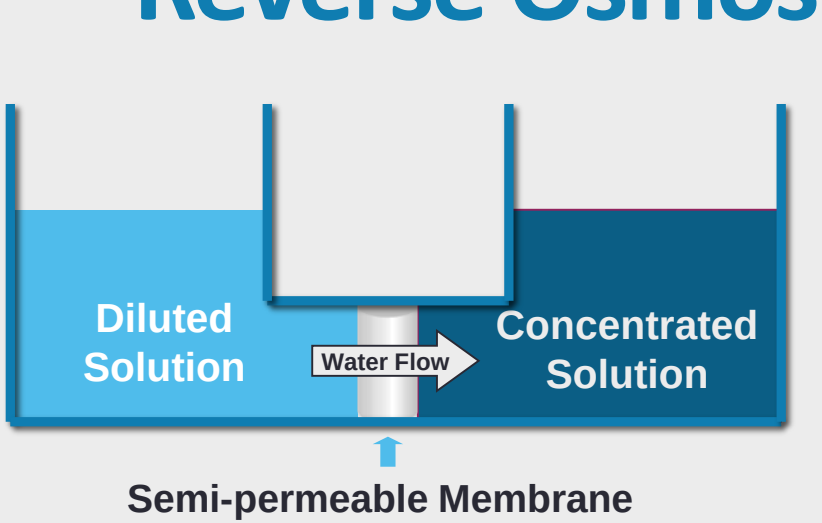
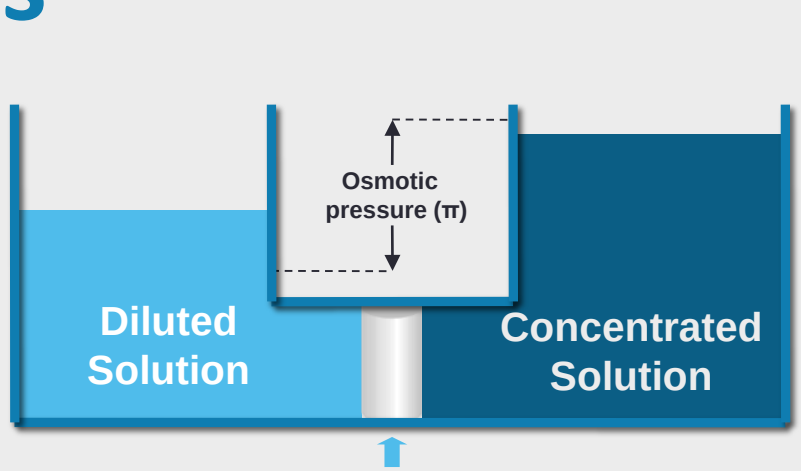
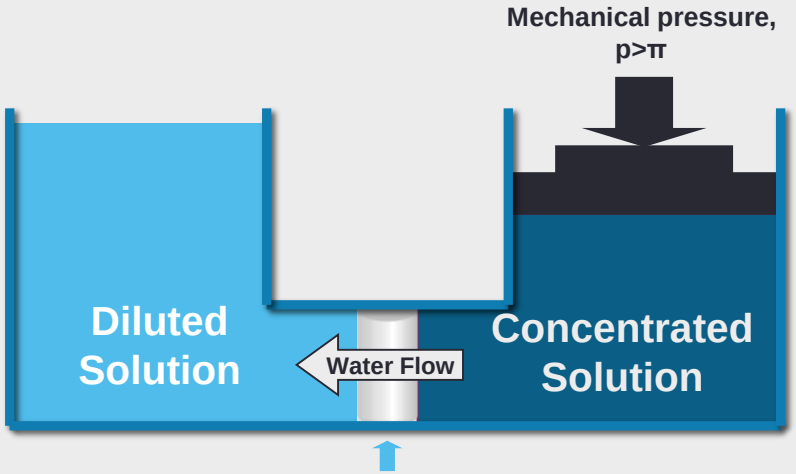
PUBLIC WORKS DEPARTMENT
WATER RESOURCES DIVISION

SEAWATER REVERSE OSMOSIS (SWRO)

Reverse Osmosis





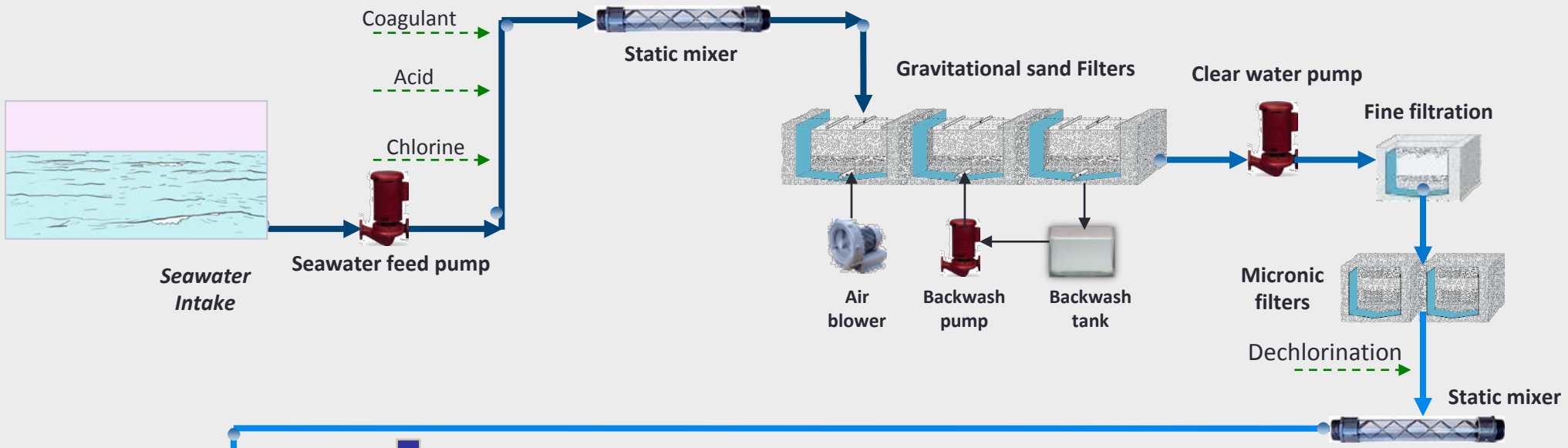


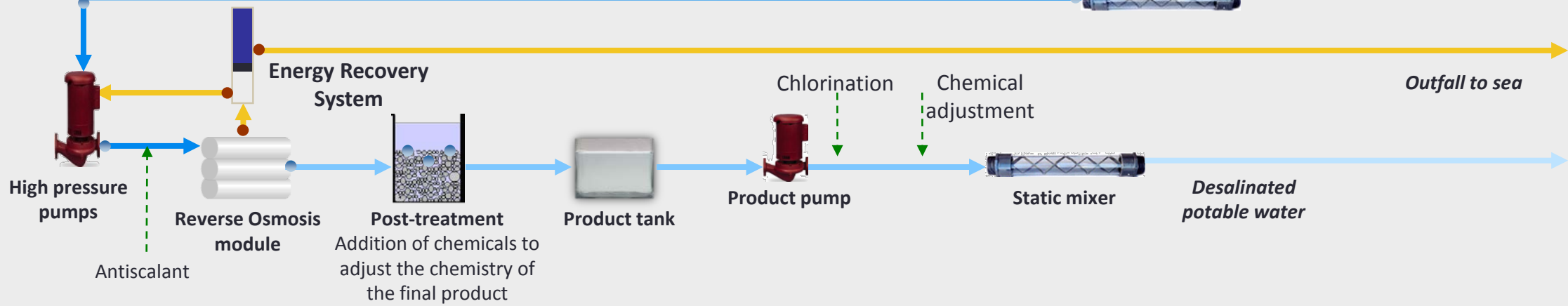
Osmosis
Fluid flows from low to high solute concentrations

Reverse Osmosis
Fluid flows from high solute concentration through a semipermeable membrane to a region of low solute concentration

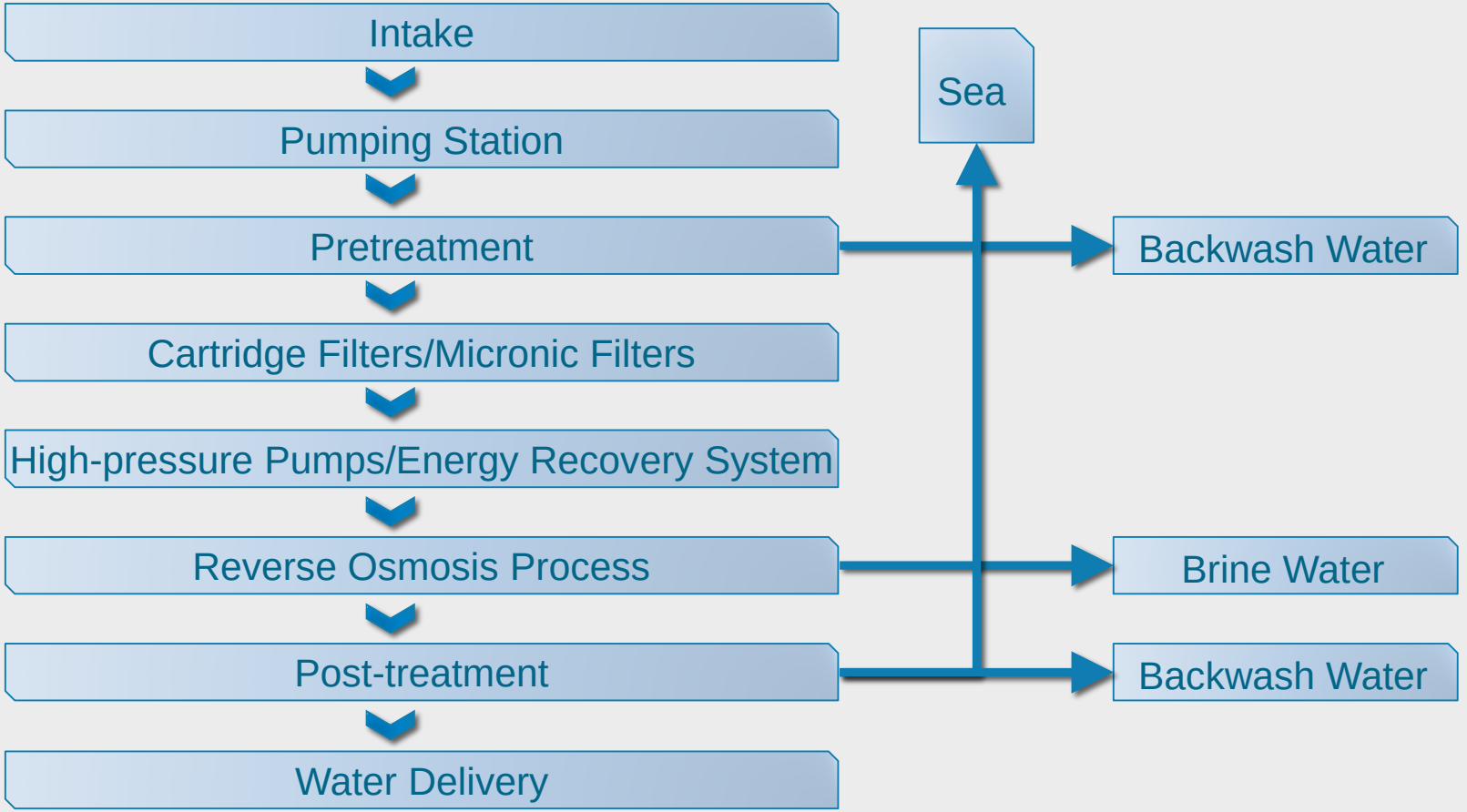
How?
By applying a pressure in excess of the osmotic pressure

Typical RO Desalination Process





Simplified RO Process Diagram



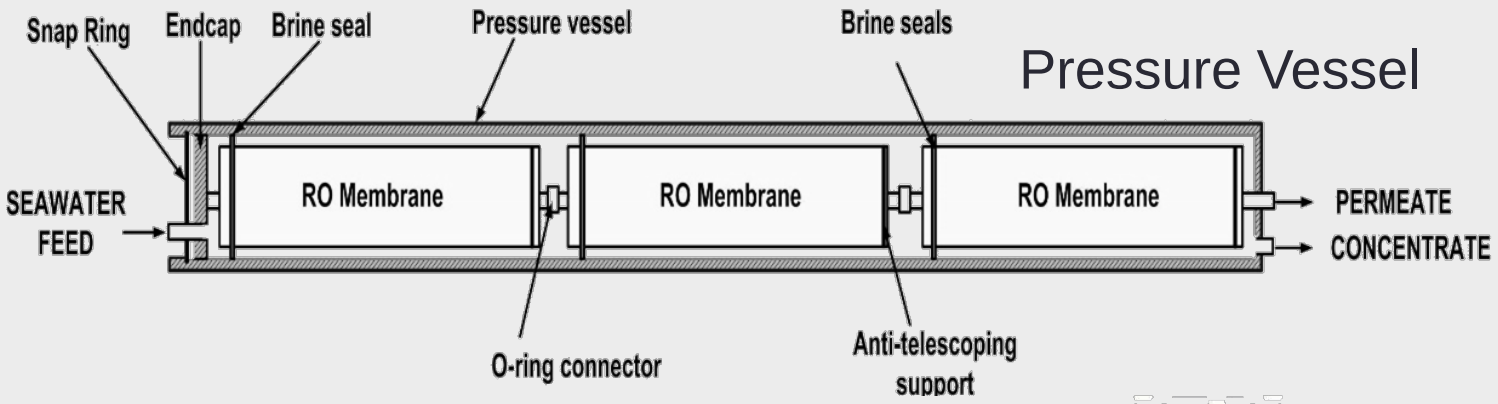
Reverse Osmosis

- Reverse osmosis is the finest level of filtration available
- The RO membranes act as a barrier to all dissolved salts and inorganic molecules, as well as organic molecules with molecular weight greater than approximately 100
- Water molecules pass freely through the membranes creating a purified product stream
- Rejection of dissolved salts is typically 95% to greater than 99%

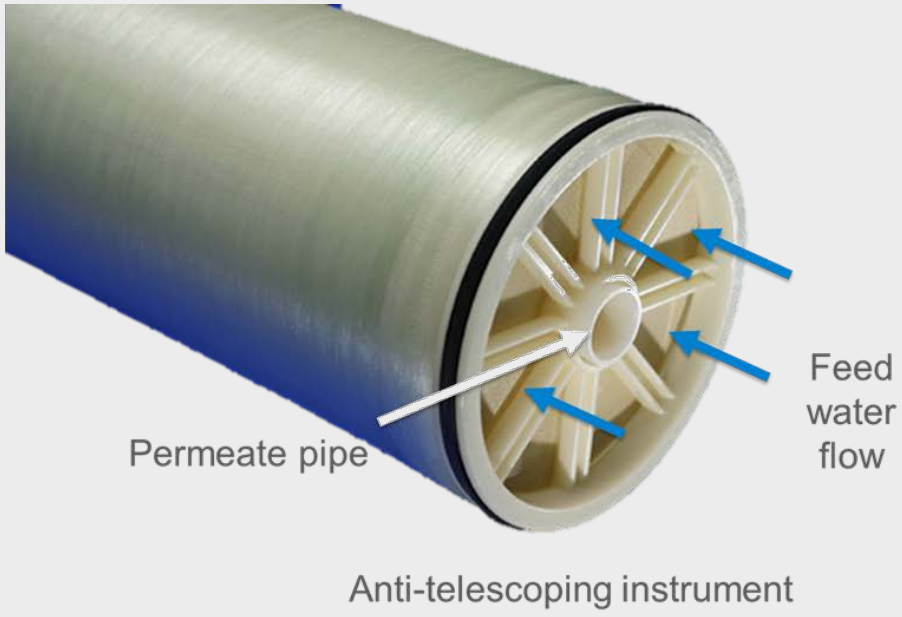
Terminology

- Recovery – the percentage of membrane system feed water that emerges from the system as product water or “permeate”
- Rejection – the percentage of solute concentration removed from the system feed water by the membrane.
- Passage – the opposite of “rejection”, passage is the percentage of dissolved constituents (contaminants) in the feed water allowed to pass through the membrane
- Permeate – the purified product water produced by a membrane system.
- Flux – the rate of permeate transported per unit of membrane area, usually measured in gallons per square foot per day (gfd) or liters per square meter per hour (lmh=l/m²/h).

RO Membrane


Snap Ring
Endcap
Brine seal
Pressure vessel
Brine seals
Pressure Vessel
SEAWATER FEED
RO Membrane
RO Membrane
RO Membrane
PERMEATE
CONCENTRATE
O-ring connector
Anti-telescoping support


FILMTEC


Permeate pipe
Feed water flow
Anti-telescoping instrument