

Zero Discharge/Water Reuse

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Water

- Many different characteristics of water
 - Treated Surface Water
 - Streams, lakes and reservoirs
 - Well Water
 - Softened, chlorinated

Water Quality in Industrial Use

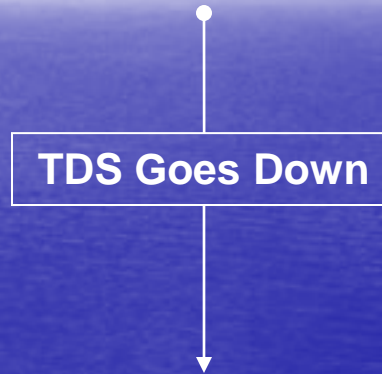
- Well Water
- City Water
- City Softened
- Reverse Osmosis
- Di Ionized Water
- Distilled Water

Water Quality in Industrial Use

- Total Dissolved Solids
- Conductivity
- Corrosive Characteristics
- Chlorine (Y) (N)
- Copper (Y) (N)
- Aluminum (Y) (N)

Water Quality

- Well
- City
- City Softened
- Reverse Osmosis
- Di Ionized
- Distilled



Criteria for Zero Discharge

- Quality of water needed?

What is the process?

– Cooling water

- Rectifiers
- Tanks

– Rinse water

- Plated parts
- Cleaning operations

Equipment Needed for Successful Zero Discharge

- Clarifier – Coagulation, Flocculation – Filter Press
- DAF – Coagulation, Flocculation – Floating Sludge – Filter Press
- Reverse Osmosis System
- Ion Exchange Columns/Resin
Specific Ion Exchange
- Belt Filter Press, Centrifuge

Industrial Example One

- Soluble Iron in Waste Stream
- Cleaners in Waste Stream
- Need for Continuous Rinsing of Finished Components
- Need for Cooling of Finished Components and Water

Sequence

- 1) Rinse, Contaminants Removed
- 2) Contaminants Flow to Stage One
Coagulation
- 3) Coagulant and Contaminants Flow
to pH Adjust Stage
- 4) Effluent (pH Adjusted) Flows to
Clarifier, Flocculation Occurs

Sequence (continued)

- 5) Clarifier Separates Solids from Liquids
- 6) Solids Flow to Filter Press (Become Non Hazardous Waste)
- 7) Water – Free of Solids – Flows through Cooling Tower
- 8) Water Returns for Further Use in Rinsing Process

Industrial Example Two

- Soybean Extracts
- Soybean Oil
- Hulls from Soybeans

Plant needs process water in order to assist in removing beans from shipping vessels.

Sequence

- 1) Rinse, Float Contaminants
- 2) Contaminants Flow to Coagulation Stage
- 3) Coagulant and Contaminants Flow to Flocculation Stage
- 4) Flow through Grit Chamber for Hull Removal

Sequence (continued)

5) Flow to DAF for Liquid/Oil Separation

- Oil floats and becomes non haz sludge (feed additive)

6) Water Flows to Reverse Osmosis System

7) Through Reverse Osmosis, Back to Holding Tank

Closed Loop

Rinse → Coagulation → Flocculation
→ DAF (liquid/solids separation) →
Oil/Clean Water → R/O System →
Holding Tank → Rinse

In Order For Success To Occur

- 1) Coagulation/Flocculation/
Clarification success is a must
- 2) Must be able to have accurate
conductivity readings
- 3) May have to feed anti scalants at
times
- 4) You must want it to work because it
is too easy to go get the water hose

Summary

- **Excellent Example of a Closed Loop System**
 - A radiator in your car
- **Questions?**