

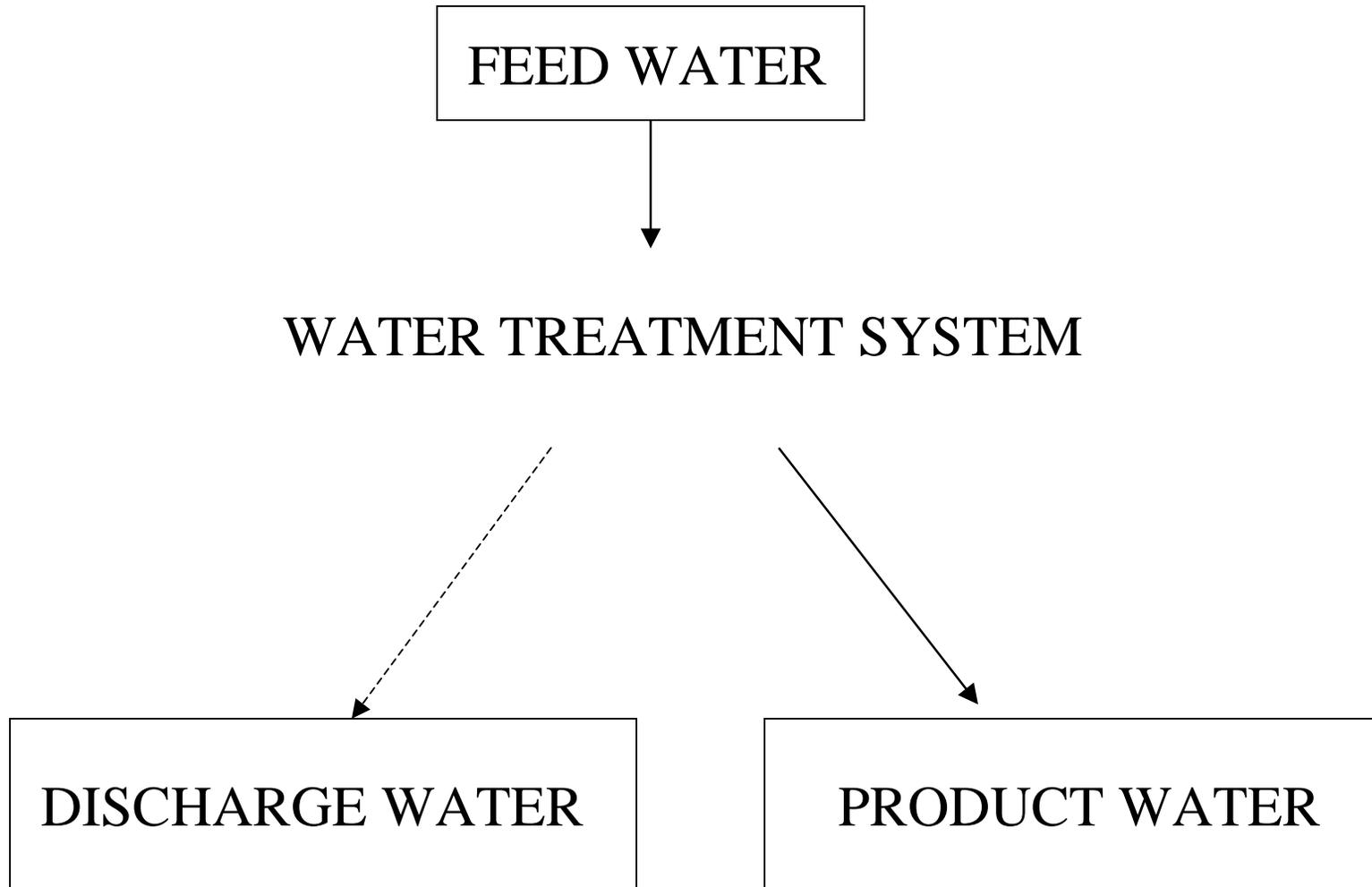
OVERVIEW OF WATER TREATMENT EFFLUENTS

MINIMIZING DISCHARGE CONTAMINATION

MARYLAND DEPARTMENT OF THE ENVIRONMENT
20 SEPTEMBER, 2006



WATER TREATMENT PROCESS



FEED WATER SOURCE

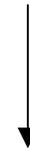
GROUND WATER

SURFACE WATER



PRIVATE/COMMERCIAL
WELLS

MUNICIPAL TREATMENT



MUNICIPAL DISTRIBUTION

WATER ANALYSIS

ACCURATE **ANALYSIS** OF FEED WATER QUALITY

AND PROPER **PRESCRIPTION** OF TREATMENT TECHNOLOGIES

WILL HELP MINIMIZE DISCHARGES.

TREATMENT TECHNOLOGY SELECTION

	SEDIMENT TURBIDITY	CONTAMINANT					
		HARD	IRON	ARSENIC	pH	NITRATE	ORGANICS
MEDIA FILTRATION	X						
MEDIA ABSORPTION				X			X
DISSOLVING MEDIA					X		
OXIDIZING MEDIA							
AIR OXIDATION			X				
REGENERANT			X				
ION EXCHANGE		X	X			X	
MEMBRANE							
MICRO	X						X
NANO	X	X					X
REVERSE OSMOSIS	X	X	X	X		X	X
INJECTION					X		

BACKWASH/REGENERATION “DISCHARGE” CYCLES

FILTER

BACKWASH

FAST RINSE

SOFTENER

BACKWASH

BRINE DRAW AND RINSE

FAST RINSE

BRINE REFILL

SINGLE-TANK COMMERCIAL FILTER



DUAL-TANK COMMERCIAL SOFTENER



TIMER TECHNOLOGY

1970's and 1980's

2006



MECHANICAL-ELECTRICAL
CONTROL



ELECTRONIC
CONTROL

WATER TREATMENT PROCESS

FEED WATER



WATER TREATMENT SYSTEM

PUBLIC
REGULATIONS



DISCHARGE WATER

INDUSTRY
STANDARDS



PRODUCT WATER

PRODUCT WATER

FORMAL STANDARDS

U.S Pharmacopoeia
Association for the Advancement of Medical Instrumentation
American Society of Testing Materials
Semiconductor Equipment and Materials International
College of American Pathologists
Environmental Protection Agency

INFORMAL STANDARDS

Spot-Free Rinse
Humidifiers
Ice Manufacture
Boilers
Coffee, Brewery, Cold beverages
Florists
Photography
Bottled Water

DISCHARGE WATER DISPOSITION

REUSE

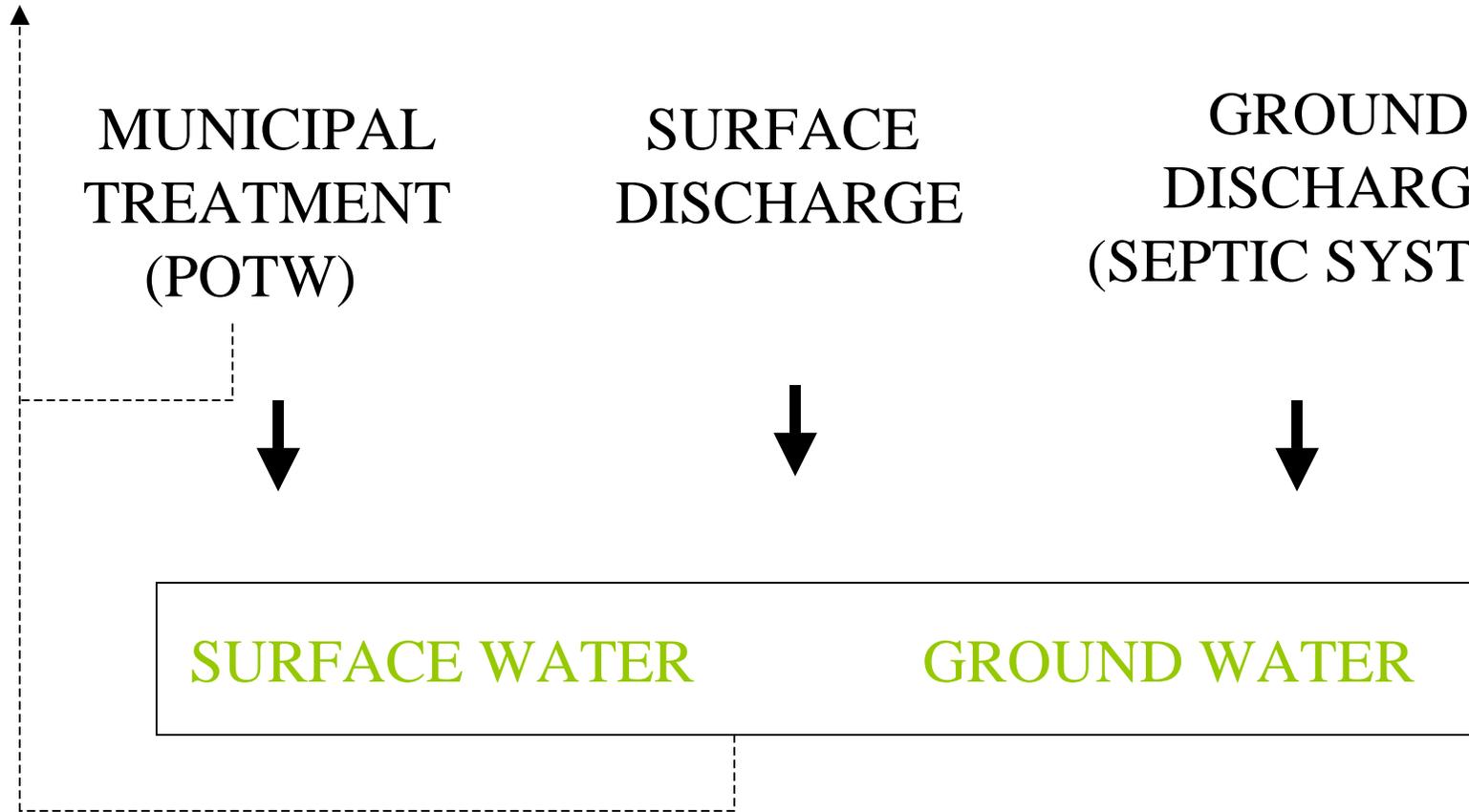
MUNICIPAL
TREATMENT
(POTW)

SURFACE
DISCHARGE

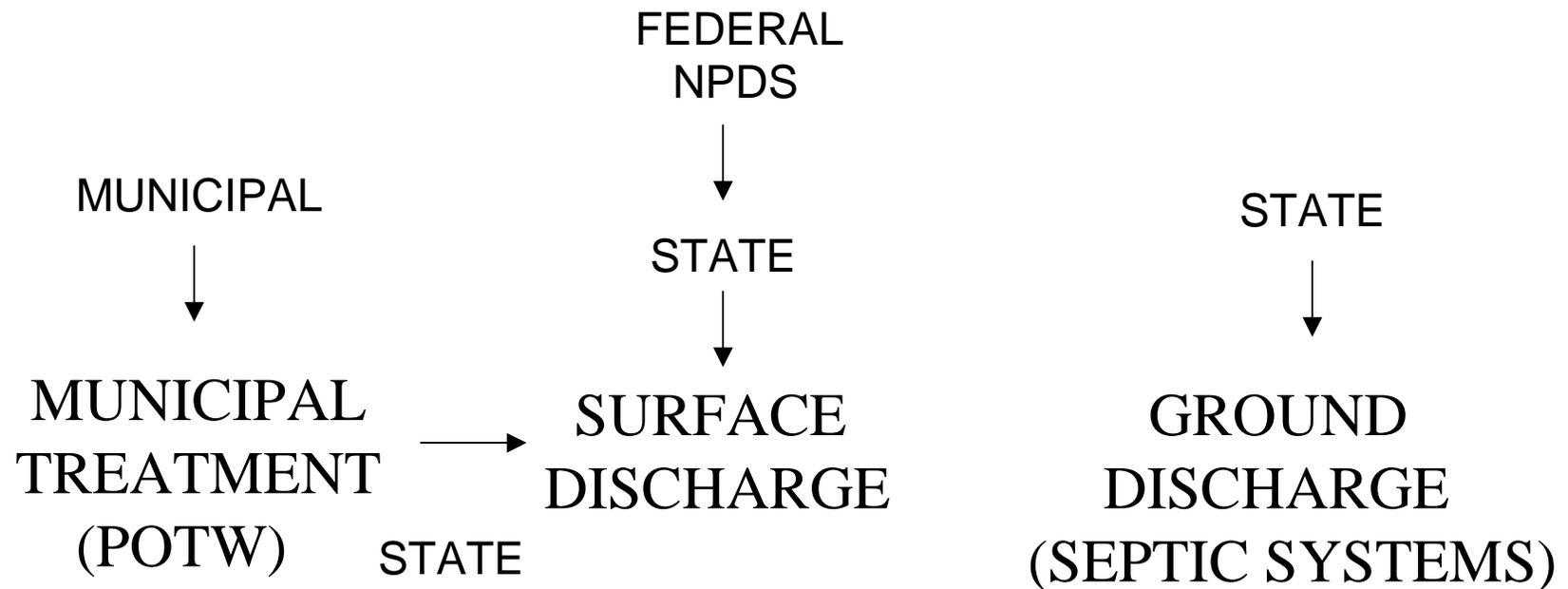
GROUND
DISCHARGE
(SEPTIC SYSTEMS)

SURFACE WATER

GROUND WATER



DISCHARGE WATER REGULATIONS



DISCHARGE ANALYSIS

PART 1

TECHNOLOGY	DISCHARGE CHARACTER		FORM OF DISCHARGE
	CONCENTRATED ONLY	ADDED SOLIDS	
MEDIA FILTRATION	X		BACKWASH MEDIA (CONSTANT)
MEDIA ABSORPTION	X		
DISSOLVING MEDIA		X	
OXIDIZING MEDIA			BACKWASH REGENERATION
AIR OXIDATION	X		
REGENERANT	X	X	
ION EXCHANGE	(X)	X	REGENERATION
MEMBRANE	X		SEPARATION
INJECTION		X	(CONSTANT)

DISCHARGE ANALYSIS

PART 2

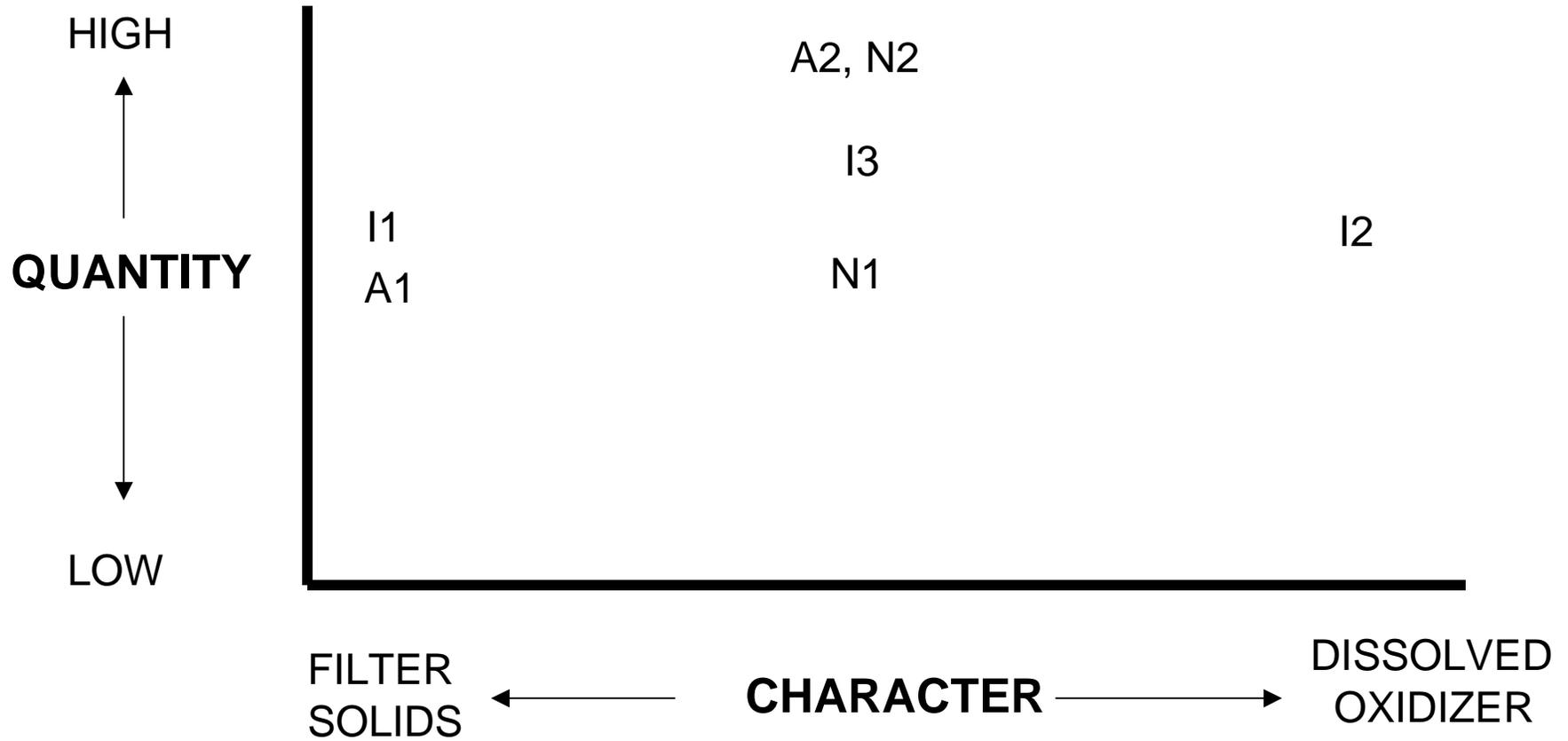
TECHNOLOGY	<u>DISCHARGE QUANTITY</u> TREATED (GAL) PER DISCHARGE GAL	FORM OF DISCHARGE
MEDIA FILTRATION	200	BACKWASH MEDIA (CONSTANT)
MEDIA ABSORPTION	300	
DISSOLVING MEDIA	300	
OXIDIZING MEDIA		BACKWASH REGENERATION
AIR OXIDATION	200	
REGENERANT	200	
ION EXCHANGE	60 TO 100	REGENERATION
MEMBRANE		SEPARATION SEPARATION SEPARATION
MICRO	5	
NANO	4	
REVERSE OSMOSIS	¼ TO 4	
INJECTION	N/A	(CONSTANT)

SELECTED TECHNOLOGIES AND THEIR ADJUSTMENT
WILL INFLUENCE

CHARACTER AND QUANTITY

OF DISCHARGE

TECHNOLOGY SELECTION



IRON

1. Air Oxidation
2. Manganese Greensand

ARSENIC

1. Absorbant
2. Reverse Osmosis

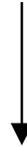
NITRATE

1. Anion Resin
2. Reverse Osmosis

WATER TREATMENT PROCESS

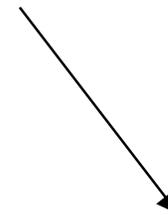
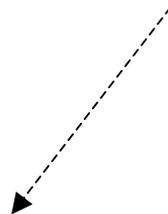
FEED WATER

**CORRECT ANALYSIS AND PRESCRIPTION WILL
INFLUENCE THE DISCHARGE WATER**



WATER TREATMENT SYSTEM

**THE SELECTED WATER TREATMENT TECHNOLOGIES
AND THEIR MAINTENANCE
WILL INFLUENCE THE DISCHARGE WATER**



DISCHARGE WATER

PRODUCT WATER

INDUSTRY STEPS AT MINIMIZING DISCHARGE

HIGHER EFFICIENCY WATER SOFTENING

PROPORTIONAL (UPFLOW) BRINING

MEMBRANE SOFTENING

HIGH RECOVERY REVERSE OSMOSIS

ULTRAVIOLET LIGHT DISINFECTION (VS CHEMICALS)

MANGANESE GREENSAND CONTINUOUS REGENERATION

BRINE REUSE

INTERNAL PLANT BRANCHING, REUSE AND RECYCLE

STAGED TREATMENT OF DISCHARGES