To Compliance and Beyond

Valley Chrome Plating's Journey to Zero Discharge

Valley Chrome

- Manufacturer of Truck Bumpers since 1961
- Decorative Chrome Plating
- 1st Plating Shop in U.S. to be permitted for Nickel Air Emissions.
- Participant in Environmental Management Systems

Regulatory Changes

- Clean Water Act of 1977
- Increased Public Scrutiny
  - High Profile Cases
- Expanded Regulations
  - Discharge limits 3.5ppm -1.3 ppm

Regulatory Requirements

Emergency Response

Employee Training

Facility Inspections

USEPA ↔ DTSC ↔ CUPA

POTW

RWQCB

SCAQMD

Cal/OSHA

Hazardous Waste

Hazardous Materials

Process Wastewater

Storm Water

Air Pollution

Worker Safety

Environmental Goals

- 100 % Compliance
- Zero Discharge
- VCP as Industry Leader
  - Seminars for local platers and regulators.
  - Sharing vision & success on national level

Compliance Approach

- What Is the Best Approach to Compliance ?
  - Traditionally
    - Treat – Discharge – Dispose
      - A Cost of Doing Business
      - Not a Main Part of the Business
  - More Sensible Approach
    - P2 First !
      - Lower Costs (Ultimately)
      - Lower Liability
      - Better Compliance
      - More Sleep !

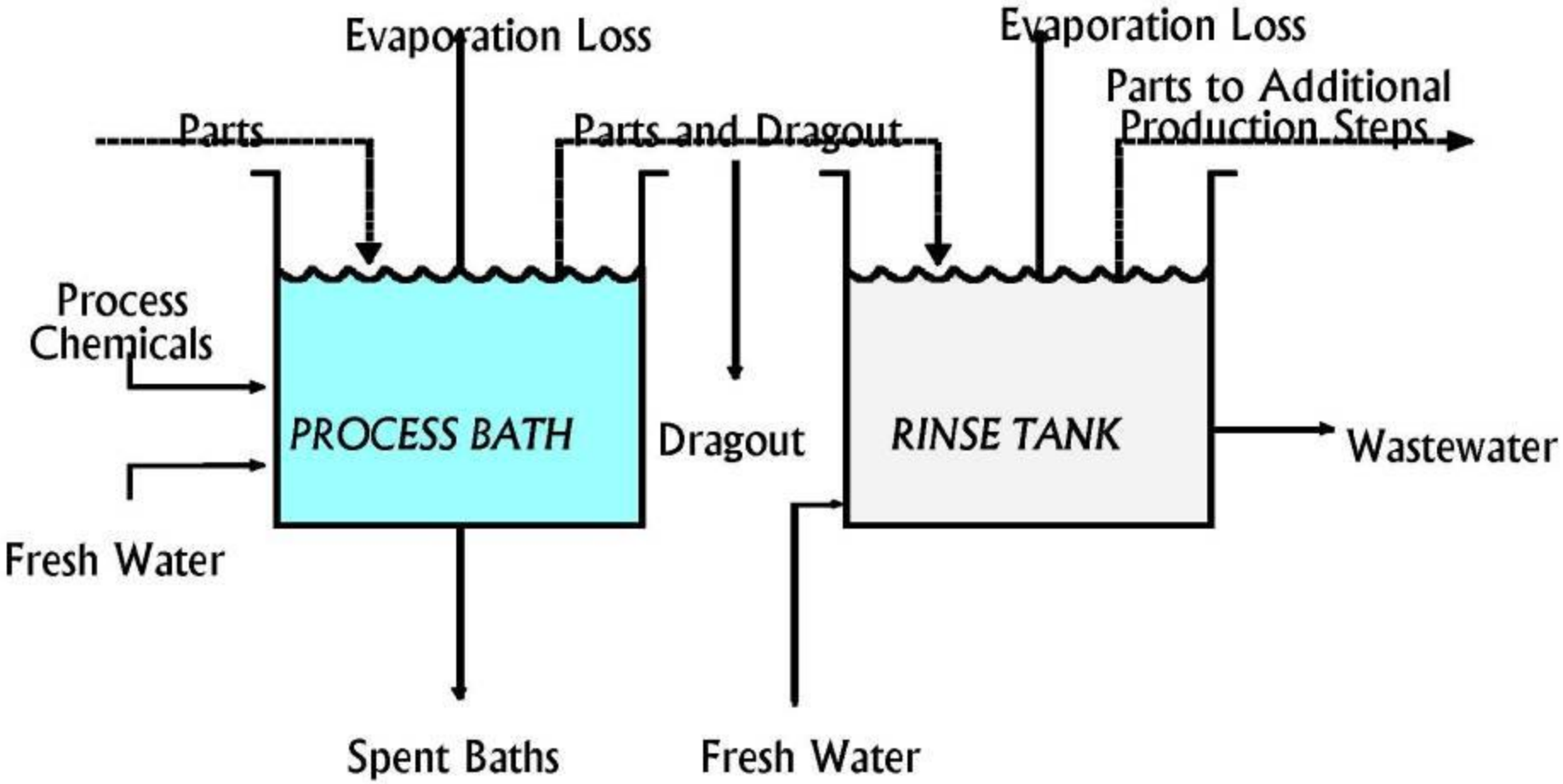
Overall Goal

- ***Reduce water flow because …***
  - Cost of water
  - POTW restrictions
  - Reduced treatment equipment size
  - Reduced treatment expenses
  - Good neighbor
  - Environmentally concerned
  - Zero discharge?
- ***Without increasing metal concentrations because …***
  - POTW violations
  - Reduced liability

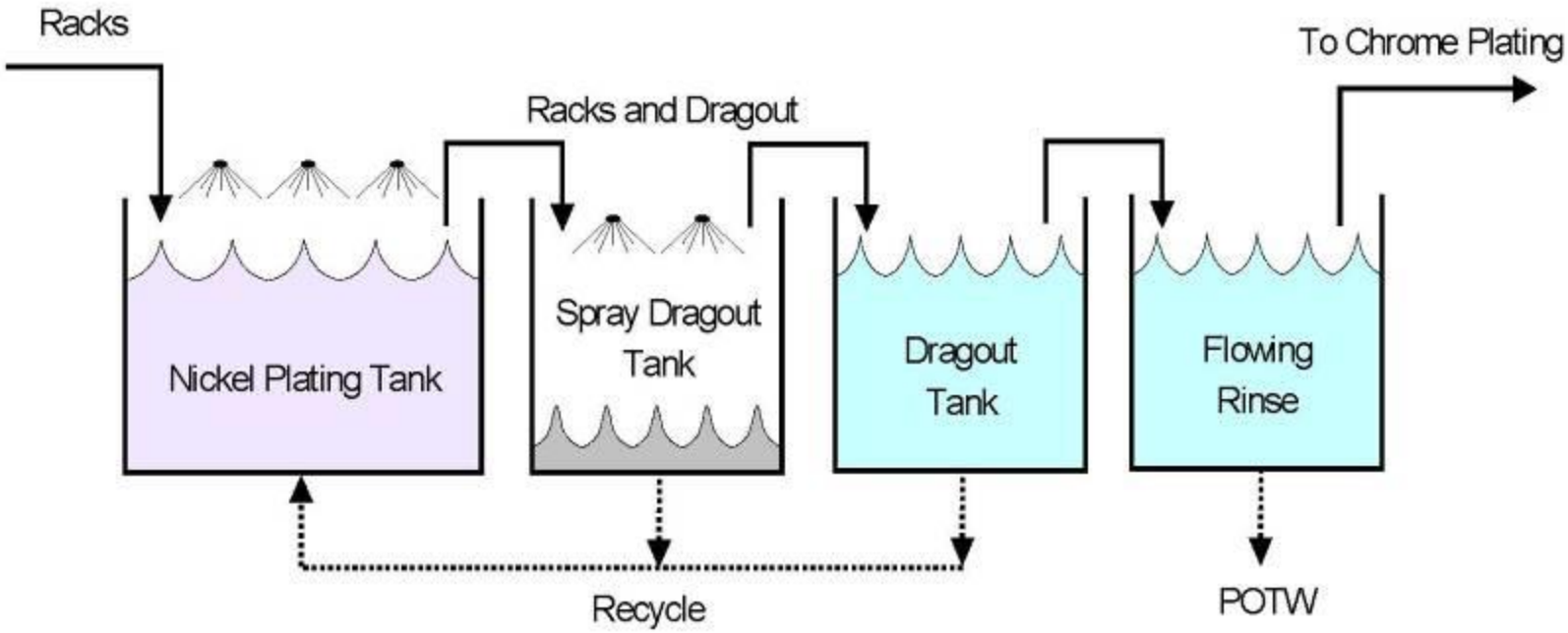
Things to Think About

- How clean do rinse tanks need to be
- What are product quality requirements
- Consideration of new processes
- Does POTW have flow restrictions
- Potential lower POTW concentration limits
- Potential permit changes
- Cost of water, discharge, labor, chemicals, permits

PFD


Evaporation Loss
Evaporation Loss
Parts to Additional Production Steps
Parts
Parts and Dragout
Process Chemicals
PROCESS BATH
Dragout
RINSE TANK
Wastewater
Fresh Water
Spent Baths
Fresh Water

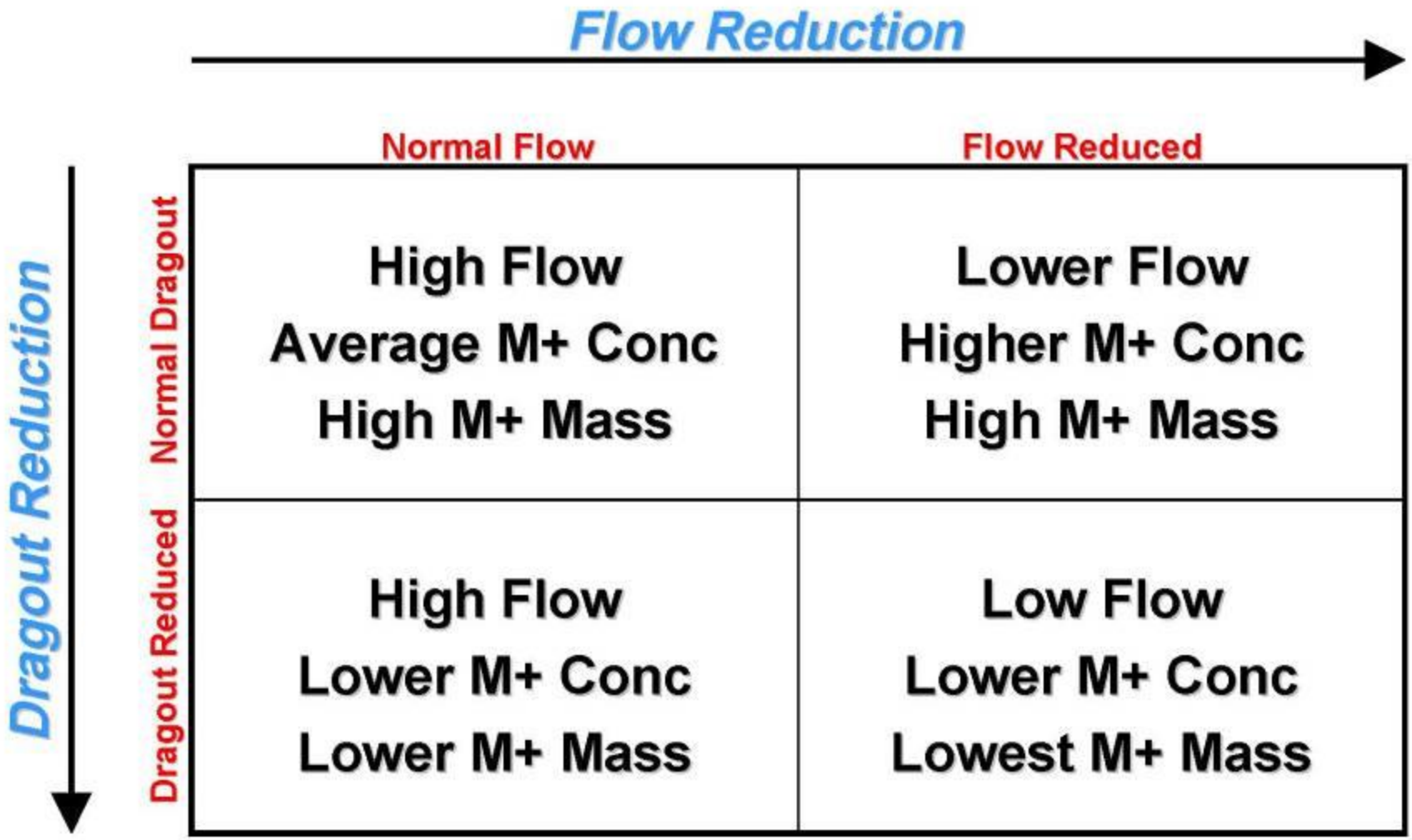
Dragout and Spray Rinse



Flow Restriction

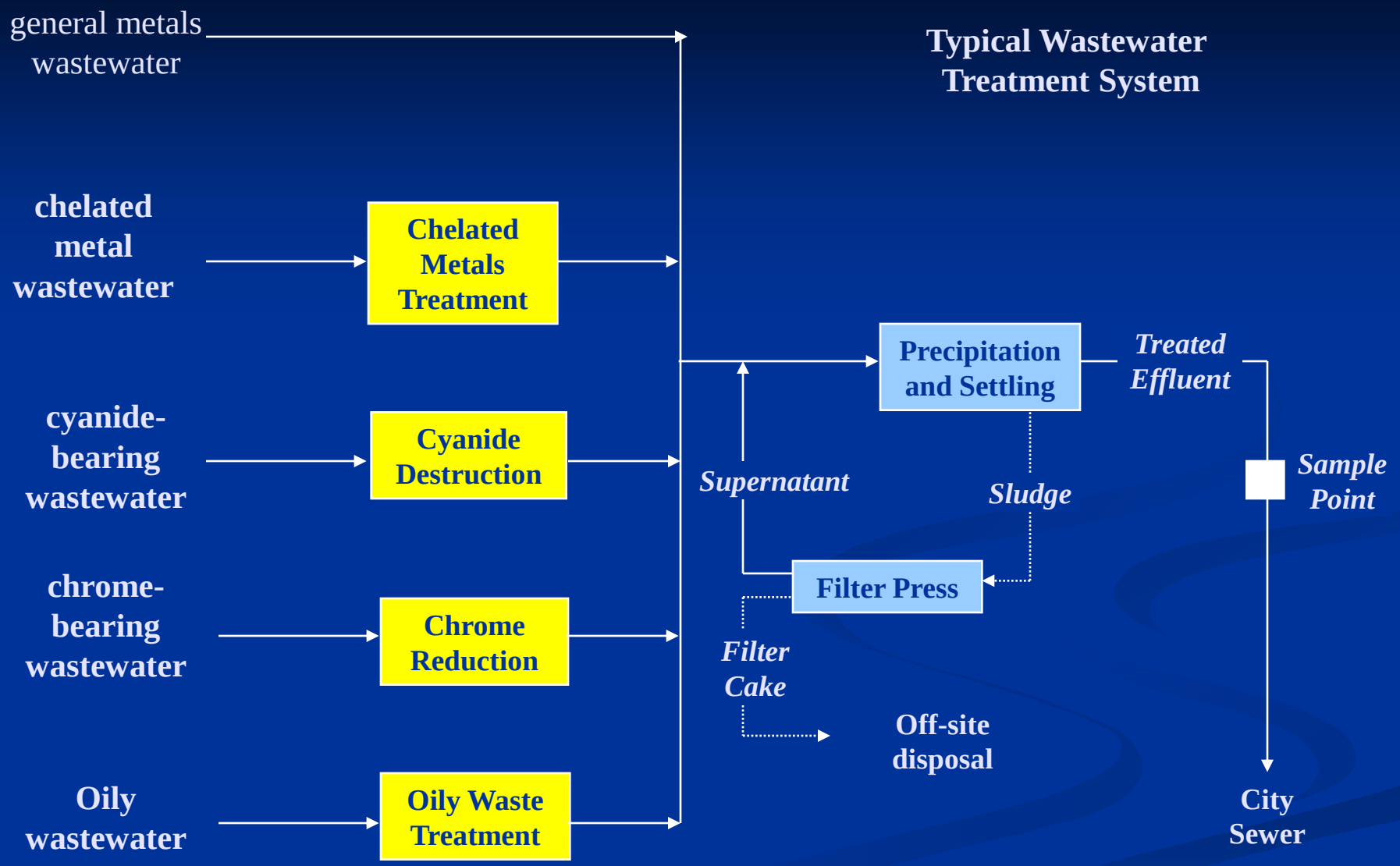
- Without accurate data, most shops don't know what flow rate is needed
  - ➢ How clean is clean?
- Rinsewater that *appears* to be too dirty may be quite acceptable
  - ➢ Need to measure TDS
  - ➢ Need to take guesswork out of flow control
    - > Restrictors and/or conductivity controllers

Summary: Sewer Discharge

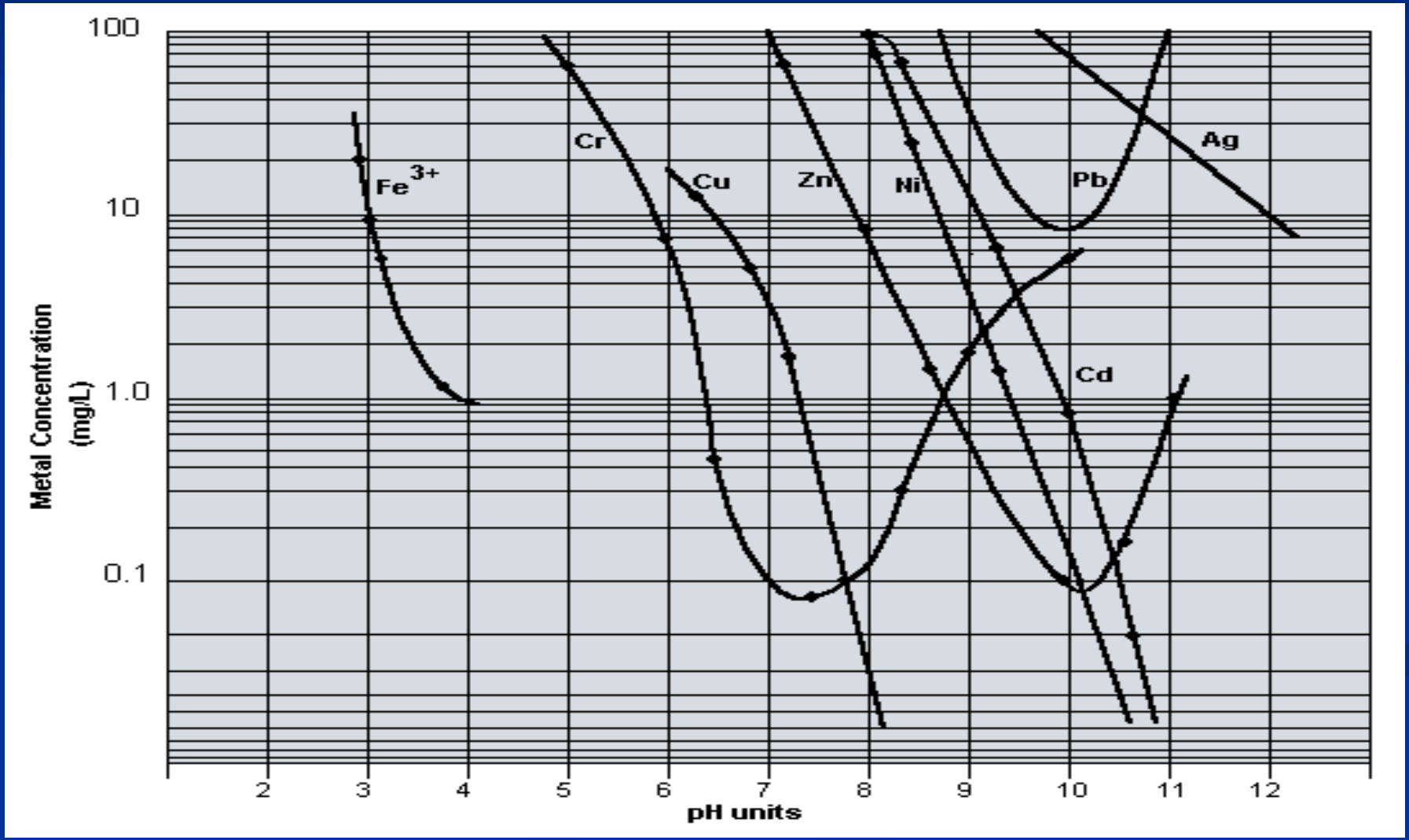


Metal Finishing WWT
Examples of Physical Treatment

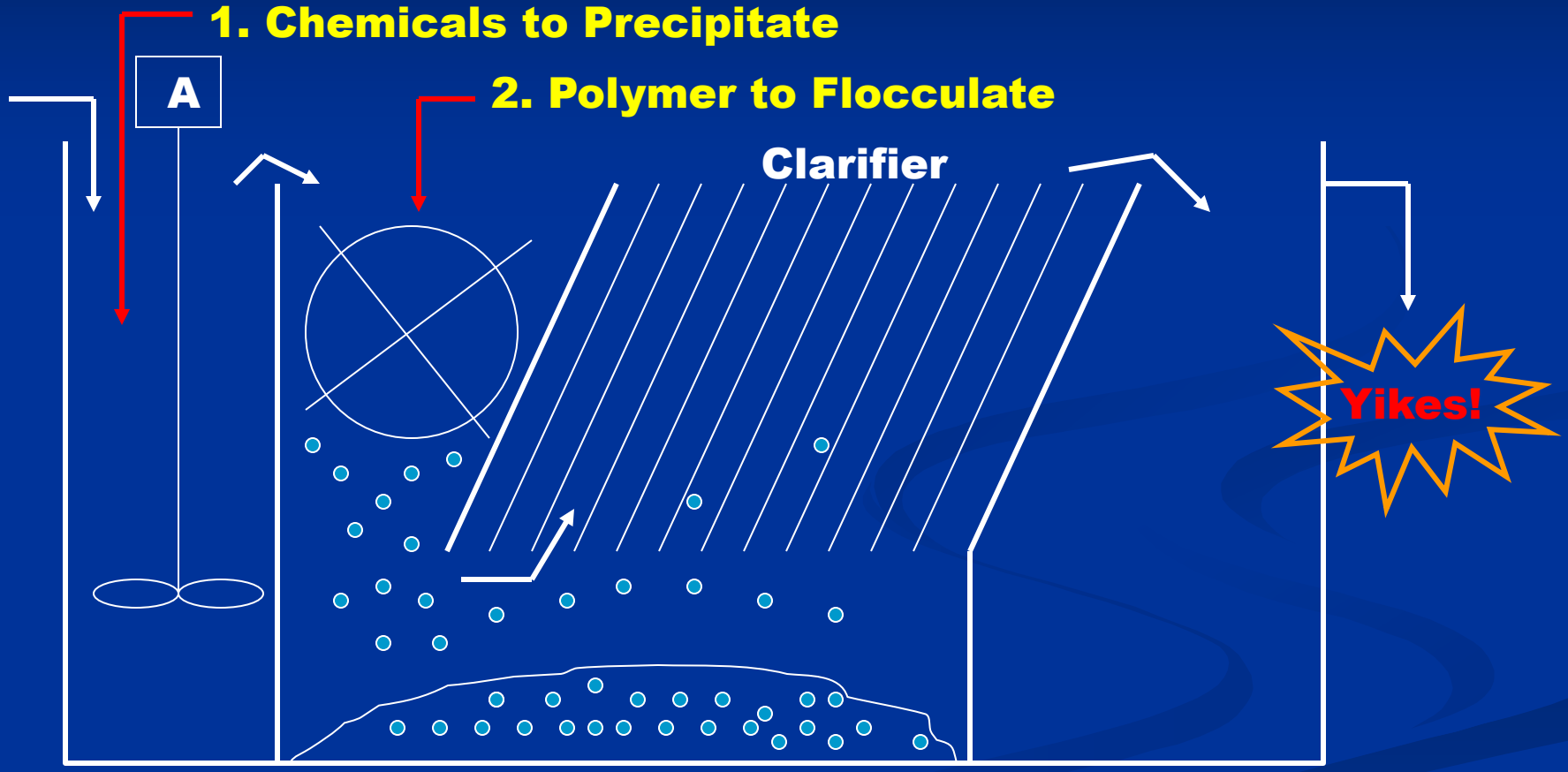
- Ion Exchange
  - A charged media attracts contaminants and exchanges them for less toxic ions.
- Electro-dialysis
  - Ionic components are separated through a semi-permeable ion-selective membrane with the aid of electrical potential between two electrodes.
- Ultra-filtration
  - Pressure up to 100psi is applied to a solution across a porous membrane, used to remove dissolved or colloidal material.
- Reverse Osmosis
  - Water molecules are allowed to pass through a semi-permeable membrane at pressures up to 500psi, leaving dissolved salts behind.
- Evaporation
  - Drive off water using heat to reduce volume and concentrate contaminates.


Typical Wastewater Treatment System
general metals wastewater
chelated metal wastewater
Chelated Metals Treatment
cyanide-bearing wastewater
Cyanide Destruction
chrome-bearing wastewater
Chrome Reduction
Oily wastewater
Oily Waste Treatment
Precipitation and Settling
Treated Effluent
Supernatant
Sludge
Sample Point
Filter Press
Filter Cake
Off-site disposal
City Sewer

Metal Finishing WWT
Chemical Precipitation
Hydroxide Precipitation Chart



What's the Problem w/ Precipitation?



Compartmentized Waste Treatment Unit

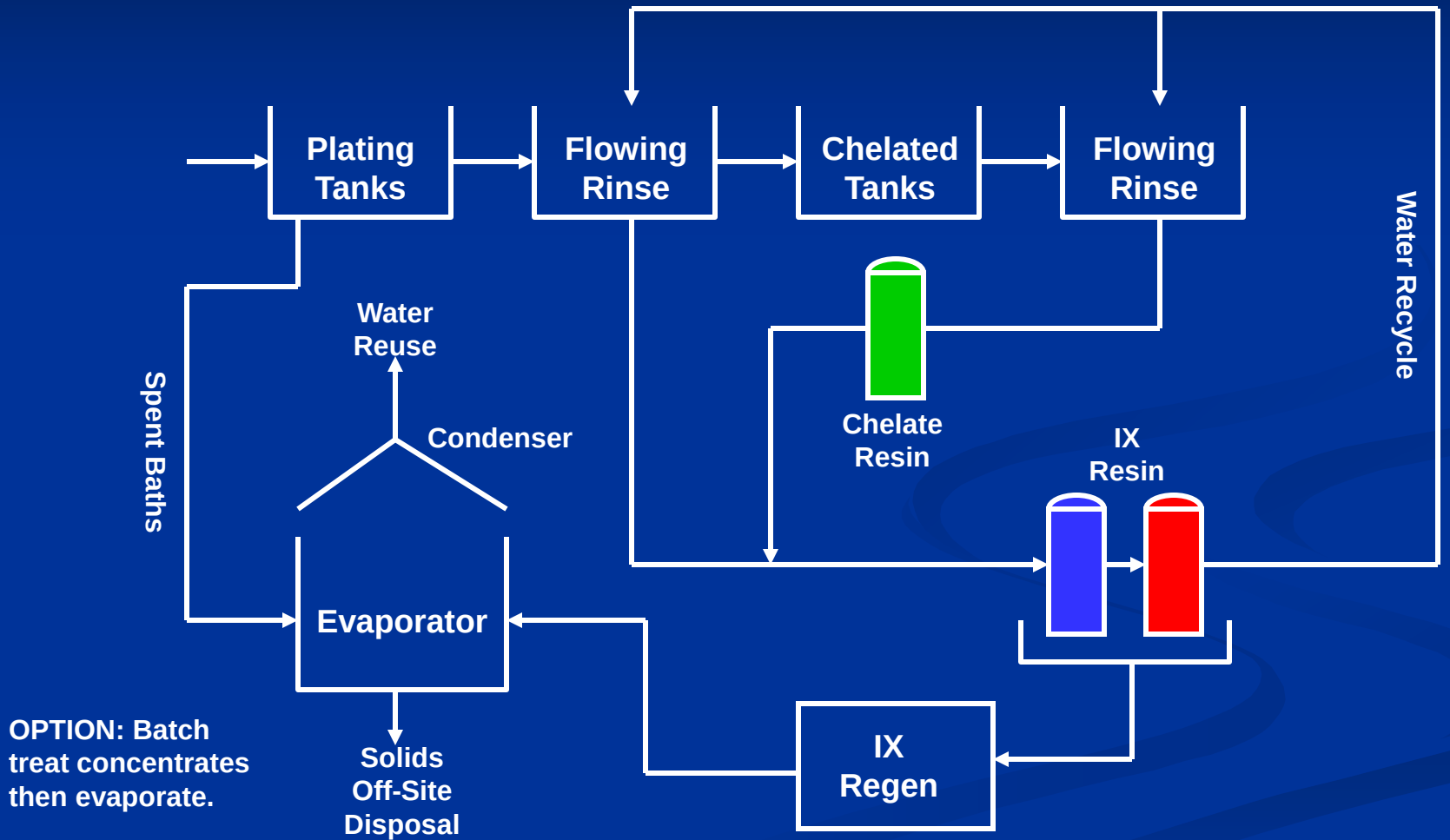
Worksheet #1:

		Yes	No
1.	Has your shop increased its production over the last two years?		
2.	Has your shop increased its water use over the last two years?		
3.	Do you think it is necessary to reduce water use and wastewater discharge?		
4.	Does your shop discharge more than 10,000 gallons per day?		
5.	Does your shop discharge more than 5,000 gallons per day?		
6.	Is your shop zero discharge?		
7.	Does your shop have limited space for additional tanks?		

Worksheet #1:

		Yes	No
8.	Does your shop use dragout tanks?		
9.	Does your shop use spray rinsing?		
10.	Does your shop use an evaporator?		
11.	Does your shop use ion exchange for water recycle?		
12.	Does your shop use another method of water recycle?		
13.	Do you routinely train your employees in water and wastewater reduction techniques?		
14.	Do you think you have done all you can to reduce water and wastewater?		
15.	Is your company signed up for the Strategic Goals Program?		

An Example Zero-Discharge Shop



Effects of Achieving Zero Discharge

- **Positive Side Effects**
  - Saving H2O
  - No discharge to POTW
  - Re-use of Chemicals
    - Resulting in $$ savings
- **Negative Side Effects**
  - Poor Rinse Quality
  - Higher reject rate (in house/in field)
  - Higher Waste Treatment Costs

Worksheet #2

Mini Water & Wastewater Reduction Audit

	Opportunity	Yes	No	Maybe	Unsure?
1.	You can make money easier by increasing production rather than decreasing costs?				
2.	Have you had any discharge violations in the last year?				
3.	Does your POTW have or plan any restrictions on your water usage or discharge flow?				
4.	Do you have drip bars and drain boards installed in your shop?				
5.	Is your process floor dry?				

Worksheet #2 continued

Mini Water & Wastewater Reduction Audit

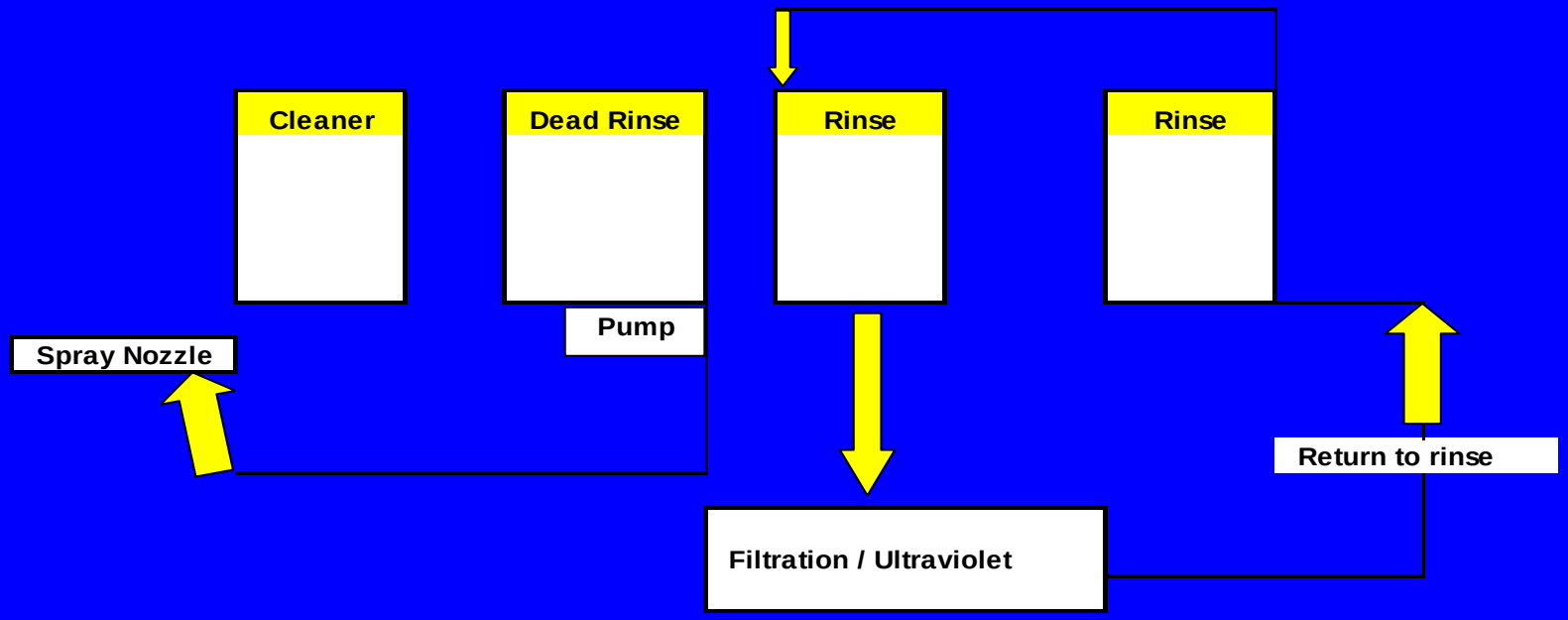
6.	Do you have space in your shop to add additional rinse tanks?				
7.	Do you currently use an evaporator anywhere in your shop?				
8.	Do you currently use ion exchange anywhere in your shop?				
9.	Does your shop have a high reject rate or other quality issues?				
10.	Do water & wastewater projects compete for investment dollars in your shop?				
11.	Does your company have a single person responsible for overseeing water use?				

Pre-Plating Improvements

Necessary to Achieve Zero Discharge

- Ultraviolet light
- Filtration
- Counter flow rinsing
- Weirs & Oil Superator
- Evaporation
- Batch Treatments

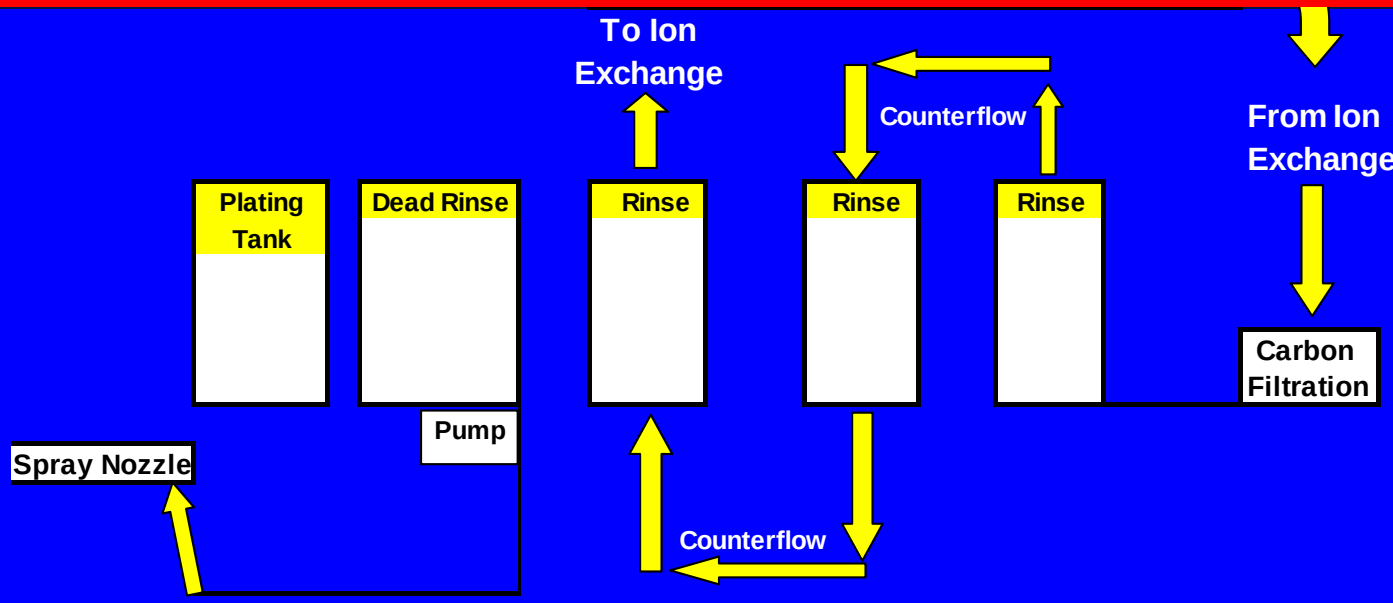
Typical Zero Discharge Rinse Set Up



1) Live rinses are pumped to holding tanks where they are treated & filtered and returned to the rinses every few weeks. Decanted solids are sent to evaporator / waste treatment unit.

2) As Cleaner evaporates, dead rinse is added to cleaner tanks. Counter-flow rinses are added to dead rinse so the closest tank to process tanks is always the cleanest.

Typical Rinse Set Up After Ni. Plating Line



1) Counter flow rinses are kept clean by removing metals through Ion Exchange. Organics are removed by carbon bed.

2) Dead Rinse (Nickel) is filtered with granular carbon at all times. This solution is added back daily to Nickel tanks.

3) Rinses after Nickel Tanks are the same water from 1987 and looks crystal clear.

4) When greenish tinge and TDS go up, Ion Exchange columns are regenerated.

Worksheet #3

Understanding Your Company's Water & Wastewater Costs

Given:

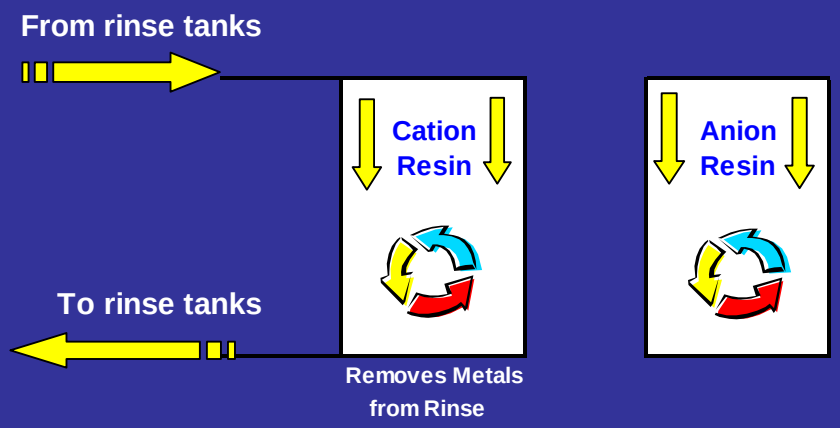
1) Cost of water per 1,000 gallons $_____
2) Cost of sewer discharge per 1,000 gallons $_____
3) Daily Process water usage _____gals
4) Work days per year _____days

P2 Cost Savings:

5) *Annual Sales*		
6) Purchased Water Cost		
7) Sewer Discharge Cost		
8) Wastewater Mgt Cost		
9) *TOTAL Water/Wastewater Cost*		
10) W/W Costs as % of Sales	%	%
11) *Other Costs*		
12) Profit [Line 5 – Line 9 – Line 11]		
13) Profit as % of Sales	%	%
14) Difference in Profit by P2		
15) Add'l Sales Required to Make Diff.		

Ion Exchange

Ion Exchange Unit



Cation Resin

1) Rinse water is cycled through resin which captures metals. (nickel or chrome)
2) Clean rinse water is returned to rinses (pumps).

3) When resin is saturated with metals, acid is added to release elements and then sent to evaporator.

Anion Resin

1) Rinse water is cycled through resin which removes negatively charged ions
2) Clean rinse water is returned to rinses (pumps).

3)When resin is saturated with contaminants, caustic is added to release metals into holding tank --> reclaim add back to bath.

Going to Zero Discharge …

- STEP 1
  - Separate waste streams
    - Spent Concentrates
    - Dragout Rinsewater
    - Dilute Rinsewater
    - Chelated Materials
    - Soapy Materials
    - Misc. Low-Volume Wastes (e.g. solvents)

Going to Zero Discharge …

- STEP 2
  - Apply Source Reduction Measures to Shop
    - Spill controls
    - Flow controls
    - Dragout controls and rinses
    - Spray rinses
    - Bath life extensions
      - Acid Filtration, Weirs, Routine Maintenance (tank bottoms)
    - Training –ongoing supervision

Going to Zero Discharge …

- STEP 3
  - Find a Home for each Waste Stream
    - Recapture dragout
    - For Example:
      - Spent Concentrates – treat or ship
      - Dragout Rinsewater – recapture or treat
      - Dilute Rinsewater – recycle
      - Chelated Materials – pretreat
      - Soapy Materials – treat
      - Solvents – offsite recycle

Going to Zero Discharge … Pt.II

- STEP 4
  - Develop equipment "Scheme"
    - Ion Exchange for rinsewater recycle
    - Evaporator for treatment of concentrates
    - Ship offsite for untreatable materials
      - Do your homework! (reduce liability)

Going to Zero Discharge …

- STEP 5
  - Build/Install/Startup
    - Readily available equipment
    - Installation – relatively simple
    - Startup – critical !

Going to Zero Discharge …

- STEP 6
  - Train
  - Retrain
  - Supervise and test
  - Set training schedule in writing
  - Set expectations for employees
  - Train the employees to train !

Where to Learn about New Technology

- Regulatory Consultation
- Environmental Management Systems
- Visiting Other Sites
- Tradeshows
  - Vendor's Showcase
  - Sur/Fin
  - AESF Regionals
- Associations
  - NASF
  - Regional Affiliates / Branches
- Industry Consultants

Storm Water Capture –The Next Goal

- Capture & Re-use of all rain water landing on our facility.
- Environmental Lawsuits will require metals and other limits in runoff.
- Use of runoff will help reduce plant water usage.
- Elimination of permit and regulatory reporting requirements.

Storm Water Capture

- Collect rain from downspouts (8000 gal cap.)
- Pump to holding tank @ plating line.
- Filter water.
- Pump into rinses to replace evaporated H20
- Interior tank has overflow prevention switch.
- Exterior tanks can overflow if capacity is achieved.
- Water claimed is *"Soft Water".*

Storm Water Capture Process