Triple Region Roundtable
P2 101 – Conducting a P2 Site Visit
May 2, 2017
Laura Babcock and Karl DeWahl
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/dgreasers
- Contract formulation and packaging
- Agreed to a site visit for P and BOD reductions

http://www.mntap.umn.edu/POTW/resources/Ver-tech.html
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

http://www.mntap.umn.edu/POTW/resources/Ver-tech.html
Assessment Skills Exercise
Water Reduction

Karl DeWahl
Optics R Us
Wastewater discharge permit:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water meter reading</td>
<td>1,350,000 gallons per year</td>
</tr>
<tr>
<td>Domestic water usage</td>
<td>550,000 gpy*</td>
</tr>
<tr>
<td>Industrial wastewater</td>
<td>800,000 gpy</td>
</tr>
</tbody>
</table>

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
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
<table>
<thead>
<tr>
<th>Process</th>
<th>Standard Line</th>
<th>Molding (tempering)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic Surfacing - generating</td>
<td>dry</td>
<td></td>
</tr>
<tr>
<td>Plastic Surfacing - polish</td>
<td>11,000</td>
<td></td>
</tr>
<tr>
<td>Plastic Surfacing - rinse</td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td>Glass Surfacing - generating</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Glass Surfacing - polish</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Glass Surfacing - rinse</td>
<td>1,500</td>
<td></td>
</tr>
<tr>
<td>Glass Surfacing - equip rinse</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Glass Surfacing - floor wash</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Wash - lens rinse</td>
<td>9,000</td>
<td></td>
</tr>
<tr>
<td>Wash - spot cleaning</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Wash - ultrasonic wash</td>
<td>15,000</td>
<td></td>
</tr>
<tr>
<td>Wash - coater</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>Wash - tool rinse</td>
<td>8,000</td>
<td></td>
</tr>
<tr>
<td>Shaping / Finishing - grinding</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Shaping / Finishing - polish</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Shaping / Finishing - wash</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>Shaping / Finishing - rinse</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Shaping / Finishing - dye</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>Shaping / Finishing - rinse</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Wash - wash tank</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Wash - spray rinse</td>
<td>40,000</td>
<td></td>
</tr>
<tr>
<td>Wash - cascade rinse</td>
<td>feed spray</td>
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<tr>
<td>Coat - dip tanks</td>
<td>12,500</td>
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<tr>
<td>Coat - spray rinse</td>
<td>700</td>
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<tr>
<td>Coat - ultrasonic tanks</td>
<td>100</td>
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</tr>
<tr>
<td>Coat - rinse tubes</td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td>Coat - mop</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>135,800</td>
<td></td>
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</table>
Reduction Methods: Process Experts

• Individual reuse
• Tank volume reduction
• Flow reduction
• Procedure change
• Improved controls
• How much? 136,000 gpy?
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
## Mass Balance

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>MX</td>
<td>150,000</td>
</tr>
<tr>
<td>Wash</td>
<td>40,500</td>
</tr>
<tr>
<td>Coat</td>
<td>17,300</td>
</tr>
<tr>
<td><strong>totals</strong></td>
<td><strong>207,800</strong></td>
</tr>
<tr>
<td>Standard Line</td>
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</tr>
<tr>
<td>Wash</td>
<td>44,000</td>
</tr>
<tr>
<td>Plastic Surfacing</td>
<td>14,000</td>
</tr>
<tr>
<td>Shaping / Finishing</td>
<td>13,000</td>
</tr>
<tr>
<td>Glass Surfacing</td>
<td>7000</td>
</tr>
<tr>
<td><strong>totals</strong></td>
<td><strong>78,000</strong></td>
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<tr>
<td>Misc Uses</td>
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</tr>
<tr>
<td>Laundry</td>
<td>370,000</td>
</tr>
<tr>
<td>RO Reject</td>
<td>120,000</td>
</tr>
<tr>
<td>Softener Regeneration</td>
<td>9500</td>
</tr>
<tr>
<td><strong>totals</strong></td>
<td><strong>499,500</strong></td>
</tr>
<tr>
<td><strong>totals</strong></td>
<td><strong>785,300</strong></td>
</tr>
</tbody>
</table>
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