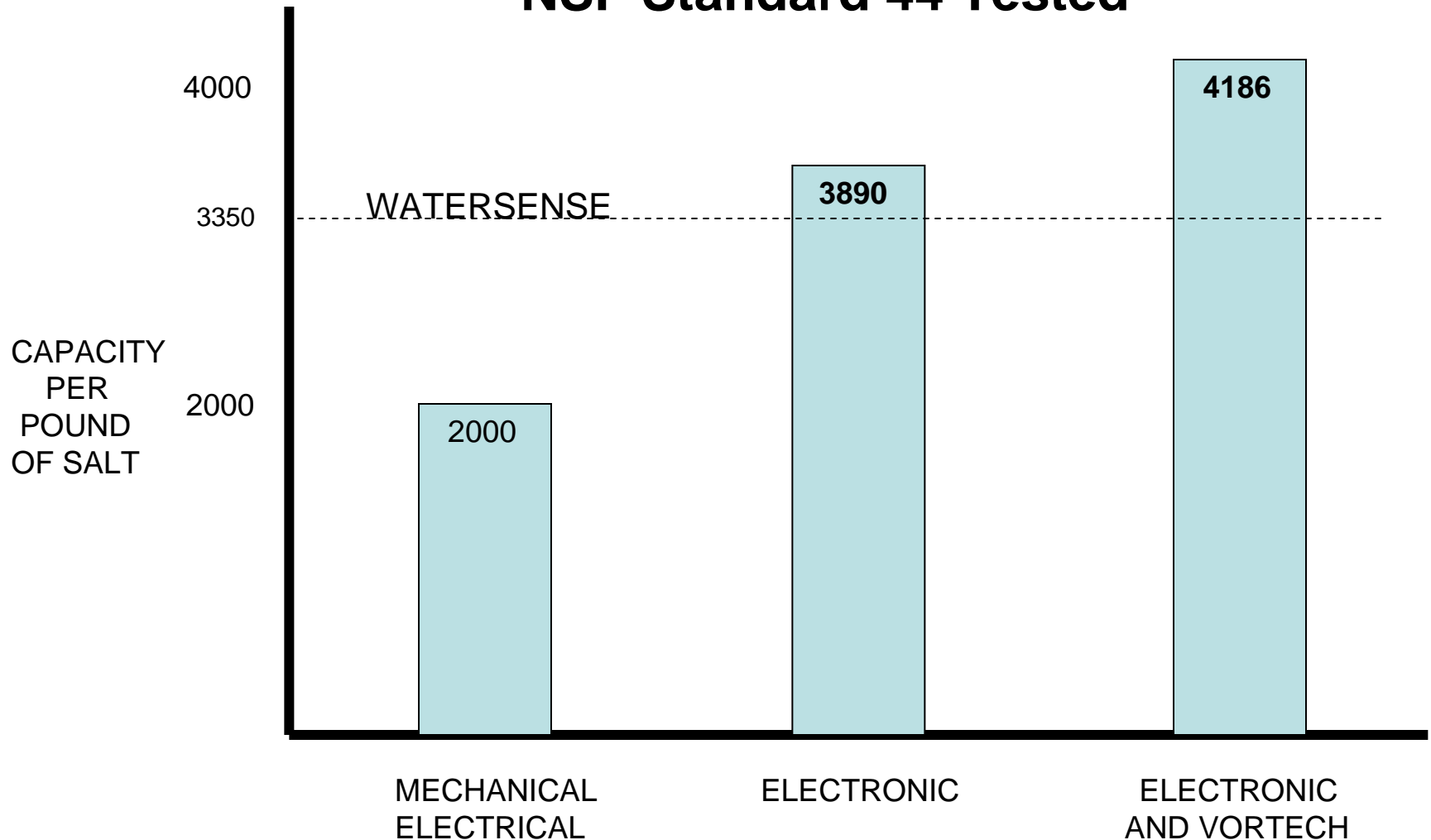
BRINE FLOW PER CUFT

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

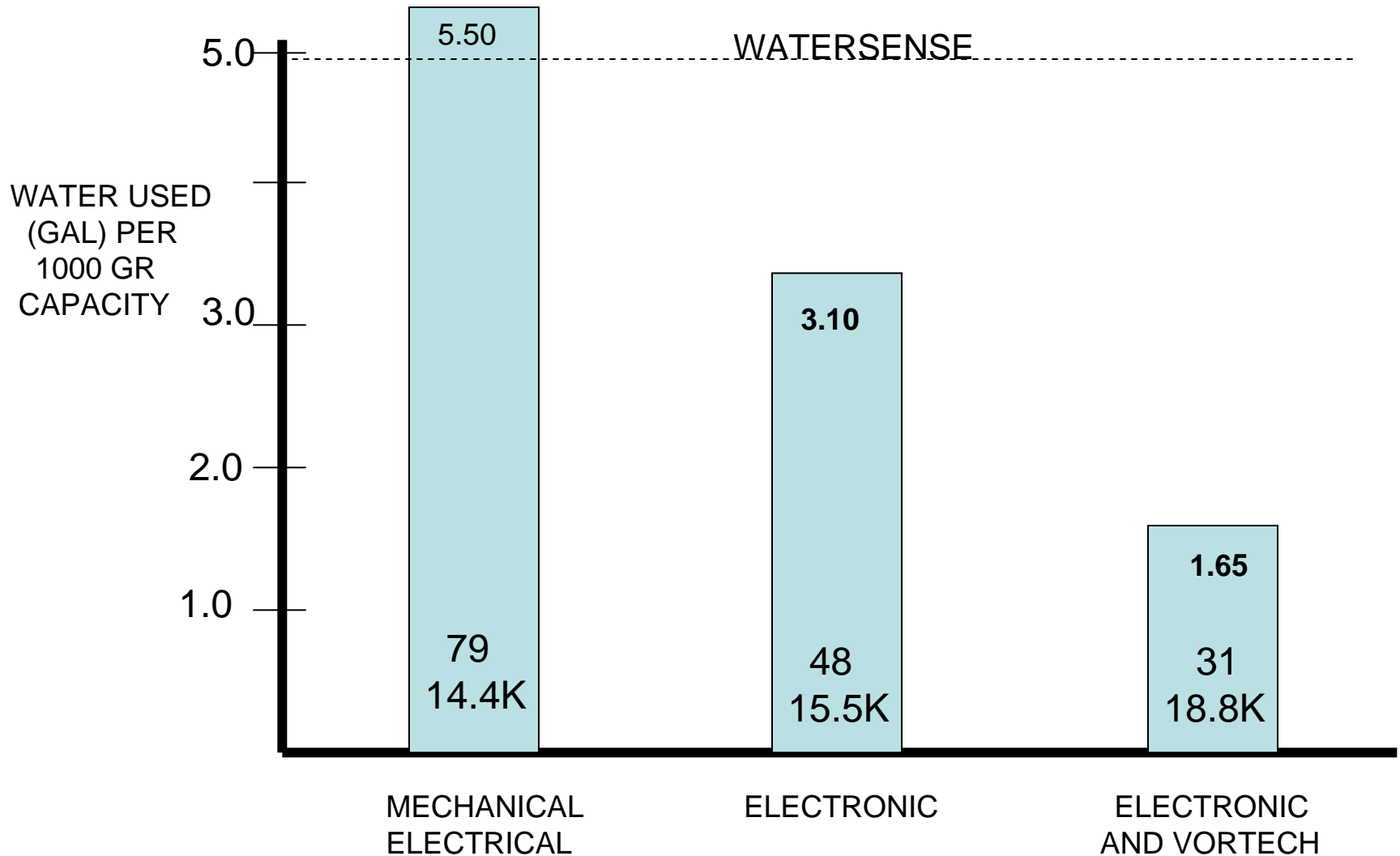
NSF Standard 44 Tested



WATER USAGE (3-5 lbs/cuft)

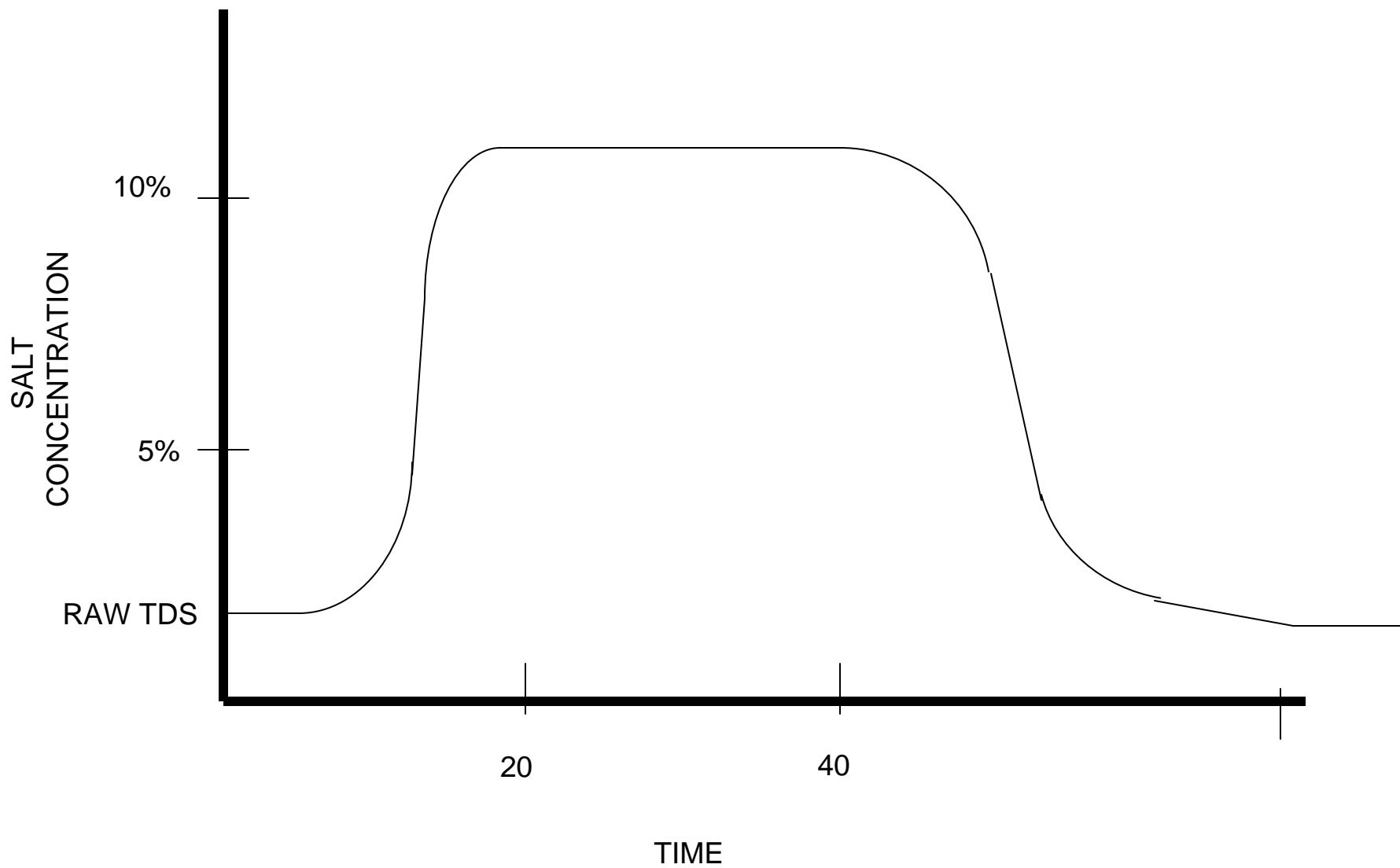
COMBINED ELECTRONIC AND VORTECH

NSF Standard 44 Tested

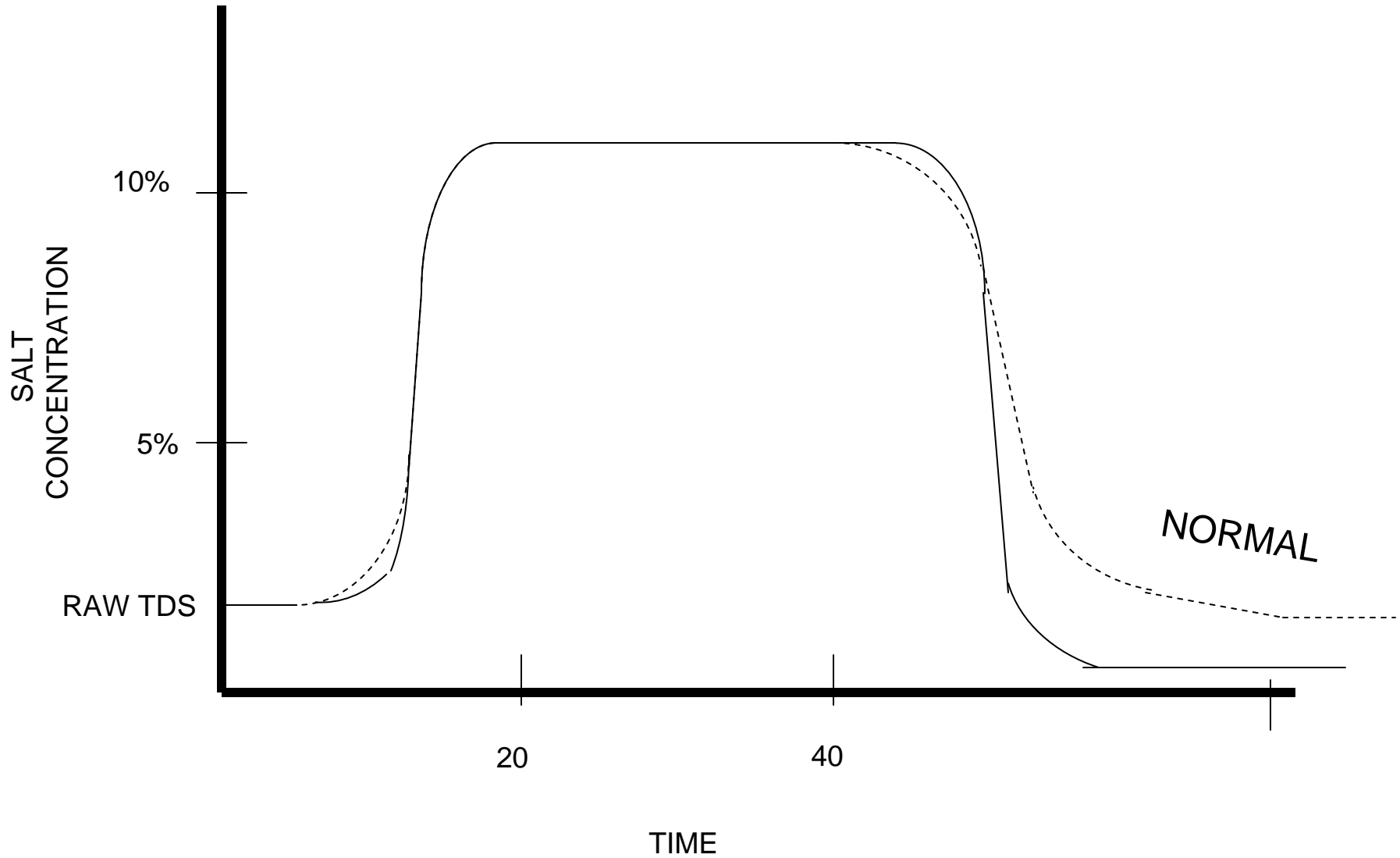


BRINE RECLAIM

“NORMAL” BRINE ELUTION CURVE

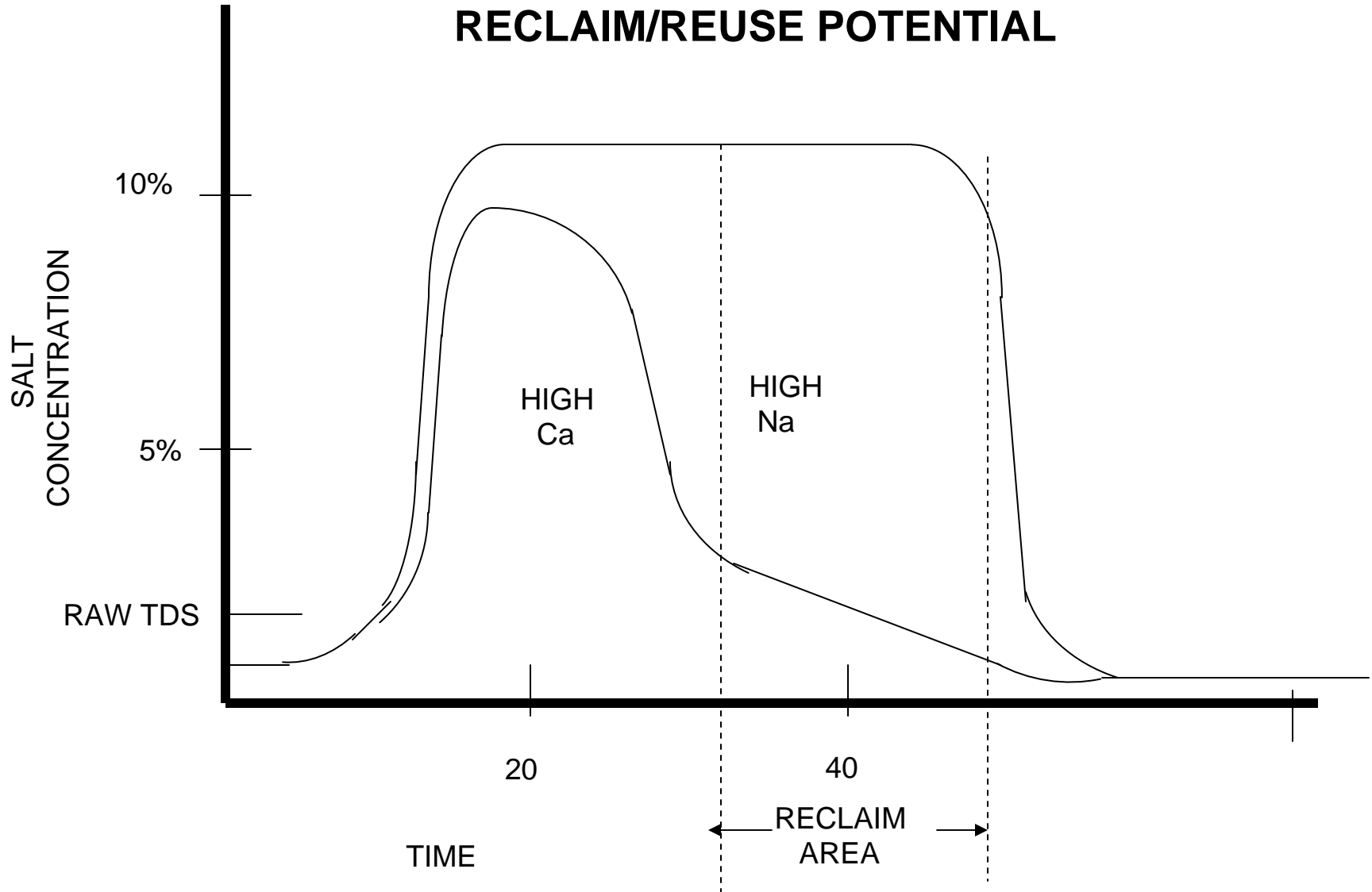


VORTECH BRINE ELUTION CURVE



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

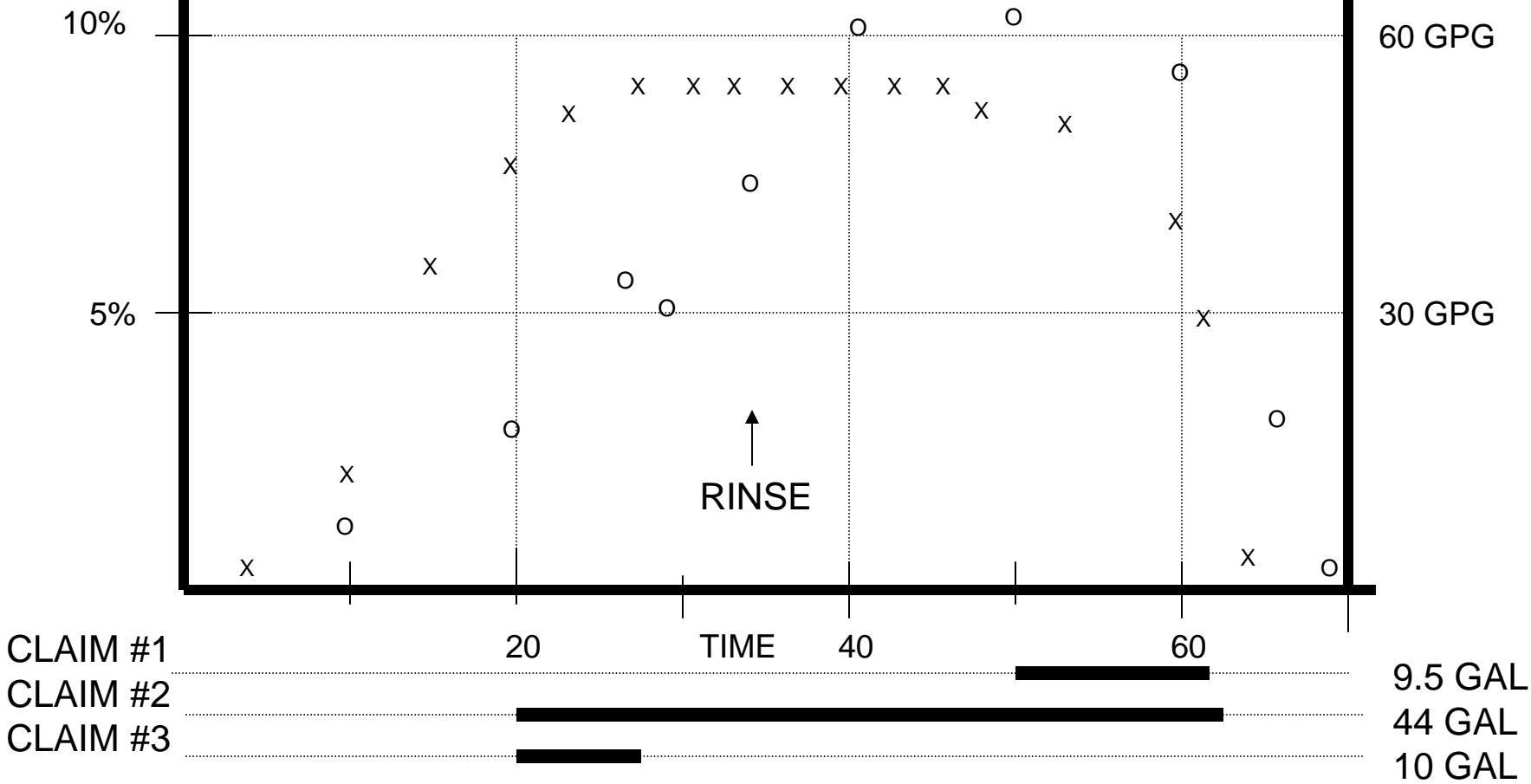
15 LBS SALT/CUFT
YELLOW INJECTOR

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

SALT
CONCENTRATION
(PERCENT)

HARDNESS
CONCENTRATION
(GPG)

**VORTECH BRINE ELUTION CURVE
RECLAIM/REUSE POTENTIAL**



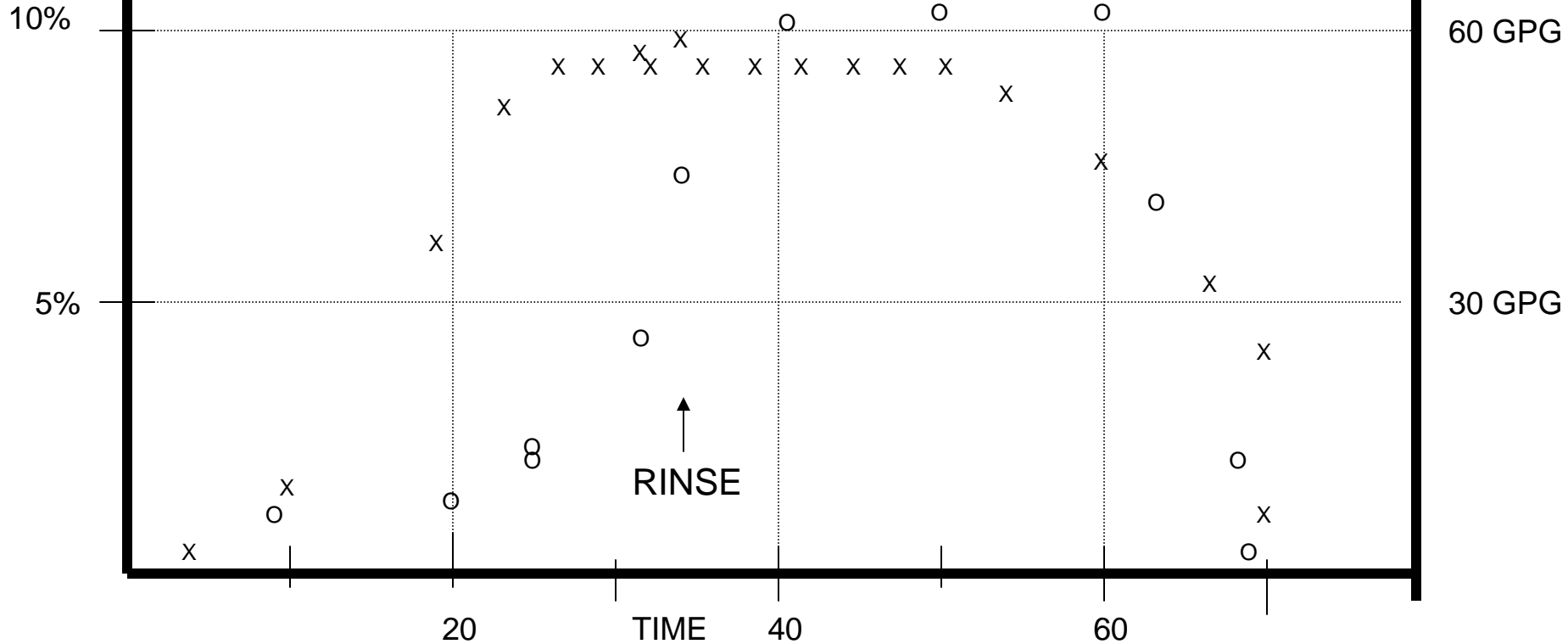
TESTING MARCH, 2009

(YELLOW) 15 LBS SALT/CUFT RESIN

VORTECH BRINE ELUTION CURVE

SALT
CONCENTRATION
(PERCENT)

HARDNESS
CONCENTRATION
(GPG)



CLAIM #1

10.4 GAL
6.9 LBS

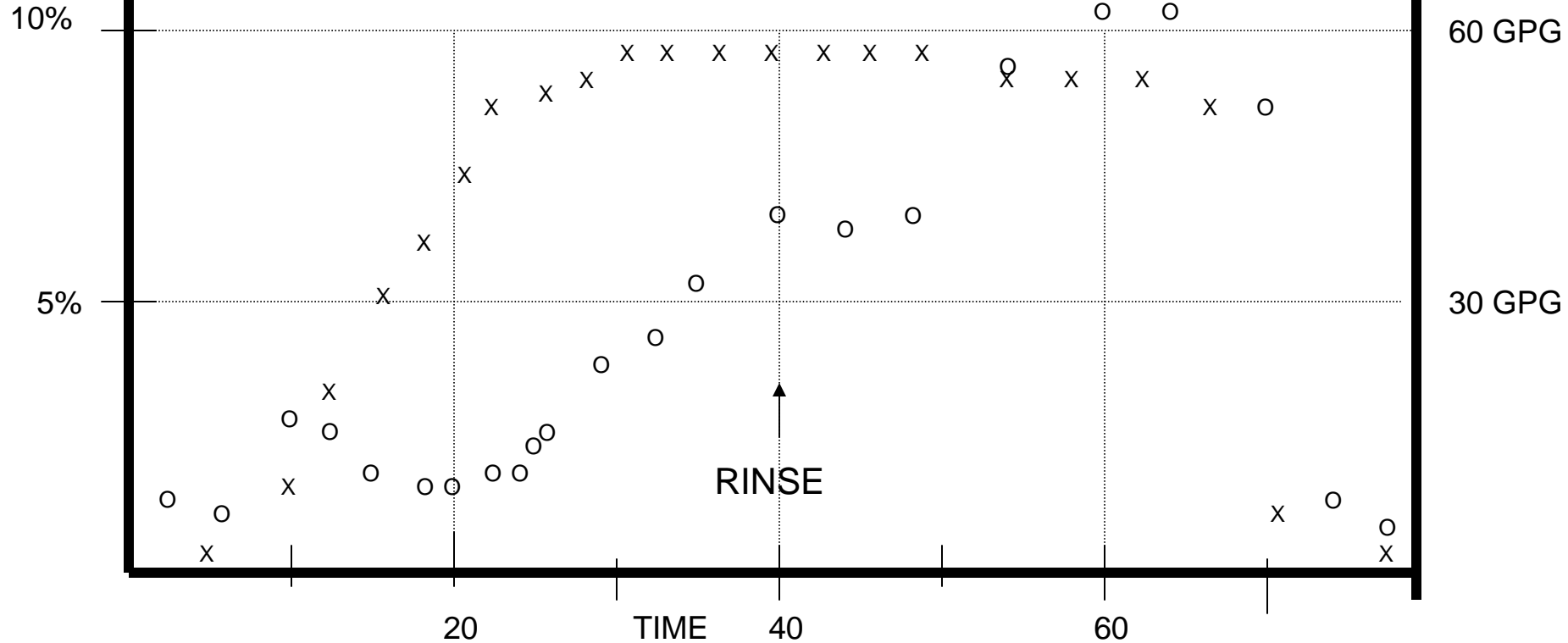
TESTING JULY, 2009

(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 AREA	GALLONS RECLAIM	POUNDS NaCl REUSED	PPM HARDNESS 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
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TDS	Less Capacity Achieved
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EFFECT OF TDS UPON CAPACITY

