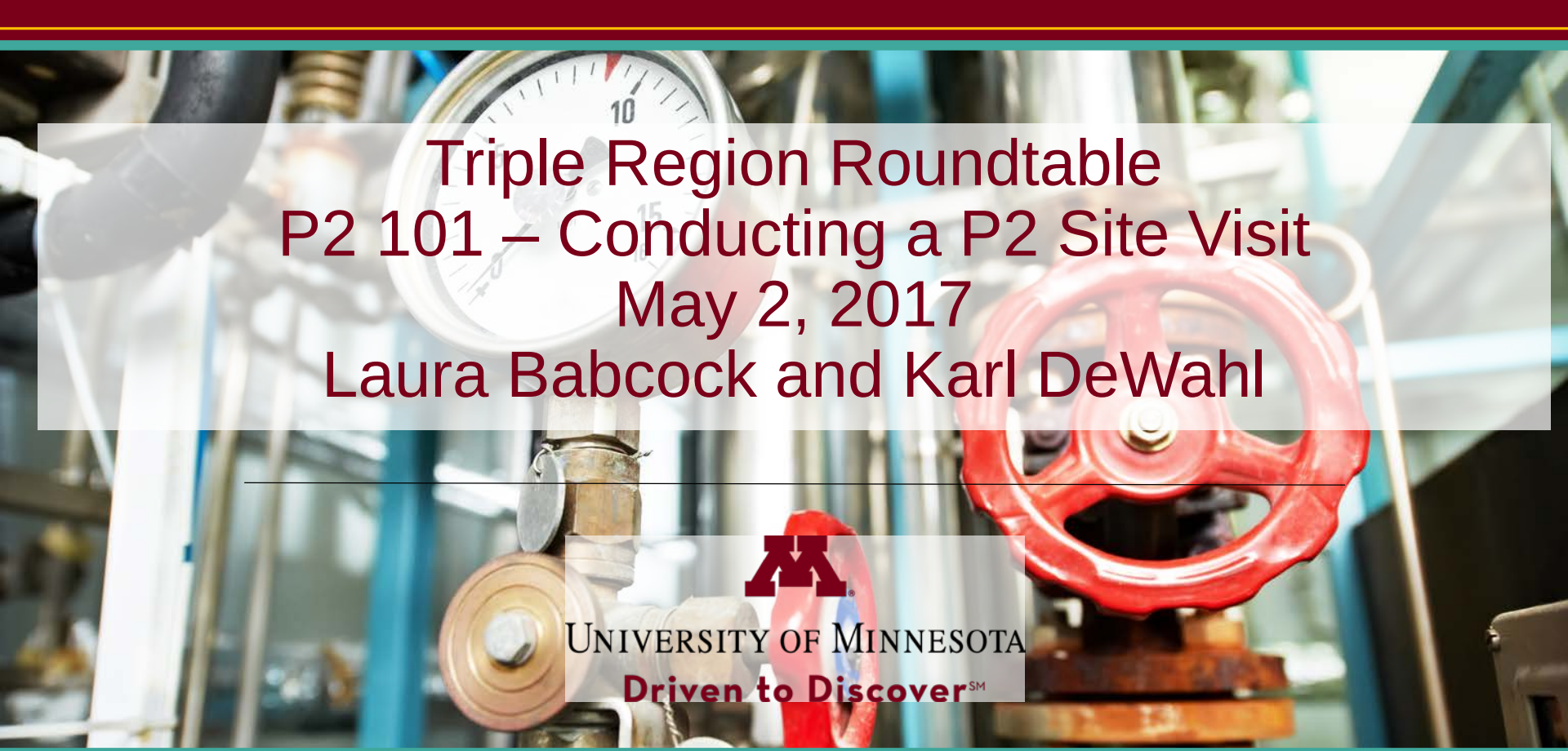


Triple Region Roundtable
P2 101 – Conducting a P2 Site Visit
May 2, 2017
Laura Babcock and Karl DeWahl

UNIVERSITY OF MINNESOTA
Driven to Discover℠

Session Goals

- **Review a general process for P2 site visits**
  - Before, During and After
- **Practice P2 observation skills**
  - Phosphorus reduction case example
    - Generating recommendations
    - Identifying the value proposition
  - Water use reduction case example
    - Illustrate importance of mass balance
    - Getting the information you need

Site Visits – Before You Go

- **Focus of the assessment**
  - What are we looking at
  - Why do they care
- **Assessment team**
  - Leadership positions
  - Know the process
- **Prepare, prepare, prepare**
  - Review relevant information
  - Bring ideas and equipment
- **Think about safety**

Site Visits – While You Are There

- **Short kick off meeting**
  - Introductions and goal review
  - Changes or concerns
- **Site tour and process flow**
  - Observe operation with all senses
  - Ask questions, engage staff
- **Data collection**
  - Who is collecting and how
  - Will there be a second visit
- **Wrap up meeting**
  - Solicit staff feedback on process
  - Provide your observations and timeline
  - Establish a primary contact

Site Visits – Follow Up

- **Analyze data**
  - Consult reference materials and case studies
  - Justify with engineering calculations and cost estimates
- **Write report**
  - Highlight key findings
  - Develop value proposition
- **Present opportunities**
  - Get feedback on results
  - Gauge interest/ ability to implement
  - Follow up with the site within one month of presenting results

Situation

- City of Rockford WWTP
- Anticipating decrease in P in next permit
- Cost $86,000/yr to meet new limit
- Seeking influent reductions to avoid cost
- Ver-tec Labs Rockford, MN
- Manufacture industrial cleaners/degreasers
- Contract formulation and packaging
- Agreed to a site visit for P and BOD reductions

Observations

- Most of Ver-Tec products contain P.
- Liquid product blend tanks were washed between runs with wash discharged to sewer.
- Solid product blends had issues with caking on tank walls and mixing units. Cleaning between runs and discharge to sewer.
- Wash effluent is alkaline and needs to be neutralized prior to discharge to WWTP.

Exercise

- Form a work team 3-4 people
- What can you recommend to Ver-Tec to reduce P and BOD in their wastewater effluent?
- Why might they be motivated to do this?
- Feel free to ask questions as you develop recommendations
- Be prepared to present your solutions and business justifications to the group

Impact: Phosphorus Reduction

Goal – Reduce high BOD and P load in wastewater effluent

Rockford, Minnesota

- **Actions**
  - Reuse rinse from liquid product blending
  - Change equipment to decrease cleaning requirements and reuse rinse
  - Schedule production to decrease cleaning requirements
  - Reformulate products
- **Results**
  - 8,650 lb reduced P to city WWTP
  - $100,000 saved from raw material purchases and discharge fees

Assessment Skills Exercise

Water Reduction

Karl DeWahl

Permit Documentation

Optics R Us
Wastewater discharge permit:

Water meter reading	1,350,000 gallons per year	
Domestic water usage	550,000 gpy*	(110 employees)
Industrial wastewater	800,000 gpy	

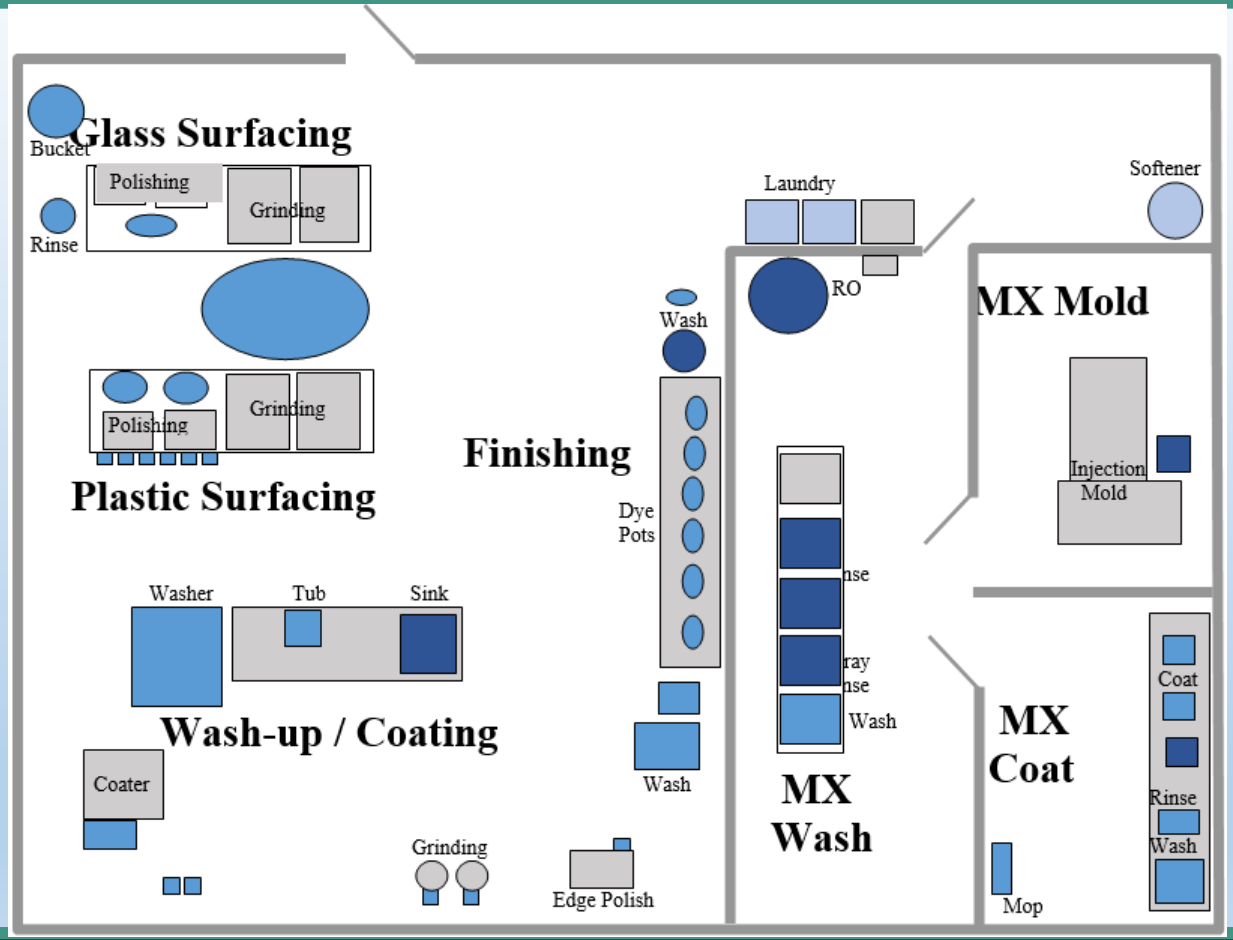
Annual water and sewer costs are $3800 per year.
SAC / WAC = $14,000 (*one time*)
SAC/WAC based on 500,000gpy increase from 3 years prior

Can you help?

Reduction Methods: Permit Docs

- Effluent purification & recycle
- Toilet & sink improvements

Tour

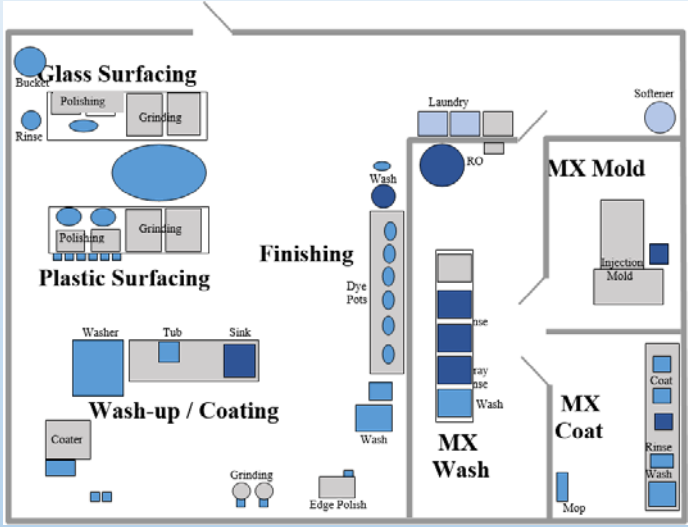

Glass Surfacing
Bucket
Polishing
Grinding
Rinse
Polishing
Grinding
Plastic Surfacing
Laundry
Softener
RO
MX Mold
Wash
Finishing
Injection
Mold
Dye
Pots
nse
ray
nse
Wash
Wash
MX
Wash
MX
Coat
Coat
Rinse
Wash
Mop
Washer
Tub
Sink
Wash-up / Coating
Coater
Grinding
Edge Polish

Reduction Methods: Tour

- Purify & recycle; toilets; sinks
- Individual reuse
- Tank volume reduction
- Flow reduction
- How much?

Talk to Operators / Experts

- Tank volume
- Change intervals
- Flow rates / duration
- Cleanliness need / specifications
- Changes over time
- Their reduction ideas



Talk to Operators / Experts – Mass Balance

Standard Line	Plastic Surfacing - generating	*dry*		
	Plastic Surfacing - polish	11,000		
	Plastic Surfacing - rinse	3,000	14,000	
	Glass Surfacing - generating	500		
	Glass Surfacing - polish	1,500		
	Glass Surfacing - rinse	1,500		
	Glass Surfacing - equip rinse	2,500		
	Glass Surfacing - floor wash	1,000	7000	
	Wash - lens rinse	9,000		
	Wash - spot cleaning	2,000		
	Wash - ultrasonic wash	15,000		
	Wash - coater	10,000		
	Wash - tool rinse	8,000	**44,000**	
	Shaping / Finishing - grinding	500		
	Shaping / Finishing - polish	500		
	Shaping / Finishing - wash	5,000		
	Shaping / Finishing - rinse	2,500		
	Shaping / Finishing - dye	2,500		
	Shaping / Finishing - rinse	2,000	13,000	**78,000**

MX

Molding (tempering)			
Wash - wash tank	500		
Wash - **spray rinse**	40,000		
Wash - cascade rinse	*feed spray*	**40,500**	
Coat - dip tanks	12,500		
Coat - spray rinse	700		
Coat - ultrasonic tanks	100		
Coat - rinse tubs	3,000		
Coat - mop	1,000	17,300	**57,800**
			135,800

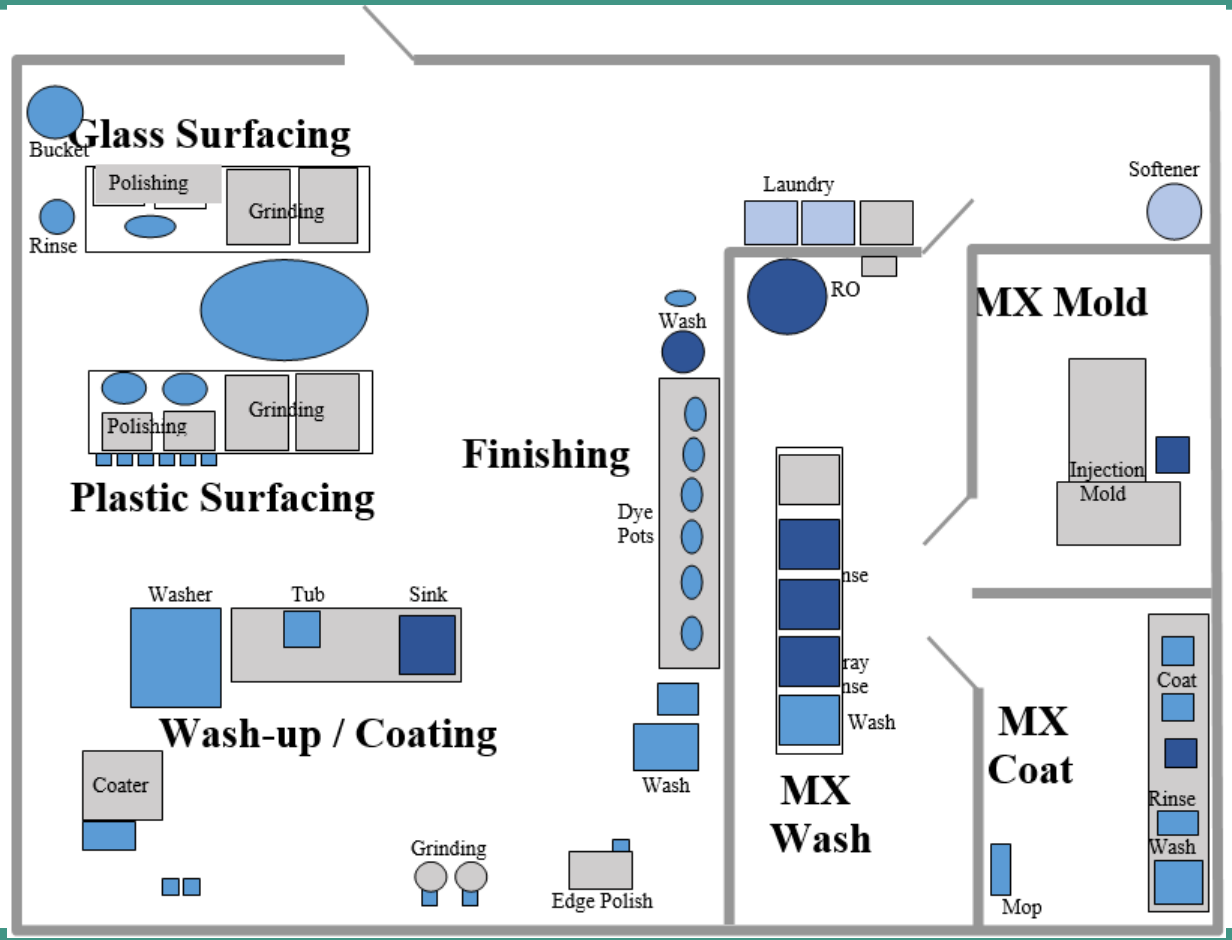
Reduction Methods: Process Experts

- Individual reuse
- Tank volume reduction
- Flow reduction
- Procedure change
- Improved controls
- How much? 136,000gpy?

What's Next?

- Tempering
- RO reject
- Laundry
- Softener
- Leaks?

- No knowledge



Assessor Investigation

- Bucket test (RO, temper?, Laundry?, softener??)
- Calculate, estimate (temper, Laundry, softener)
- Find external expert / resource (RO, temper, Laundry, softener)
- Test, trial, pilot

Assessor Investigation

Mass Balance			totals
MX	**Molding (tempering)**	**150,000**	
	Wash	**40,500**	
	Coat	17,300	**207,800**
Standard Line	**Wash**	**44,000**	
	Plastic Surfacing	14,000	
	Shaping / Finishing	13,000	
	Glass Surfacing	7000	**78,000**
Misc Uses	**Laundry**	**370,000**	
	RO Reject	**120,000**	
	Softener Regeneration	9500	**499,500**
			785,300

Reduction methods: Investigation

- Outsource laundry
- More efficient washer or RO
- Reuse RO reject
- Tempering control

Assessment Stages

- Review permit - facility totals, totals history
- Tour – source ID, qualitative magnitude
- Ask process experts – quantitative, procedures, history, reduction ideas
- Investigation – further details – tests, manuals, vendors

Conclusions:

- Mass Balance – have everything important?
- Get complete overview
- Have to ask
- You Generated the ideas
  - Investigation Generated Opportunities
  - Understanding the Process is Key

Generating Ideas is only the First Step

- Next steps
  - evaluate feasibility;
  - justification