

MI DEQ & RETAP Pollution Prevention (P2) Training

P2 Technologies & “Dee-fusion”



Cam Metcalf, Executive Director

Richard Meisenhelder, P2 Specialist

Lori Hoetker, Technical Coordinator

Kentucky Pollution Prevention Center (KPPC)



Metal Finishing Regulations

New “Drivers”

- ❑ F006 generators accumulate up to 180 days if:**
 - ❑ P2 to reduce volume or toxicity**
 - ❑ Make more amenable to metals recovery & recycle**
 - ❑ <16,000 kg (1 truckload) at one time**
 - ❑ Comply with applicable management standards**
- ❑ Metal Products & Machinery (MP&M)**
 - ❑ Technology-based effluent limitations**
 - ❑ OPEI staff reviewing 5 specific P2 technologies**

MP&M P2 Technologies

- ❑ **For Metal-bearing Wastes:**
 - ❑ **Segregation of WW, preliminary treatment (inc. oil-water separation), chemical precipitation, sedimentation using a clarifier + in-process flow control & P2**
 - ❑ **Segregation of WW, preliminary treatment (inc. oil removal by ultrafiltration), chemical precipitation, solids separation using microfiltration + in-process flow control & P2**

MP&M P2 Technologies (cont)

☐ For Oil-Bearing Waste

Oil-water separation by:

☐ Chemical emulsion breaking

☐ Ultrafiltration

☐ Dissolved Air Flotation (DAF)

+ in-process flow control & P2

Metal Finishing Regulations

New “Drivers”

- Pretreatment Streamlining of 40CFR Part 403**
 - Reduce burdens on POTWs**
 - Still adequately control dischargers**
 - Examples: Flexible pH measurement, mass-based limits, defining categorical industrial users, sampling for pollutants not present, determining significant non-compliance**
 - Due in 2003, if data collection is complete**
- Chrome MACT**

Metal Finishing Regulations

New “Drivers”

Chrome MACT under development:

- ❑ Accommodates fume suppressants**
- ❑ Alternative standard for hooded tanks: site-specific mass-based vs. concentration limits**
- ❑ Electroplating & anodizing definitions to include ancillary equipment**
- ❑ Composite mesh pads: pressure drop from $\pm 1''$ to $\pm 2''$**

Customers may require ISO 14001 Registration...

- ❑ Honda requiring tier 1 suppliers be registered by 2001 (March 1999)**
- ❑ GM requiring suppliers to have an ISO 14001 EMS by Dec. 31, 2002 (September, 1999)**
- ❑ Ford requiring ISO 14001 registration by 2001 and 2003 (September, 1999). Ford first to have all of its plants (140) ISO 14001 registered (December, 1998)**
- ❑ Toyota Tier 1 suppliers by 2003 (March 2000); all Toyota plants in North America are registered (April, 1999)**

KMFI Case Study: ElectroShield

- ❑ Acid Zinc Plater,
3 shifts/5 days in
Georgetown, KY
- ❑ ~ \$3,000,000/yr sales
(Mostly automotive)
- ❑ 5 Plating Lines
 - ❑ 2 Automated Rack
 - ❑ 2 Manual Barrel
 - ❑ 1 Automated Barrel



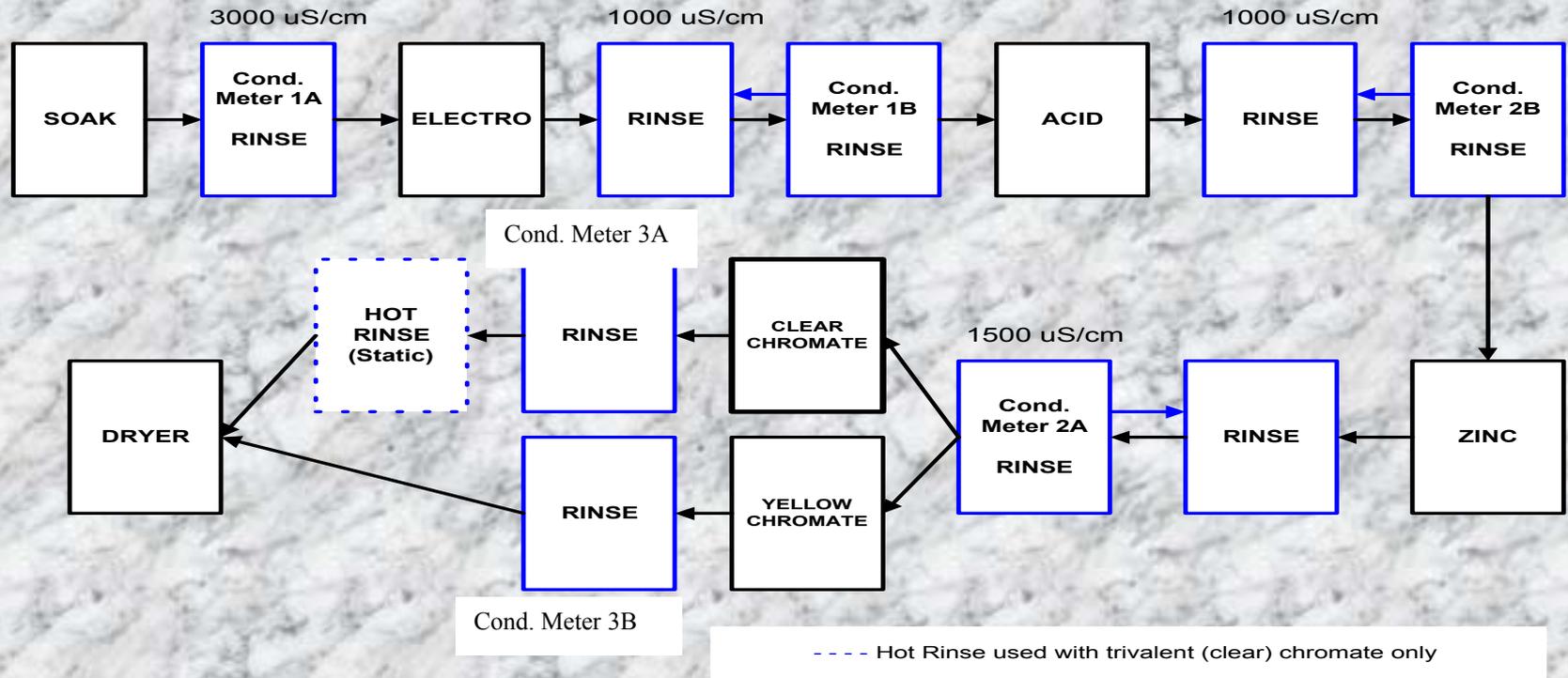
P2 Process: Phase 1

- ❑ **Conduct Site visit to assess Operations for Potential P2 Opportunities**
- ❑ **Additional visits for information (Process maps & diagrams, water flow rates, etc.)**



KMFI Case Study: ElectroShield

Acid Zinc Plating Process Diagram Line 3



KMFI Case Study: ElectroShield

❑ Facility Info for 5 Lines

- ❑ \$108,000/yr Water & Sewer Bills
- ❑ \$ 70,000 WWT Costs
- ❑ \$ 36,000 Sludge Disposal Costs
- ❑ \$214,000 TOTAL COSTS



❑ Estimated Costs for Line #3

- ❑ Water = $\$108,000 \times (0.75/3) = \$27,000$
- ❑ WWT Chemicals = \$17,500
- ❑ Sludge = \$ 7,000
- ❑ TOTAL COSTS = \$51,000

P2 Assessment Process: Phase 1

- ❑ Taking ultrasonic flow measurements on 9 plating lines (Meter = \$500/2 days or \$5,000)
- ❑ Developed detailed process maps with flow rates



Metal Finishing

Proven Practices & Technologies

- ❑ Conductivity Controls**
- ❑ Wastewater Reduction/Reuse**
- ❑ Energy Efficiency (E2)**
- ❑ Bath Filtration**
- ❑ Cleaners Recycling**
- ❑ Acid Recycling**
- ❑ Electroless Nickel**
- ❑ Alternative Barrel Designs**
- ❑ Cyanide Substitution & Management**

KMFI Case Study: ElectroShield

P2 Assessment Recommendations:

- Water monitoring, measuring & reduction/reuse**
 - Install Totalizer Meter on Automated Barrel Line (#3)**
 - Conductivity-Controlled Rinsing on Line #3**
 - Install Sewer Meter for facility**
- Install Air Knives**
- Install Air Agitators on Rinse Tanks**
- Match Barrel-Hole Size with Parts**
- Use DI Water in Plating Bath**

Final Assessment Process: Phase 1

- ❑ P2 Assessment Report
- ❑ On-site Meeting to Discuss P2 Opportunities (Involve all interested partners)



Kentucky Metal Finishing Initiative (KMFI)

- A *Voluntary* Program for Metal Finishing Organizations:
 - ⇒ Focuses on P2 assessment of proven technologies & methods
 - ⇒ Facilitates “*Going Beyond*” P2 Recommendations to P2 Implementation
- Modeled After the Successful Voluntary Program -- “Accelerated Diffusion of P2 Technology (ADOP2T)” (Waste Management & Research Center, University of Illinois)

KMFI Case Study: ElectroShield

- ❑ Install Conductivity-Controlled Rinsing on Line #3 (3 conductivity meters, 6 solenoids & totalizer)**
- ❑ Estimated Savings: ~ \$15,375/yr (25% reduction in water)**
- ❑ Payback: $\$4,900 / (\$15,375/\text{yr}) = 3.8$ months**
- ❑ P2 Applied Research Agreement (See attached)**
 - ❑ KPPC agrees to buy equipment (\$4,900) for applied research & provide technical assistance**
 - ❑ ElectroShield agrees to install (\$440) & pay KPPC back if project has <12 month payback**

Pilot Study-Initial Installation

- ❑ Purchased, set up & tested meters in the lab
- ❑ Developed quality & calibration procedures



KMFI Process: Phase 2

- ❑ **Final Report on Pilot Study:**
 - ❑ **Development of quality control instructions (QCI)**
 - ❑ **Calibration procedures**
- ❑ **Full-Scale Implementation**
- ❑ **Actual Results & Overall Cost Savings of Project**
- ❑ **Full-Scale Demonstration for Others**



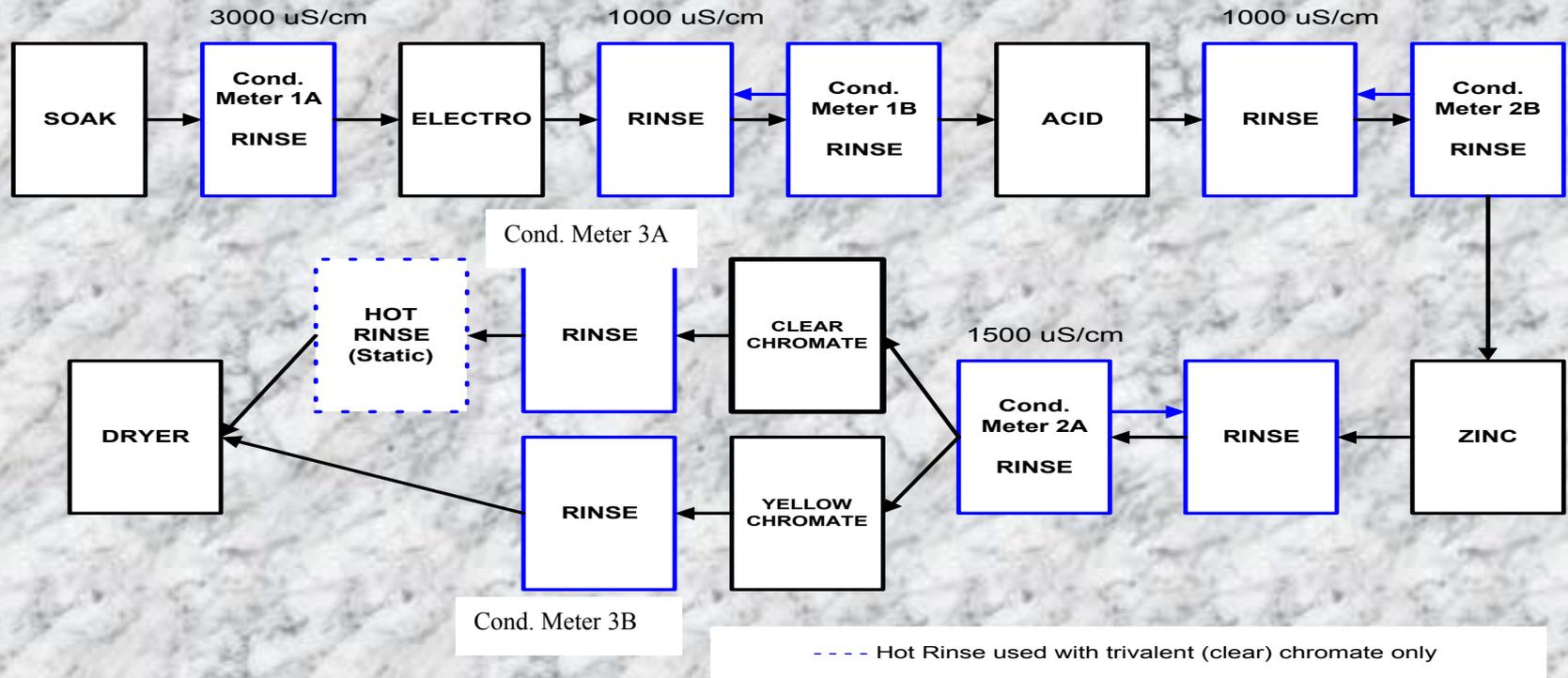
KMFI Case Study: ElectroShield

- ❑ Installed & programmed system on-site



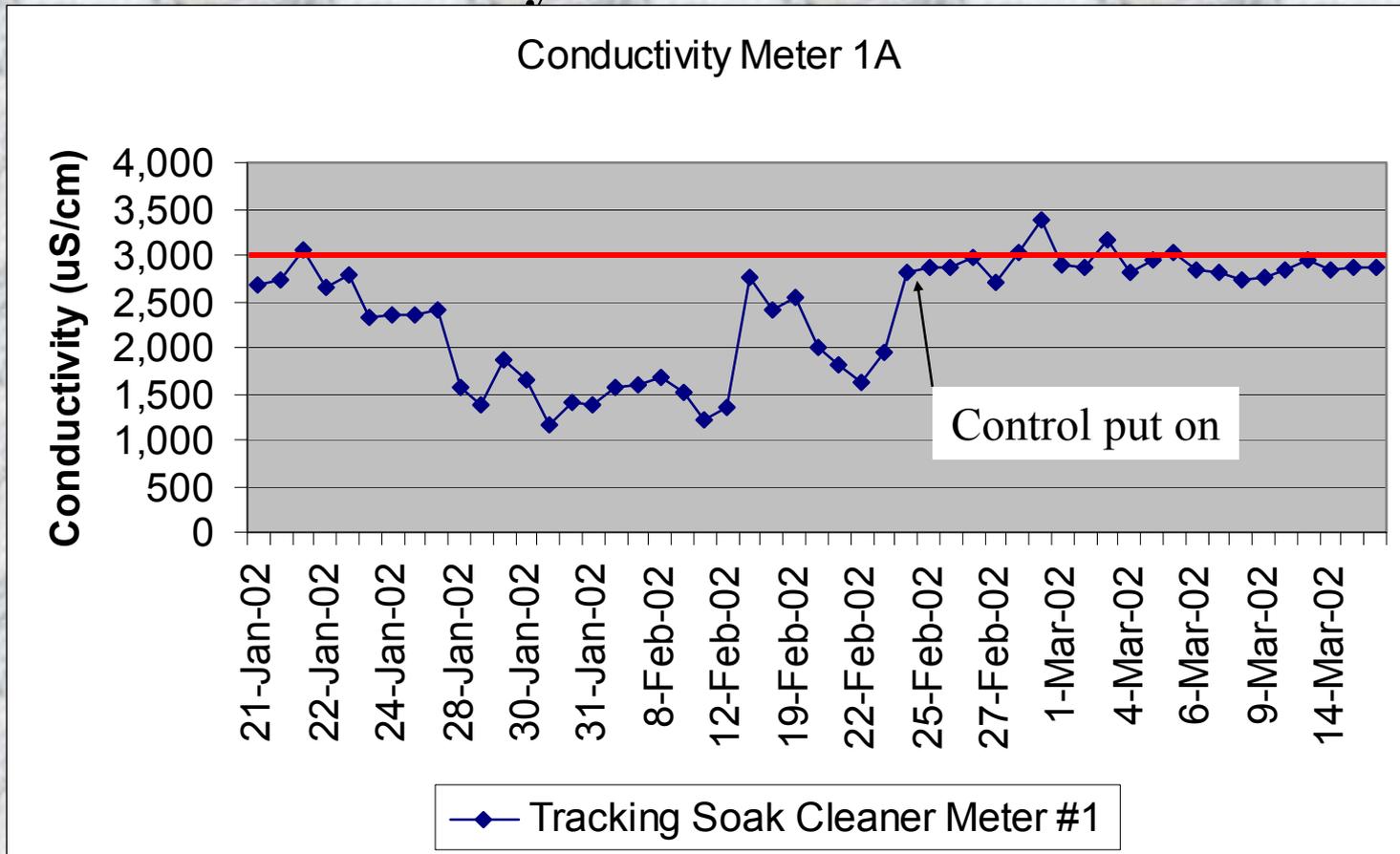
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Acid Zinc Plating Process Diagram Line 3



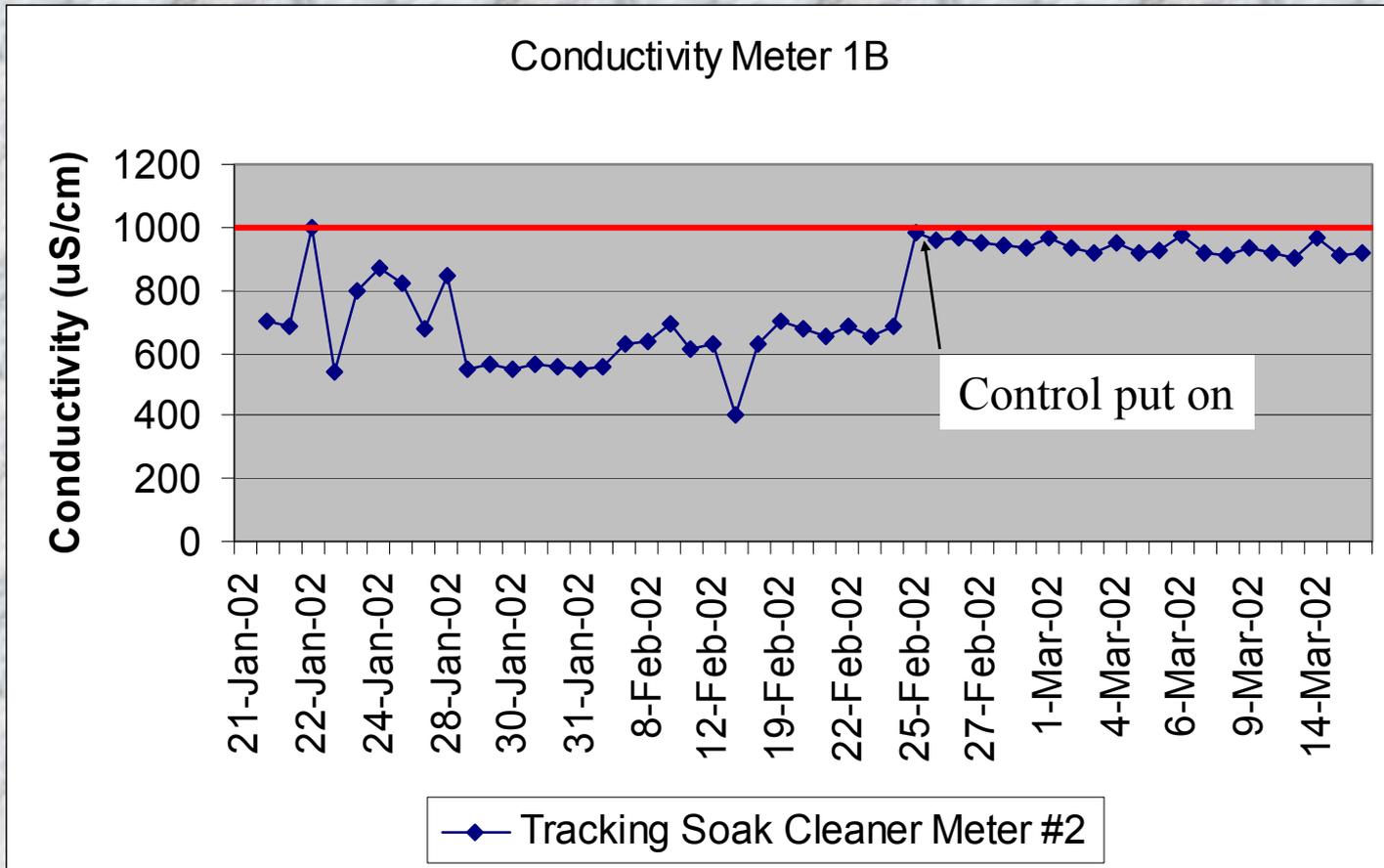
KMFI Case Study: ElectroShield

Conductivity Results for Meter 1A



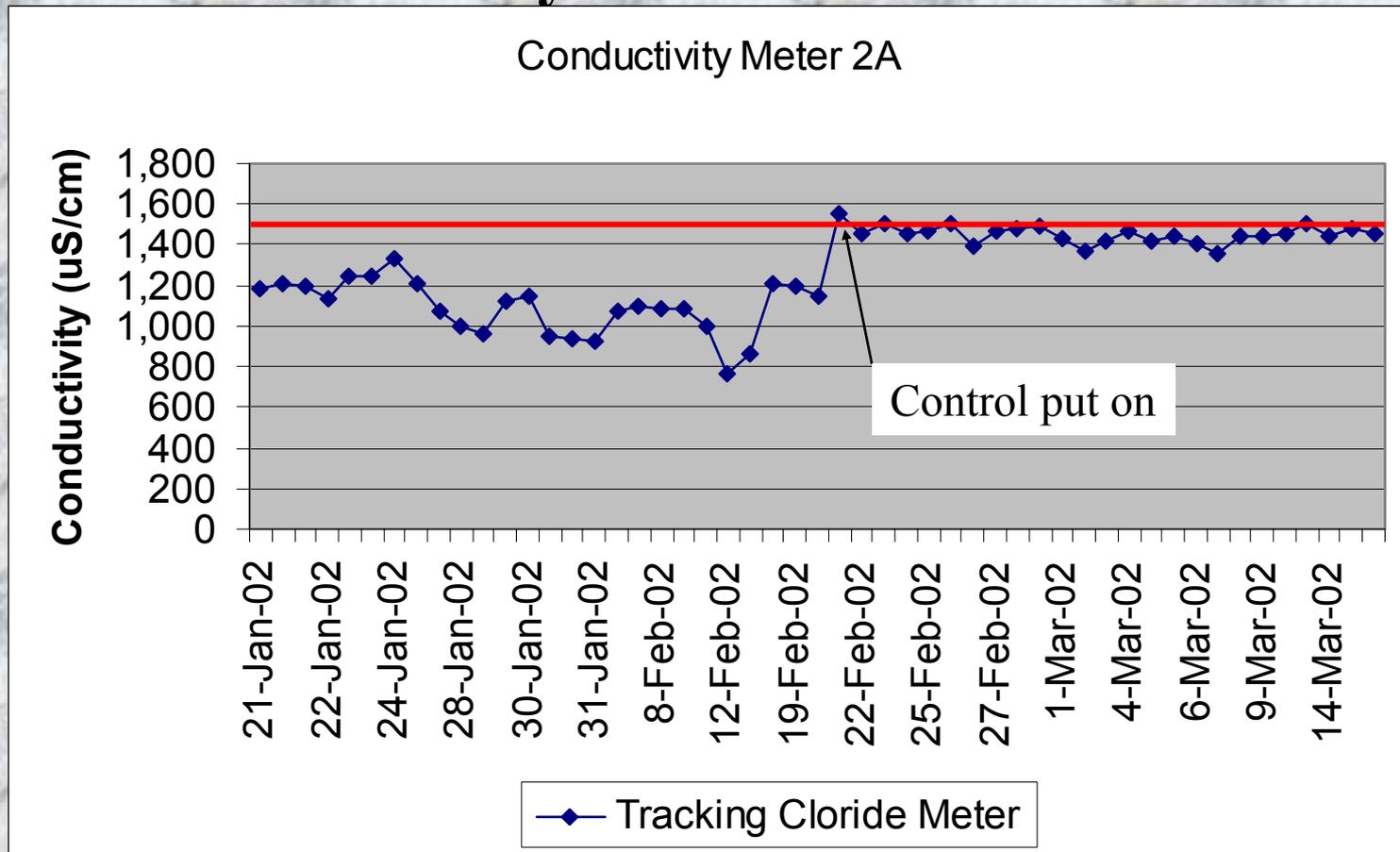
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Conductivity Results for Meter 1B



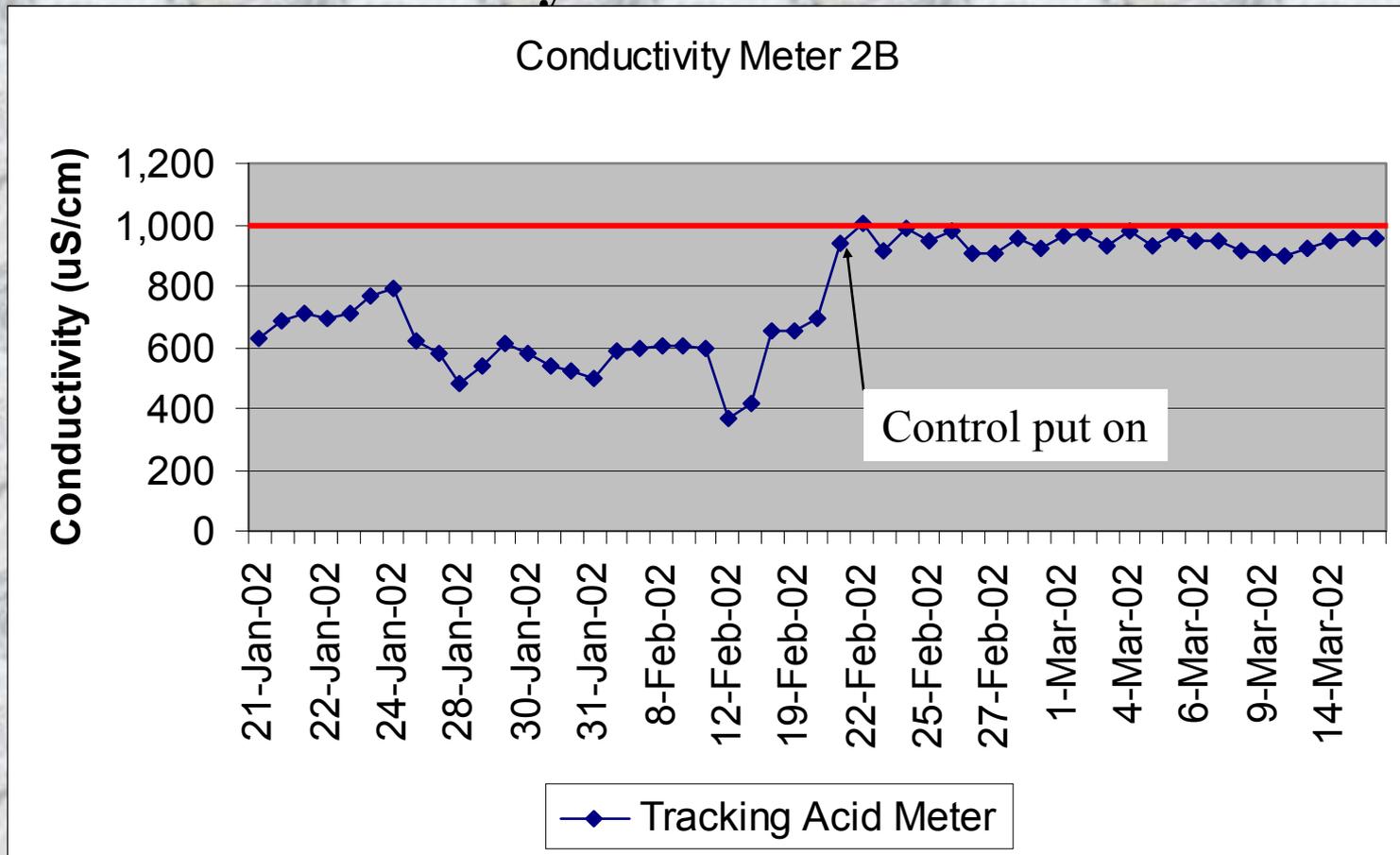
KMFI Case Study: ElectroShield

Conductivity Results for Meter 2A



KMFI Case Study: ElectroShield

Conductivity Results for Meter 2B



KMFI Case Study: ElectroShield

☐ Actual results during 3 week start-up:

☐ About 35% reduction in water/sewer use!

✓ On track for \$10,000/yr savings in water costs!

**☐ A 40% increase in facility water pressure
(32 to 45 psi)**

**☐ Reduction in wastewater process problems
due to hydraulic overloading (66 %
reduction in backwashing – 3X to 1X/shift)**

**☐ Sludge & wastewater chemical costs will be
determined but it takes longer time frame**

KMFI Case Study: ElectroShield

Next steps:

- Install 3rd Meter on Chromate rinse tanks (3/28/02)
- Determine setpoints for 3rd meter (1000 uS/cm)
- Increase setpoints of 1st & 2nd meters
- Determine total savings for water use & wastewater treatment
- Facility wishes to install conductivity-controls on other 2 automated plating lines (KPPC helps facilitate this!)
- Study 2 manual plating lines (Procedures & Dragout)
- Payback KPPC for “research” start up monies

“Results-oriented” Organizational Participation

- Time, Cooperation & Collaboration (Contract)**
- Access to Various Records:**
 - Water Usage & Costs**
 - Energy Consumption & Costs**
 - Chemical Usage, etc.**
- Willingness to Evaluate New Ideas & Concepts**
- Access to Operations’ Personnel Knowledgeable in Metal Finishing Processes**
- Retraining for Operators & Maintenance**
- Reviewing Monitoring & Calibration Procedures**

P2 Implementation Partners

- Metal Finishing Employees**
- Vendors/Suppliers/Contractors – Current or New**
- KPPC P2 Engineers, Retired Engineers & Graduate Engineering Students**
- University Lab Support Staff**
- Others?**

KMFI Environmental Management Program (EMP) Timeline

Varies Depending On:

- ❑ Mindset of Facility Management, Employees & EHS**
- ❑ Types of Data Available/Ease of Access**
- ❑ Complexity of Problem(s) & Solution(s)**
- ❑ Pilot Study & Installation Timelines Success**
- ❑ Testing, Analyzing & Finalizing Operational Controls, Monitoring & Calibration Procedures**
- ❑ Documenting the Results for P2 Technology Diffusion**

Current KMFI Status

- ❑ Targeted Metal Finishing Sector (Initially)**
- ❑ 2 Metal Finishers have volunteered for Program (7 are interested after assessments)**
- ❑ Water use reduction options are being evaluated**
- ❑ Provides methods for meeting Strategic Goals Program (SGP) Objectives (US EPA)**
- ❑ Next Target: Energy Efficiency (E2)**

MI DEQ & RETAP Pollution Prevention (P2) Training

***Next Steps: Encourage
Adoption of P2 Technologies!***

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