Getting Your "Food" in the Door: Strategies to Engage Food Manufacturers in Pollution Prevention Technical Assistance

US Environmental Protection Agency
Region 9 Pollution Prevention Program

March 24, 2020

Getting Your "Food" in the Door

EPA P2 Hub Helpline:

- Voicemail - (202) 566-0799
- Email: P2Hub@epa.gov
- Webform:

www.epa.gov/p2/forms/p2-hub-helpline-contact-form#form

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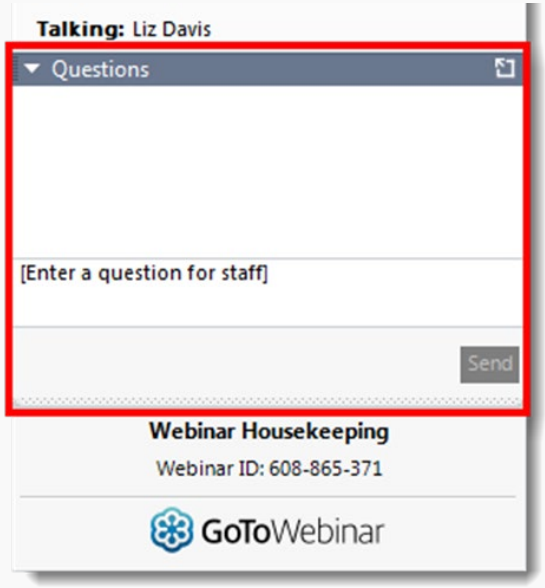

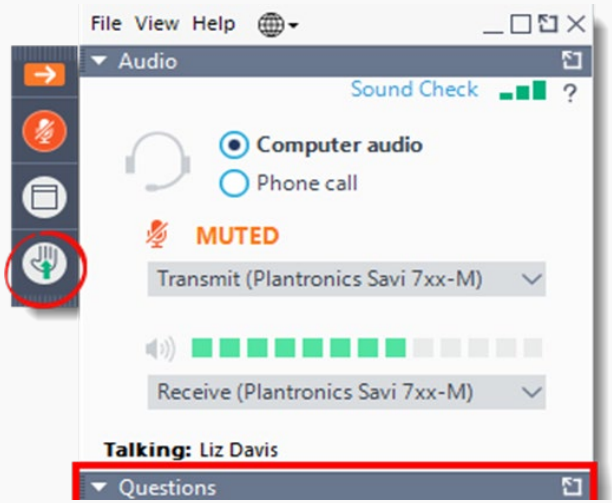

Getting Your "Food"in the Door

- Bruce Dvorak – University of Nebraska
- Derek Boer – CO Dept. of Public Health and Environment
- Brian Morgan, Kerry, Inc.

P2 for Food and Beverage Manufacturers

University-Based P2 Grant Program:
Integration of Multiple Partners to Place, and Support Student Interns

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University of Nebraska Lincoln

P3 Partners in Pollution Prevention

Overview

University of Nebraska-Lincoln's Partners in Pollution Prevention (P3) program

- Summer student-driven one-on-one technical assistance with written business management reports.
- Various sources of funding (EPA P2 Grants, State P2/Recycling Grants, DOE IAC).
- Small staff allocated to program (<1 FTE).
- Clients pay $5,000 toward student.
- Clients are in the manufacturing sector.
  - Each grant has different client requirements/ deliverables

Overview

University of Nebraska-Lincoln's Partners in Pollution Prevention (P3) program

- Scope of work prepared in early spring, including expectations of client (e.g., degree of support, post-project documentation).
- Students take a 3-credit hour Engr. summer class.
- 12 weeks in-house assistance + business management report
- Allow some aspects of confidentiality to be initially vague (esp. with data collection focused projects).

Vacuum sampler

Auto sampler

Ultrasonic Flow Meter

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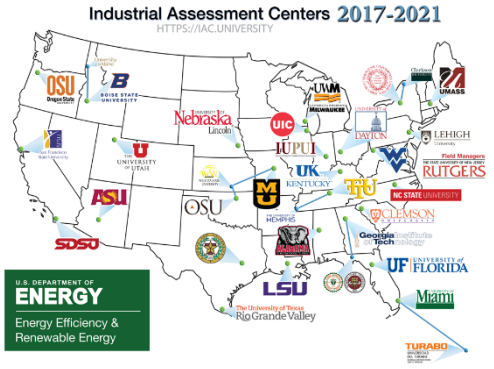
Partnerships



- Nebraska Industrial Assessment Cer (NIAC)
  - One day, no cost energy and waste assessments
  - P3 faculty operate NIAC
- Nebraska Electric and Wastewater Utilitie (all publicly owned)
  - Relationship based on NIAC
  - Provide introductions to potential partners
- Nebraska Manufacturing Extension Partnership (NMEP)
  - Portions of state grant pay NMEP staff to help with P3, and NMEP is able to claim some part of the project results
- UNL Food Science Faculty
  - Based on shared USDA grants

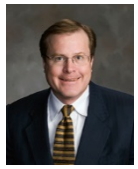
Industrial Assessment Center
U.S. DEPARTMENT OF ENERGY

Partnerships take time to build

Other Important Partnership

- Nebraska Department of Environment and Energy
- University of Nebraska Extension (both Food Safety and other areas)

Cross-linked Partnerships



Dvorak
P2 Lead

US DOE NIAC

Williams
IAC lead

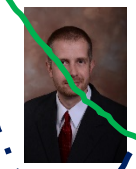
US EPA P2 Grant

IAC
Engr.

+Pay

NDEE Waste Redux Grant

USDA Beef Safety Grant



NMEP
Staff

+ Pay

Subbiah
USDA Grant lead

Finding Food Processors for projects

- ~~Cold calling.~~
- Clients came via introductions from other contacts.
- Initial Introductions from:
  - Past clients (10%),
  - Food science faculty (20%),
  - NE Manufacturing Extension Partnership (20%),
  - Electric and wastewater utilities (20%), and
  - NE Industrial Assessment Center (30%).

Examples of cross-over services:

- Plant 1 - Electric Utility referral + past client → NIAC → P2 intern
- Plant 2 - Wastewater Utility + NMEP referral → P2 intern → NIAC
- Plant 3 - Food Science referral + past client → P2 intern → Research

How Food Manufacturers are Different

- Product loss (emphasis on ways to avoid edible material hitting floor and becoming inedible).
- Antimicrobials can add to wastewater load.
- Large water use and wastewater production.
- Energy in the water (60-80% of cost is for heating for sanitation).
- Quantity of data that is not fully analyzed.
- Have not determined full costs for water / wastewater
  - Real cost of (hot) water [purchase, treatment, heating, wastewater, O&M]
  - Real cost of wastewater loadings [wastewater pre-treatment, surcharges, O&M]

Topics of Interest to Food Manufacturers

- Help plant respond to corporate mandates related to “sustainability.”
- Help make sense of their data they have collected (e.g., many have water and energy monitoring systems, but have not sufficiently analyzed the data to identify opportunities).
- Provide highly capable, trained, students with access to monitoring equipment.
- Reducing Energy use through “lower hanging fruit” (demand management, lighting, compressed air, VFDs).
- Reducing water use, wastewater surcharges, and product loss.
- Energy recovery (e.g., boiler economizer, heat exchanger).

“Top” P2 Recommendation Types

- Similar to other manufacturers:
  - Short payback & low implementation cost recommendations are highly implemented.
- Recommendations to build into their capital improvement plans.
- Topics with implementation where paybacks are long:
  - Water use reduction and solid waste reduction
    - Part of corporate sustainability goals
  - Wastewater loading reduction
    - Reduce “risk” of compliance violations
    - Reduce “risk” from public relations issues within local community

Assessing Success

One year afterwards (+ multi-year follow-up as needed):

- Open-ended in-person interviews with previous clients
- Reassessments determine:
  - Implementation status
  - Savings (client provided)
    - Money
    - Hazardous waste
    - Energy
    - Water
  - Health, Safety and Prevention
  - Other intangible benefits
  - Include narrative concerning the client's anecdotal remarks

30 min to
2 hrs

QUESTIONS?

Engaging Food and Beverage Manufacturers

Colorado's Experience Collaborating with Regulators

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Programmatic Setting

- Small P2 and leadership programs
- Colorado Department of Public Health and Environment
- Food and beverage NEA
- Co-located with environmental health regulatory programs

Program Revitalization

- Increase technical assistance to businesses
- Minimal outreach capacity - materials, reputation
- We needed to be able to:
  - Identify facilities
  - Build relationships with industry
  - Build momentum

Program Integration

- Partner with state Manufactured Foods (MF) Program to identify opportunities
- MF Program regulates food safety
- Build from existing connections and relationships

Benefits

- P2 Program
  - Greater reach
  - Trust
  - Screening ability
- Manufactured Foods
  - Increased value and service
  - Compliance through voluntary measures
  - Build greater trust

Inspector Training

- Met and trained food inspectors
- Introduce basic P2 concepts, what to look for
- Periodic trainings

Outreach Materials

- Sector-specific P2 fliers and guidance
- Inspectors hand out during inspections

Inspections

- Identify P2 opportunities during inspections
- Gauge business interest
- Provide P2 information

Referrals

- Refer company to P2 specialist
- Tracking and feedback to the inspector

Partnered Response

- Improved assistance – industry experience, technical expertise, compliance assistance
- Joint site visits with regulatory inspectors

Inspector Expertise

- Collaborate with inspectors to address P2 issues
- Provide insight on:
  - Layout
  - Process improvements
  - CIP
  - Chemical alternatives
  - Sanitizing

Recognition

- Environmental Leadership Program
- MF refers businesses to both P2 Program and ELP
- Feedback when businesses are recognized
- Invite inspectors to awards event

Case Studies

- Promote innovative P2 techniques

For two Colorado breweries, reducing waste leads to a better business and better beer

More and more breweries are looking for ways to improve their bottom line through reduced operational costs, improved processes, company differentiation and improved customer relations while maintaining a sustainable brewing process. Colorado is home to more than 300 breweries that have a statewide economic impact of more than $1 billion. Considering the sheer number of breweries, especially small ones such as microbreweries and brewpubs, and their aggregated economic contribution, there is significant opportunity to test and develop best practices.

Fortunately, most brewers tend to be nimble and innovative and are not afraid to try new things in the hopes of better beer and a better business. Two of Colorado's leading breweries, Left Hand Brewing Company and Broken Compass Brewing, have seen their businesses improve through pollution prevention "P2" techniques that reduce waste and increase efficiencies.

Left Hand's P2 practices improve bottom line

Those of us who live in Colorado know Left Hand as a premier brewery located along the banks of the St. Vrain River. With a passion for the environment, Left Hand President and cofounder Eric Wallace has created a sustainability committee. Members from each brewery department brainstorm ways the business can become more sustainable.

Left Hand has increased landfill diversion and recycling using waste audits, signage and waste reduction campaigns. As with most breweries, spent grain is collected by cattle ranchers to be used as feed. They also divert sweet water[1] from the local wastewater treatment plant and give it to cattle ranchers.

While Left Hand focuses much of its efforts on waste reduction, energy efficiency and water conservation are also key to Left Hand's pollution prevention successes. Left Hand has added a Braukon Kettle[2] to operations, reducing natural gas use by half. They also have installed a 4.8 kilowatt solar photovoltaic system to offset grid-supplied electricity. To reduce water consumption, Left Hand uses a clean-in-place system[3] and water-efficient brewing equipment.

While a majority of efficiencies result from equipment and process changes, Left Hand has been successful engaging staff in its efforts. Employees were particularity motivated by their peers and management: When they saw the the president involved, and the work of the sustainability committee, they were more willing to engage in sustainable activities.

Currently, Left Hand uses 28 kilowatt-hours and 3.92 gallons of water per barrel of beer produced and diverts 99 percent of waste from the landfill. They have also received zero waste certification from Boulder County's Partners for a Clean Environment program.

Broken Compass' vision: Most sustainable brewery in the world

Broken Compass is a true microbrewery pub, located in the heart of Breckenridge. When David Axelrod helped co-found Broken Compass, he looked at his business and building holistically, from a systems perspective -- everything that happened in his business, including the brewing process and operations, is connected.
From the beginning, the brewery tapped local resources:

Partnered Outreach

- Present P2 at trainings and food safety conference
- P2 techniques and economic savings obtained through the implementation of P2

Ongoing Collaboration

- Sustainable breweries
- Coffee roasters and bakeries
- Periodic meetings with inspectors
- Share P2 information - TRI
- Related initiatives – Food-11 Initiative, Food Waste Summit

Lessons Learned

- Regulatory programs can be conduit to businesses
- Regulatory staff provide insight into P2 opportunities
- Regular contact with regulatory staff improves
  - Buy-in and interest
  - Ability to identify P2 opportunities
- Enforcement/assistance interaction may be difficult
  - Assistance must remain enforcement free

Kerry / MnTAP Partnership 2017 & 2019

UNIVERSITY OF MINNESOTA
Driven to Discover℠

MnTAP

UNIVERSITY OF MINNESOTA

Company Background

- **The Taste & buNutrition Company**
  - World HQ: Naas, Ireland
  - North American HQ: Beloit, Wisconsin
- **Rochester Site**
  - Applied Health & Nutrition
  - Spray dried fermented ingredients
    - Shelf-life extenders in bread & meat products
    - Natural meat cultures
  - Liquid ffered vinegars & peptides

Figure: Kerry R3 spray dryer start-up

Motivations for Change – "Sustainability 2020"

KERRY 2015-2020 ENVIRONMENT PROGRAMME			
	Carbon Emissions	Water Use	Waste
Targets BASELINE YEAR 2013	-13%	-7%	-12%
2016 Performance BASELINE YEAR 2013	-2.5%	-2.7%	-10%

MnTAP Intern Program

- **Partnership between UofM, MPCA, Industry**
- **Low Cost Summer Intern**
  - Focus on water & chemical use reduction
  - Aligned project ideas with Kerry's business needs
- **Enabling Growth for Kerry**
  - Reduce resource intensity
  - Make more product with same amount of energy/water

Recommendation	Impact	Cost	Savings, per year	Payback Period	Status
Install RO Skid	2.1 million gal water, 68,100 therms	$210,000	$38,600	2.5 years	Installed
Equalization Tank	16,600 lb caustic, 9,400 lb sulfuric acid	$2,050,000	$8,000	>10 years	Installed
Closed Loop Cooling	200 million gal water	$900,000	$27,000	>10 years	Planned 2021
Effluent process control	4 million gal water of unsafe pH	$0	$20,000	Instant	Implemented
Condensate water reuse	30 million gal water	$600,000	$300,000	3 years	In Design
Re-route scrubber water	1.2 million lb. BOD	$0	Further analysis needed	Instant	Partially implemented
Improved product scheduling	200,000 lb. BOD	$0	Further analysis needed	Instant	Recommended
Powder packaging control	Further analysis needed	Further analysis needed	Further analysis needed	N/A	In Design
On-site biological treatment	Further analysis needed	Further analysis needed	Further analysis needed	N/A	Further analysis needed.

Questions?

Recommendation: Wastewater Optimization

- Increases residence time
- Regulates pH and mixing
- Programs automated control
- Benefits
  - Chemical usage
  - Permit compliance
- Increases efficiency by 94%

Figure: (L) Water sampler connected to waste system. (R) Access hatch to an adjustment tank

BOD Identification and Re-Routing

- **Conduct wastewater assessment**
  - BOD characterization
- **Optimize process controls**
  - Logic programming
- **Develop ideas for improvement**
- **Perform water balance**

Figure: (Top) Lower portion of scrubber for R3 spray dryer. (R) Water samples were obtained from major assets.

Recommendation: Reverse Osmosis (RO)

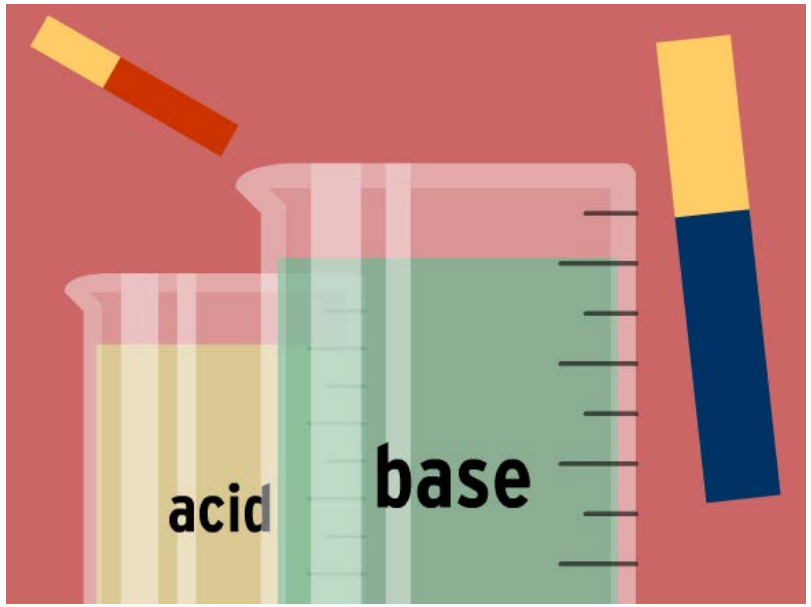
Recommendation	Waste Reduction, per year	Savings, per year	Payback Period	Status
Install RO Skid	2.1 million gal water, 68,100 therms	$38,600	2.5 years	Recommended/ Implementing

- **Improve water chemistry**
  - Reduce boiler blowdown
  - Reduce treatment chemical use
  - Cleaner heat transfer surfaces
  - Increase equipment longevity
- **Environment**
  - 361 metric tons of CO_2

Water Softening for Boiler Water

Recommendation: Equalization Tank

Recommendation	Waste Reduction, per year	Savings, per year	Payback Period	Status
Equalization Tank	16,600 lb caustic, 9,400 lb sulfuric acid	$8,000	>10 years	Recommended/ Implementing



- **Chemical optimization**
  - Agitation and dosing within tank
  - Improve acid/base effectiveness
  - 50% caustic reduction & sulfuric acid reduction
- **Prescreen equipment**
  - Large debris

Recommendation: Closed Loop Cooling

Recommendation	Waste Reduction, per year	Savings, per year	Payback Period	Status
Closed Loop Cooling	200 million gal water	$27,000	Needs further review	Recommended

- **Significantly reduce well water consumption**
- **Reduce electricity consumption**
- **No need to constantly run well pump**

Glycol Chiller

Recommendation: Improve Steam Traps

Recommendation	Waste Reduction, per year	Savings, per year	Payback Period	Status
Improve Pasteurizer HX Steam Traps	270,000 gal water 4110 therms	$2,500	3.5	Needs further review

- **Begin improvement with pasteurizer**
- **Reduce new make-up water**
  - Natural gas and water savings
- **Improve equipment operation and maintenance**
  - Steam line longevity

Orifice Steam Trap