Brewery Safety Bootcamp

2019 Craft Brewers Conference, Denver
SAFETY RECRUITS - WELCOME TO BOOTCAMP!

A QUICK OVERVIEW OF THE CLASS
Housekeeping

- 11:30 am – 2:30 pm
  - Stay throughout
  - Complete the quiz
  - Earn Essential Safety Documentation

- Restrooms, fire alarms, exits, AEDs
- Scheduled break ca. 1:15 pm
- Fast Moving Class
  - Get Up and Move
  - Permission to Laugh!
Larry Horwitz
Board of Directors
Brewers Association
Boulder, Colorado
Matt Stinchfield
Safety Ambassador
Brewers Association

Andy Clearwaters
Health and Safety Mgr.
Bell’s Brewery

Tony McCrimmon
Principal
Brewery Safety Consulting

Andrew Dagnan
Environ. and Safety Mgr.
Breckenridge Brewery

Chris Bogdanoff
Head Brewer
Heroes Restaurant and Brewery

Brian Godfrey
Senior EHS Specialist
TRC Companies, Inc.
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SAFETY CLIMATE OF THE CRAFT BEER INDUSTRY
Injury Rates Are Down!

Bureau of Labor Statistics

- Injury rates continue downward trend
- Can we continue to improve in 2019 and beyond?
- Breweries lowest rate of all beverage manufacturers
OSHA, OSHA Consultation, and Trade Association Alliances

Region V – Ohio Region VIII - Colorado
<table>
<thead>
<tr>
<th>GENERAL DUTY CLAUSE</th>
<th>OSHA REGS ARE MINIMUM REQ’D</th>
<th>HOW TO CREATE A SAFE AND HEALTHFUL WORKPLACE?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employer creates a “safe and healthful workplace”</td>
<td>Employers can customize, as long as minimums are met</td>
<td>Employ the Hazard Assessment Process</td>
</tr>
<tr>
<td>Employees abide by safety instructions, use equipment provided</td>
<td>Documentation of hazards, compliance, and training are essential</td>
<td></td>
</tr>
</tbody>
</table>
Matt Stinchfield
Safety Ambassador
Brewers Association
Boulder, Colorado

@MattStinchfield
#SafetyAmBadAssador
mstinchfield
HAZARD ASSESSMENT OVERVIEW

DOCUMENTING SAFETY AND PROCEDURES
What is Safety?

Freedom from hazards in the workplace
Hazard Assessment

1. Outline steps in task
2. Identify hazards
3. Specify hazard controls
4. Revise procedure to include controls

1. Understand the task or process
2. Imagine what could go wrong, i.e. hazards and outcomes
3. Think creatively for ways to prevent or reduce the hazards
4. Document your findings in writing, i.e. SOP
Caustic Washing of a Beer Tank

1. Set up CIP Machine
2. Dispense Caustic
3. Run Caustic in Tank
1 - Outline the Steps

Basic Outline of Steps in the Task

1. Connect CIP to FV
2. Fill CIP Tanks
3. Load Caustic
4. Circulate Caustic
5. Drain Caustic
6. Load Rinse
7. Circulate Rinse
8. Drain Rinse & Air Dry
1 - Outline the Steps

Basic Outline of Steps in the Task

1. Connect CIP to FV
2. Fill CIP Tanks
3. Load Caustic
4. Circulate Caustic
5. Drain Caustic
6. Load Rinse
7. Circulate Rinse
8. Drain Rinse & Air Dry
1. Connect CIP to FV
2. Fill CIP Tanks
3. Load Caustic
4. Circulate Caustic
5. Drain Caustic
6. Load Rinse
7. Circulate Rinse
8. Drain Rinse & Air Dry

(opt.) Drill Down to Instruction Level

a. Add cool water to left tank up to overfill tube
b. Add hot water to right tank up to 1” below overfill tube
c. Dispense 4,000 ml caustic into plastic beaker
d. Add caustic to right (hot) tank
e. Rinse beaker and put back on caustic drum
<table>
<thead>
<tr>
<th>NO.</th>
<th>STEP</th>
<th>HAZARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CIP to FV</td>
<td>Slips &amp; Trips, Electrical</td>
</tr>
<tr>
<td>2</td>
<td>Fill CIP Tanks</td>
<td><strong>Slips &amp; Trips, Temperature, Concentrated Caustic</strong></td>
</tr>
<tr>
<td>3</td>
<td>Load Caustic</td>
<td>Slips &amp; Trips, Temperature, Dilute Caustic</td>
</tr>
<tr>
<td>4</td>
<td>Circulate Caustic</td>
<td>Slips &amp; Trips, Temperature, Dilute Caustic</td>
</tr>
<tr>
<td>5</td>
<td>Drain Caustic</td>
<td>Slips &amp; Trips, Temperature, Dilute Caustic</td>
</tr>
<tr>
<td>6</td>
<td>Load Rinse</td>
<td>Slips &amp; Trips</td>
</tr>
<tr>
<td>7</td>
<td>Circulate Rinse</td>
<td>Slips &amp; Trips</td>
</tr>
<tr>
<td>8</td>
<td>Drain Rinse</td>
<td>Slips &amp; Trips</td>
</tr>
</tbody>
</table>
### Identified Hazards for Step 2, Filling the CIP Tanks

<table>
<thead>
<tr>
<th>NO.</th>
<th>STEP</th>
<th>HAZARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Fill CIP Tanks</td>
<td>Slips &amp; Trips, Temperature, Conc. Caustic</td>
</tr>
</tbody>
</table>

### 3 – Specify Hazard Controls

#### Slips and Trips Hazard Controls

<table>
<thead>
<tr>
<th>PREVENTION (SWP &amp; AC)</th>
<th>PROTECTION (EC &amp; PPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid walking in puddles</td>
<td>Textured surfaces</td>
</tr>
<tr>
<td>Keep eyes on the floor</td>
<td>Slotted drain covers (not open)</td>
</tr>
<tr>
<td>Walk like a duck (lower ctr. of grav.)</td>
<td>Waterproof, slip resistant boots</td>
</tr>
<tr>
<td>Organize or stow hoses and cords</td>
<td></td>
</tr>
</tbody>
</table>
## Hot Temperature Hazard Controls

<table>
<thead>
<tr>
<th>PREVENTION (SWP &amp; AC)</th>
<th>PROTECTION (EC &amp; PPE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand back when filling, recirculating</td>
<td>Thermostatic temp. control</td>
</tr>
<tr>
<td>Disconnect tri-clamps carefully with valves closed</td>
<td>Long pants, long sleeved shirt</td>
</tr>
<tr>
<td></td>
<td>Rubber boots, rubber gloves, safety glasses</td>
</tr>
</tbody>
</table>

## Concentrated Caustic Hazard Controls

<table>
<thead>
<tr>
<th>PREVENTION (SWP &amp; AC)</th>
<th>PROTECTION (EC &amp; PPE)</th>
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</thead>
<tbody>
<tr>
<td>Read, understand SDS; Observe labels &amp; placards</td>
<td>Appropriate pumps, non-reactive</td>
</tr>
<tr>
<td>Trained in chemical handling</td>
<td>Long pants, long sleeved shirt</td>
</tr>
<tr>
<td>Good housekeeping</td>
<td>Rubber boots, gloves, apron</td>
</tr>
<tr>
<td>Rinse affected surfaces</td>
<td>Goggles &amp; splash shield</td>
</tr>
<tr>
<td>Dispense where/when others will not be affected</td>
<td></td>
</tr>
</tbody>
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4 – Write/Revise Your S.O.P.

Original Outline of Steps, plus Procedural Instructions and Hazard Controls

1. Connect CIP to FV
2. Fill CIP Tanks
3. Load Caustic
4. Circulate Caustic
5. Drain Caustic
6. Load Rinse
7. Circulate Rinse
8. Drain Rinse & Air Dry
### SOP FORM

**1) Purpose**

This SOP describes Brewery’s procedure for safe and effective __________________.

**2) Scope**

This SOP is limited to _________________________.

---

### Hazard Assessment Form

<table>
<thead>
<tr>
<th>STEP</th>
<th>DESCRIPTION</th>
<th>HAZARDS</th>
<th>CONTROLS</th>
<th>PPE</th>
<th>FMEA NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TASK:**

**HA DATE:**

**DEPT:**

**INITIALS:**

---

### Hazard Assessment BMP

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# CraftBrewersCon

### BEST PRACTICES
- Industry Updates
- **Brewery Safety**
  - FREE Online Safety Training
  - Safety Ambassador
  - Safety Exchange
  - Hazard Assessment Principles
- Confined Spaces
- Protective Clothing
- Powered Industrial Trucks
- Compressed Gas Cylinders Management
- Surviving an OSHA Inspection
- Good Manufacturing Practices for Craft Brewers
- Engineering
  - Design and Construction of Brewery Quality Labs

### RESOURCES
- Hops
  - Hop Breeding Program
  - Grower Codes
  - Cost of Hop Production
  - Hop Resources
- Malt
  - Barley Characteristics
  - Managing Supply Chain Quality
  - Barley Resources
- Sustainability
  - Sustainability Manuals
  - Sustainability Benchmarking Tools
  - Sustainability Ambassador
- Quality
  - Quality Priority Pyramid
  - FSMA FAQs for Brewers
  - Food Safety Plan for Craft Brewers
  - Quality Ambassador
  - ASBC Methods of Analysis
  - Quality Management Book
  - Guide to Quality Craft Beer
  - Date Lot Coding
  - Basics of Beer Quality Workshop
- Draught Beer Quality
  - Draught Beer Quality Ambassadors
  - Draught Quality Resources
- Kegs
  - Guidelines
  - Repatriation

### BUSINESS TOOLS

### STATISTICS

### GOVERNMENT AFFAIRS

### GUIDELINES
EXAMPLE HAZARD ANALYSIS

TASKS

• Examples of typical brewery tasks that carry one or more hazards
Some bad things that can happen to you if you experience the hazard

EXAMPLE HAZARD ANALYSIS

HAZARDS

OUTCOMES

• Some bad things that can happen to you if you experience the hazard
EXAMPLE HAZARD ANALYSIS

CONTROLS

• Substitution or Elimination
• Safe Work Practices
• Engineering Controls
• Administrative Controls
• PPE
Another Great Presentation This Week

OSHA Safety Consultation
Tuesday, 2:40-3:40, Mile High 4
Moderator: Matt Stinchfield with Four Distinguished Panelists
Andy Clearwaters
Health and Safety Manager
Bell’s Brewery
Comstock, Michigan

andy-clearwaters-3069989a
WALKING AND WORKING SURFACES & HOUSEKEEPING

AVOIDING SLIPS, TRIPS AND FALLS…
...AND OTHER HORRIBLE INCIDENTS
WALKING AND WORKING SURFACES...

...Wherever Your Feet Touch

- Floors
- Elevated surfaces
- Ladders

Why Are They Important?

- We interact with them constantly
- Slips and falls account for 15% of accidental deaths
- OSHA regulates them
- Let me tell you a story
WALKING AND WORKING SURFACES HAZARD ANALYSIS

### TASKS
- Daily brewery work
- Brew deck stairs
- Tank cleaning
- Dry hopping

### HAZARDS
- Slips, trips, falls
- Falls from height
- Falling items
- Increased severity of other incidents
- Electrocution

### CONTROLS
- Good housekeeping
- Proper use of surfaces and ladders
- Fall Protection
- SWP – caution
- Emergency planning and egress
WALKING AND WORKING SURFACES

GENERAL REQUIREMENTS

General Requirements

• Good condition
• Clean
• Orderly
• Good lighting

Examples in Brewery

• Hoses, cords, buckets
• Wet surfaces and chemical puddles
• Drains, older floors
• Clutter
WHY IS GOOD HOUSEKEEPING IMPORTANT?

Eliminates Hazards

- Slips and trips (water, ice, glycol, dust)
- Emergency egress
- Access to critical devices
  - Eyewash stations
  - Fire extinguishers
- Falling items (wrench on a ladder)
- Combustible dust build up

Increased Efficiencies

- Better flow of materials and byproducts
- Inventory control
- Effective use of space
- Reduced janitorial services
- Greater productivity
- Improved worker morale
GOOD HABITS

- Put away tools/equipment after each task
- Manage hoses, cords, and drain grates (“good hose-keeping”)
- Label storage areas
- Position storage space close to work areas
- Keep brooms, mops, squeegees, spill cleanup supplies on hand & in good repair
- Wear PPE appropriate for the housekeeping activity
- Develop SOPs for common housekeeping activities
LADDER USE – ALL WRONG!!!
### Ladder Use

<table>
<thead>
<tr>
<th>Rolling Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Nice to use</td>
</tr>
<tr>
<td>• Electricity and metal don’t mix</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extension Ladders</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 4 to 1 pitch</td>
</tr>
<tr>
<td>• If exiting, extend 3ft above the surface exiting to</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step Ladders</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Stepladder only used in locked-open position</td>
</tr>
<tr>
<td>• No lean against tanks</td>
</tr>
<tr>
<td>• Do not stand on top two steps/rungs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fixed Ladders</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Before installation understand the rules around clearance and fall protection.</td>
</tr>
</tbody>
</table>
LADDER USE – MUCH BETTER!!!

3 POINTS OF CONTACT RULE  BELT BUCKLE RULE
REMEMBER

Most Falls Occur from Lower Heights

- Majority of fall deaths are less than 4 ft drop
- That “dangerous feeling”
ELEVATED WORK SPACES

GENERAL REQUIREMENTS

Engineering Controls

• “Engineer it Out”
• Guard rails/toe boards
• Equipment below
• Guard openings

Fall Protection Systems

• ABC’s
• #1 Rule… Don’t hit the ground
A KEY SAFE WORK PRACTICE IS TO...
WALK LIKE A DUCK
Tony McCrimmon
Principal
Brewery Safety Consulting
Aurora, Colorado

[LinkedIn icon] tony-mccrimmon-30852543
PHYSICAL HAZARDS

ELECTRICITY, PRESSURE, NOISE, MOVING PARTS AND GRAVITY
### Electrical Hazards

<table>
<thead>
<tr>
<th>U.S. workers</th>
<th>Number</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly</td>
<td>4,000</td>
<td>Non-disabling electrical shock injuries</td>
</tr>
<tr>
<td>Yearly</td>
<td>3,600</td>
<td>Disabling electrical shock injuries</td>
</tr>
<tr>
<td>Every year</td>
<td>2,000+</td>
<td>Sent to burn centers with electrical burns</td>
</tr>
</tbody>
</table>

Every day at least 1 person is electrocuted at work
## ELECTRICAL HAZARD ASSESSMENT

### TASKS
- Grist mill, conveyors
- Pumps, mixers
- Chillers
- Power tools
- Packaging lines
- Office/retail equipment
- Kitchen appliances

### OUTCOMES
- Electric shock
- Electrocution
- Arc flash/blast
- Damage to equipment
- Building fire

### CONTROLS
- No openings in boxes or covers
- Rated for amps required
- Switches, GFCIs, Disconnects, Grounds
- Equipment access in emergency
- No cords through doors, openings, walls…
OHM’S LAW

\[ I = \frac{E}{r} \]

- \( I \) = current, is the flowing electricity
- \( E \) = volts, force that pushes
- \( r \) = resistance trying to hold it back

\[ W = E \cdot I \]

- \( W \) = watts, unit of power
- 745.7 W = 1 Hp
LOOK AT YOUR PUMP MOTOR: HIGHER VOLTAGE USES LOWER AMPERAGE
**WHEN DO I FEEL A SHOCK?**

<table>
<thead>
<tr>
<th>CURRENT</th>
<th>PHYSIOLOGICAL RESULT</th>
<th>FEELING OR LETHAL INCIDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mA</td>
<td>Perception threshold</td>
<td>Tingle</td>
</tr>
<tr>
<td>2 – 10 mA</td>
<td>Sensation of shock</td>
<td>Maintain muscle control, not painful</td>
</tr>
<tr>
<td>5 mA</td>
<td></td>
<td>GFCI trips</td>
</tr>
<tr>
<td>10 – 20 mA</td>
<td>Paralysis threshold of arms</td>
<td>Cannot release hand grip, may be thrown clear</td>
</tr>
<tr>
<td>20 – 50 mA</td>
<td>Respiratory paralysis</td>
<td>Breathing stops, usually fatal</td>
</tr>
<tr>
<td>50 – 200 mA</td>
<td>Fibrillation threshold</td>
<td>Heart beat uncoordinated, usually fatal</td>
</tr>
<tr>
<td>&gt;200 mA</td>
<td>Tissue burns</td>
<td>Non-fatal unless are vital organs</td>
</tr>
</tbody>
</table>
KEEP CLEAR ACCESS FOR AN EMERGENCY

RIGHT

CAUTION

AREA IN FRONT OF THIS ELECTRICAL PANEL MUST BE KEPT CLEAR FOR 36 INCHES. OSHA-NEC REGULATIONS

WRONG

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EXTENSION CORDS

SELECTION

• Protective jacket over insulated conductors
• Read instructions for use and amps.
• Select cords rated for your current
• Thick, round, big gauge, high amp cords are best
EXTENSION CORDS

THE LONGER THE CORD...
• ...the higher its RESISTANCE
• ...the lower its CURRENT rating

THE HEAVIER THE GAUGE...
• ...the lower the GAUGE
• ...the higher its CURRENT rating
EXTENSION CORDS

READ THE CORD!

• S – Flexible cord
• W – Outdoor use
• J – 300V insulation
• No J – 600V insulation
• P – Parallel wire construction, used in air conditioner cords and household extension cords

• T – Jacket is vinyl thermoplastic
• E – Jacket is thermoplastic elastomer rubber (TPE)
• O – Cord is oil-resistant

• Wire Gauge and Number of Conductors e.g. 18/3, 8/4
CORD CARE
• Outlet, cover plate get hot
• Plug ends gets hot at outlet box
• Both plugs get hot
• Entire cord gets hotter
• Transfer of electricity across a gap creates heat

LOVE YOUR CORD
• Pull on the plug
• Unplug from outlet first, then tool
• Power arcs across the connection
• Avoid touching when wet
• Unplug it
• Cords are temporary; add more outlets

ROLLED CORDS
• Current heats cords
• Inductive coupling magnifies heat
• Stop using hot cord
GROUNDING AND CIRCUIT INTERRUPTORS

- SWITCH
- GROUND
- DISCONNECT
- GFCI
- BREAKER
SWITCH VERSUS DISCONNECT

1-Pole Switch Diagram #1

VS.

Fused Disconnect Switch
DISCONNECT VERSUS BREAKER
BREAKER VERSUS GFCI
GFCI VERSUS GROUND WIRE

What's in the GFCI?
(Plug-in)

- Electro Mechanical Latching Device
- Current Imbalance and Grounded Neutral Sensor
- Push-to-test Button
- 15k Resistor
- Load Hot
- Load Neutral
- EGC

Circuitry with Open and Grounded Neutral detection

VS.

kWh Meter:
Utility

Junction Box

PV Service Fused Disconnect

240 VAC Inverter

AC Service Entrance:
60/240V, 120VAC, 60Hz
ELECTRICAL HAZARD CONTROLS

**SWPs**
- Squeegee floors
- Reduce water
- Close panels
- Clean dust out of panels
- Minimize extension cords
- Dust off outside of equipment

**RESPECT “WASHDOWN”**
- Motors are not water-tight
- Drain holes in bottom
- You can get shocked

**SHUTOFFs**
- Disconnect not switch
- “within sight of” equipment
- “easy to reach”
- Clearly indicates OFF
- OFF is always down

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PRESSURE HAZARDS

• Compressed Air
• Compressed Gases: CO₂, N₂, O₂
• Beer Under Gas or Hydrostatic Pressure
• Keg Cleaning
• Packaging Systems
• Draught Systems
• Kettle Pressure
• Pumped Fluids and Hot Water
<table>
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<tr>
<th>TASKS</th>
<th>OUTCOMES</th>
<th>CONTROLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving Beer</td>
<td>Equipment Failure</td>
<td>Use gauges</td>
</tr>
<tr>
<td>Keg Cleaning</td>
<td>• Tank Vacuum Implosion</td>
<td>• Primary &amp; Secondary Regulators</td>
</tr>
<tr>
<td>Vessel CIP</td>
<td>• Tank Pressure Explosion</td>
<td>• Cylinder Restraint</td>
</tr>
<tr>
<td>Using Compressed Air and Gases: CO₂, N₂, O₂</td>
<td>• Flying Objects</td>
<td>• Pressure / Vacuum Relief Valves</td>
</tr>
<tr>
<td></td>
<td>• Oxygenating</td>
<td>• Burst Disks</td>
</tr>
<tr>
<td></td>
<td>• Carbonating</td>
<td>• Proper Fittings</td>
</tr>
<tr>
<td></td>
<td>• Packaging</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wort Production</td>
<td></td>
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</table>
PRESSURE HAZARDS

DON’T BE A HOSER!

WAY TO GO!!!

NO NO NO!!!

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MECHANICAL HAZARDS

PINCH, CUT, CRUSH AND ERGONOMIC HAZARDS

#CraftBrewersCon
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<tbody>
<tr>
<td>Grain Milling &amp; Conveying</td>
<td>Crushed, Amputated Parts</td>
<td>Use proper fittings, not hardware store fixes</td>
</tr>
<tr>
<td>Pumping, Mixing</td>
<td>Broken Bones</td>
<td>Machine guarding</td>
</tr>
<tr>
<td>Material Handling</td>
<td>Eye Injury</td>
<td>Hands out of moving equipment</td>
</tr>
<tr>
<td>Grain bags, boxes, pallets</td>
<td>Laceration, Infection</td>
<td>LO/TO</td>
</tr>
<tr>
<td>Lifting beer kegs, cartons</td>
<td>Back, RMD</td>
<td>Safe knife use</td>
</tr>
<tr>
<td>Packaging Beer</td>
<td>Forklift – “caught between”</td>
<td>PM schedules</td>
</tr>
<tr>
<td>Taproom, Kitchen Activities</td>
<td>Damage to equipment</td>
<td></td>
</tr>
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<td></td>
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</tr>
</tbody>
</table>
MACHINE GUARDING

• How large can the openings be?
• If can touch, what bites?
• Emergency shutoff
MACHINE GUARDING ENGINEERING CONTROLS

- Machine guarding, safety windows
- Interlocks, process logic controls
- Good repair / with PM program
- Lockout/tagout
- Guards limit water travel
- Body protection
- Sound barrier
ERGONOMIC HAZARDS

MORE TO COME FROM ANDREW...

#CraftBrewersCon
NOISE HAZARDS

NOISE SOURCES
• Grist mills
• Pumps
• Centrifuges
• Packaging Lines
• Air Compressors
• Loud Music Systems
• Personal Music Systems

NOISE CONTROLS
• Isolate workers from noise
• Insulated rooms, walls
• Hearing protection
  • Voluntary
  • HPP
• Hearing rule of thumb

You need to be able to hear your brewing systems: mill, pumps, bearings, HLT/CLT, co-workers, etc.!
Andrew Dagnan
Environmental and Safety Manager
Breckenridge Brewery
Littleton, Colorado
MATERIAL HANDLING

MANUAL AND MECHANIZED MOVEMENT OF MATERIALS
<table>
<thead>
<tr>
<th><strong>HAZARDS</strong></th>
<th><strong>INJURIES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lifting/moving heavy objects</td>
<td>• Sprains, strains, tears</td>
</tr>
<tr>
<td>• Bending, twisting, turning</td>
<td>• Soreness and pain</td>
</tr>
<tr>
<td>• Falling objects</td>
<td>• Bruises and contusions</td>
</tr>
<tr>
<td>• Lifting, pushing, pulling</td>
<td>• Cuts, lacerations, punctures, punctures,</td>
</tr>
<tr>
<td>• Improperly stacked materials</td>
<td>crushing, and amputations</td>
</tr>
<tr>
<td>• Struck-by or caught-in/-between hazards</td>
<td></td>
</tr>
<tr>
<td>• Falls, slips, trips, or loss of balance</td>
<td></td>
</tr>
<tr>
<td>• Repetitive motion</td>
<td></td>
</tr>
<tr>
<td>• Overexertion</td>
<td></td>
</tr>
</tbody>
</table>
MANUAL LIFTING

How many times have you seen this?

160 lb.!!!
CONCLUSIONS

• Employees at increased risk for upper extremity (shoulder and wrist) Work-related Musculoskeletal Disorders (WMSDs)

• Employees exposed to combination of ergonomic risk factors

• Survey indicated that 50% of employees felt safety training received was not adequate and safety procedures in place don’t work
BEFORE YOU LIFT/MOVE – THINK

• How heavy is the object?
• How can the object be lifted?
• Can you get help from a coworker?
• What is the proper way to lift the object(s)?
• Can you get help from equipment?
• Dollie, handtruck, pallet jack, forklift, hoist

If it’s just too heavy, awkward, or large…
  Don’t lift it.
TYPICAL HEAVY OBJECTS

- Case of Beer – 30 lb.+
- Hop Box – 44 lb.
- Malt Bag – 50/55 lb.
- Keg (1/6 bbl) – 55 lb.
- Keg (1/2 bbl) – 160 lb.
- Full Barrel – 500 lb.+
- Brewing Hoses – can be very heavy
- Various Others – packaging change-over parts, waste or recycling containers
LIFTING HAZARD CONTROLS

- Reduce / Eliminate lifts
  - Automate processes
  - Keg Vacuum Lift or Robot
  - Hoists / lifts
  - Bulk (silos, super sacks)
- Two-person lifts
- Training on proper lifting
- Redesign tools / areas within appropriate heights
  - Above knees, below shoulders
- Rotate employees
- Encourage micro breaks
ADVANTAGES OVER MANUAL MATERIAL HANDLING

• Lower Cost of Labor
  • Higher Efficiency
  • Capital Expense is Greater

• Mechanized Material Handling
  • Adds its own new hazards
  • Extra Certification / Training

• Other Advantages
  • Fewer Injuries
  • Lower Workers Comp Premium
  • Increased Productivity
“ROLL OUT THE BARREL” – EQUIPMENT EXAMPLES
“KEG PARTY!” – EQUIPMENT EXAMPLES
STILL MORE EQUIPMENT EXAMPLES
- Check capacity plate – Never overload
- Protective footwear
- Inspect before use
  - Look for cracks or other defects
  - Ensure wheels are in good condition
- Check floor for ruts, bumps, imperfections
- If view is obstructed, have a spotter assist
- Not for human transportation
- When going down an incline, push, don't pull
- Hand Truck – Place load over axle – the operator should only balance and push
CRANES AND HOISTING

• Operated only by thoroughly trained and qualified workers
• Before operation know
  • Load & counterbalance wt.
  • Capacity of the crane
  • Effective rigging methods
  • Center of gravity of crane plus load
  • When the load is safe to lift
• Use accepted hand signals and verbal cues
• Non-essential people out of the way
POWERED INDUSTRIAL TRUCKS (PITs)

- **PIT**
  - Mobile
  - Power-propelled truck
  - Can carry, push, pull, lift, stack materials

- **Includes**
  - Forklifts
  - Powered Pallet Jacks
  - Powered Stackers
# CraftBrewersCon

**P.I.T. “CRASH COURSE” – NO, DON’T CRASH!**

**MUST DO**
- Written Program
- Training Documentation
- Inspections
  - Daily
  - Shiftly
- Packaging Beer

**YES, DO**
- Seat Belt, Horn, Lights, Backup Alarm, Safety Glasses
- Loads within Capacity, Low and Centered
- Forks
  - <6” operating
  - On the floor when parked

**SWPs**
- Hands inside the Cage
- Travel at Appropriate Speeds
- Anticipate Pedestrians
  - Make eye contact
  - No mirrored eyewear
  - Use traffic mirrors
- In and Out Carefully
- Replace Pallets
P.I.T. “CRASH COURSE” – NO, DON’T CRASH!

NO! NO!

- Riders
- Impaired Operators
- Exceeding load or tilt
- Trying to Catch a Falling Load
  - Kegs
  - Barrels
  - Supersacks
P.I.T. “CRASH COURSE” – NO, DON’T CRASH!

SEPARATE

- PITs from Pedestrians
- Indicate On
  - Floors
  - Wall Signs
  - Barricades
- Protect With
  - Bollards
  - Dock Boards
  - Wheel Chocks
REQUIRED TRAINING

- **PITs**
  - Before Use
  - Every 3 years
  - Re-training in certain cases

- **CRAINS/HOISTS**
  - Before First Use
  - Annual Refresher

RECOMMENDED TRAINING

- **GENL MATL HANDLING**
  - How to Recognize / Avoid Material Handling Hazards

- **HAND TRUCKS, PALLET JACKS**
  - Before Use

- **BACK SAFETY**
Another Great Presentation This Week

Brewing Ergonomics
Thursday, 1:00-2:00, Rm 505-507
Presenter: Steve Finnie
Brewer and Physical Therapy PhD

#CraftBrewersCon
Chris Bogdanoff
Head Brewer
Heroes Restaurant and Brewery
Anaheim, California
CHEMICAL HAZARDS

SAFETY DATA SHEETS AND PERSONAL PROTECTIVE EQUIPMENT
### CHEMICAL USAGE HAZARD ANALYSIS

#### TASKS
- Routine cleaning and sanitizing
- SS passivation
- Draught line cleaning
- Lab assays
- Maintenance projects

#### HAZARDS
- Skin, eye damage
- Respiratory distress
- Damage to brewery equip.
- Beer contamination
- Slippery surfaces

#### CONTROLS
- Substitution and Elimination
- Good housekeeping
- SWP – caution
- Maintaining SDSs, labels, signs, and placards
- Proper PPE use, selection, inspection, replacement
CHEMICALS IN BREWERIES/PUBS

1
CORROSIVES
- Acid Cleaners
- Caustic Cleaners
- Alkaline Powders

2
OXIDIZERS
- Hydrogen Peroxide
- Peracetic Acid
- Nitric Acid / Iodine
- Ozone
- Chlorine Dioxide

3
OTHER BEER PRODUCTION
- Non-Oxidizing Sanitizers (Quats)
- Glycol Coolant
- Lab Reagents
- Water Treatment
- Filter Aids
- Glues
4

ASPHYXIANTS
- SIMPLE
  - Carbon Dioxide
  - Nitrogen
- CHEMICAL
  - Carbon Monoxide
- OXYGEN
  - Ambient: 20.9%
  - Deficient: <19.5%
  - Enriched: >23%

5

FLAMMABLES
- Alcohols
- Propane
- Natural Gas
- Lab Reagents

6

FACILITIES CHEMICALS
- Lubricants
- Paints
- Janitorial
- Pest Control
- Food Service
TOTAL MINDSET FOR PREVENTION AND PROTECTION AROUND CHEMICALS

1. SWP
2. E C
3. A C
4. PPE
SAFE WORK PRACTICES – ATTENTIONING THE HAZARDS

**HOUSEKEEPING**
- Keep Labels Visible
- Keep Clear Pathways
- Put Away Equipment

**WALKING, WORKING AND EXITING**
- Avoid Spills
- Rehearse Emergency Procedures

**HYGIENE**
- Wash PPE and Hands After Chemical Use
ENGINEERING CONTROLS FOR BREWERY CHEMICALS

Secondary Containment

Chemically Compatible Equipment

Ventilation and Monitoring
ADMINISTRATIVE CONTROLS FOR BREWERY CHEMICALS

SDS

Safety Data Sheet
Spartan Chemical Company, Inc.

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: CAUSTIC CLEANER FP

2. HAZARDS IDENTIFICATION

GHS Classification: Category 1a Caustic - Corrosive - Severe

GHS Label Elements: Signal Word: Danger

Emergency Telephone Numbers:

800-222-1222
800-222-1222

3. PREVENTION MEASURES

Prevent contact with skin, eyes, and clothing. Wash thoroughly with soap and water. Use personal protective equipment. Provide eye/face protection. Wear appropriate personal protective equipment.

4. First Aid Measures

Eye Contact: Rinse eyes immediately. If needed, proceed to a hospital.

Skin Contact: Rinse with soap and water. If needed, proceed to a hospital.

Inhalation: If needed, proceed to a hospital.

Manufacturer:

Spartan Chemical Company

5. STORAGE

Store in a dry, cool, and well-ventilated area.

6. DISPOSAL

Disposal must comply with local, state, and federal regulations.

7. TRANSPORTATION

Follow all regulations and guidelines for transportation of hazardous materials.

LABEL

CAUSTIC CLEANER FP

DANGER

CORROSIVE - SEVERE

Cautions: Causes severe skin burns and serious eye damage. May be corrosive to metals.

Signs:

WEAR GOGGLES, FACE SHIELD, RUBBER GLOVES AND APRON WHEN HANDLING ACID OR CAUSTIC

PLACARDS

Corrosive

Caustic

A7

TOXICITY M5000

Oxidizer

A5

5.1

OXIDIZER
Safety Data Sheet
Spartan Chemical Company, Inc.

Revision Date: 02-Jul-2018

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier
Product Name: CAUSTIC CLEANER FP
Product Number: 3189
Recommended Use: Cleaning agent
Uses Advised Against: For Industrial and Institutional Use Only
Manufacturer/Supplier: Spartan Chemical Company, Inc.
1110 Spartan Drive
Maumee, Ohio 43537 USA
800-537-8990 (Business hours)
www.spartanchemical.com

24 Hour Emergency Phone Numbers:
Medical Emergency/Information: 888-314-6171
Transportation/Spill/Leak: CHEMTREC 800-424-9300

2. HAZARDS IDENTIFICATION

GHS Classification
Skin Corrosion/Irritation: Category 1 Sub-category A
Serious Eye Damage/Eye Irritation: Category 1
Corrosive to Metals: Category 1

GHS Label Elements
Signal Word: Danger
Symbols:

Hazard Statements: Causes severe skin burns and serious eye damage. May be corrosive to metals.

Most Comprehensive Resource on Hazards, Properties, Management Recommendations

- 16 Standard Sections
- 1st Four Sections
  - Product/Co. Info.
  - Hazards (summary)
  - Composition (ranges)
  - First Aid
- Other Sections Include
  - Storage & Disposal
  - Emergencies Mgmt.
  - PPE
  - Chemical Properties

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Carbon Monoxide

H220: Extremely flammable gas. - H331: Toxic if inhaled. - H360D: May damage the unborn child. - H372: Causes damage to organs through prolonged or repeated exposure

Keep container tightly closed. Avoid breathing vapours. If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a Poison Center or doctor. Store in a well-ventilated place.
CAUTION
Minor to Moderate Injury Potential

WARNING
Death or Serious Injury is Possible

DANGER
Death or Serious Injury Likely

Black on Yellow
Black on Orange
Black and Red on White Background
HEALTH HAZARD

4 = Can be lethal
3 = Can cause serious or permanent injury
2 = Can cause temporary incapacitation or residual injury
1 = Can cause significant irritation
0 = No hazard

FLAMMABILITY HAZARD

4 = Will vaporize and readily burn at normal temperatures
3 = Can be ignited under almost all ambient temperatures
2 = Must be heated or high ambient temperature to burn
1 = Must be preheated before ignition can occur
0 = Will not burn

SPECIAL HAZARD

ALK = Alkaline
ACID = Acidic
COR = Corrosive
OX = Oxidizing
RAD = Radioactive
W/W = Reacts violently or explosively with water
W/OX = Reacts violently or explosively with water and oxidizing

INSTABILITY HAZARD

4 = May explode at normal temperatures and pressures
3 = May explode at high temperature or shock
2 = Violent chemical change at high temperatures or pressures
1 = Normally stable. High temperatures make unstable
0 = Stable
US DOT Hazmat Class & Division Placards
LIMITATIONS

- NOT Failsafe
- Last Line of Defense
- Poor Understanding
  - Selection
  - Use
  - Cleaning
  - Inspection
  - Replacement
EYE PROTECTION

FROM SPLASHES

- Standard Safety Glasses
- Indirect Vented Goggles
- Face Shield
HAND PROTECTION

FROM DIRECT CONTACT

- Inexpensive disposable nitrile
- Neoprene hybrid over woven or latex base
- Heavy duty reusable nitrile
FOOT PROTECTION

FROM SPILLS, PUDDLES, CONTAINER WEIGHT

• Sturdy leather or synthetic work shoes/boots with reinforced toe and shank

• Knee-high rubber (PVC) with reinforced toe and shank

• Low-rise rubber (PVC) with reinforced toe and shank or rubber pullover over sturdy work boot
OTHER PROTECTION

VARIOUS HAZARDS

• Splash protection apron

• Fall protection harness, lanyard, and anchoring

• Hearing protection, disposable or reusable
RESPIRATORY PROTECTION

FROM DUSTS, MISTS, VAPORS, AEROSOLS

• Chemical Mists/Vapors
  • Brewery Washdown
  • Paints, Coatings, Solvents

• Particulate protection
  • Grain Dust
  • DE Filter Aids
  • Metal, Wood, Plastic Fabrication/Welding

None of These Work in the Absence of Sufficient Oxygen!!
A Deeper Dive on Brewery Chemicals

Brewery Chemicals
Thursday, 11:00-12:00, Rm 505-507
Presenter: Matt Stinchfield
BA Safety Ambassador
10 MINUTE BREAK

CHECK OUT THE SELFIE PANELS
SPECIAL BREWERY HAZARDS

A DEEPER DIVE ON THREE IMPORTANT HAZARDS
KETTLE BOILOVERS
KETTLE BOILOVERS

**TASKS**
- Wort Boiling
- Hop Addition

**HAZARDS**
- Deep Tissue Burns/Fatality
- Permanent Disability
- PTSD
- Production Shutdown and Product Loss

**CAUSES**
- Overcharging kettle volume
- Lack of foam controls
- Rapid hop addition
- Failure to monitor temp.
KETTLE BOILOVERS

ENGINEERING CONTROLS

- Foam shutoff switch
- Anti-foam agent
- Spray hose to cool
- Temperature sensor
- Manway positioning in regard to operator

PROCEDURAL & PPE

- Stick to design volumes
- Avoid “line of fire”
- Gradual hop addition, only after hot break
- Follow an SOP
- Eye protection, insulated gloves, long pants over boots
More Detail on this Vital Subject

**Brewery Burns**

Wednesday, 2:40-3:40, Rm 505-507

Presenter: Matt Stinchfield
BA Safety Ambassador
Brian Godfrey
Senior EHS Specialist
TRC Companies, Inc.
Greenville, South Carolina

brian-godfrey-b604b123
PRESSURIZED SYSTEMS:

PROTECTING CELLAR VESSELS
PRESSURE FAILURES: CELLAR VESSELS

**TASKS**

- CIP cleaning
- Fermentation
- Racking
- Carbonating, nitrogenating

**HAZARDS**

- Implosion
- Explosion
  - Beer cannon
  - Tank rocket
- Flying objects
- Production Shutdown and Product Loss

**CAUSES**

- Temp. delta in a closed system
- CO$_2$ - Caustic rxn.
- Transfer w/o open inlet valve
- Runaway fermentation
- PRV/VRV failure or absence
PRESSURIZED SYSTEMS

CELLAR VESSEL HAZARD CONTROLS

ENGINEERING CONTROLS

• Safety valve
• Pressure Relief Valve (PRV)
• Vacuum Relief Valve (VRV)
• Burst disk, or Rupture disk
• Correct sizing and pressure/vacuum settings

PROCEDURAL & SWP

• Follow an SOP
• Understand chemical and physical reasons for tank failure
• Know MAWP
• Inventory valves
• Schedule relief valve inspection and cleaning
TYPES OF PRESSURE RELIEF DEVICES

Conventional Pressure Relief Valve

Common Spring-loaded Tri-clamp Pressure Relief Valve

Rupture Disk

Pressure Relief Valve / Rupture Disk Combination

Lever Action Pressure Relief Valve

Storage Tank Relief Device (protects overpressure and vacuum)
PRESSURIZED SYSTEMS

HOSE COUPLINGS
PRESSURE FAILURES: PACKAGING & DISPENSE

**TASKS**
- Keg cleaning, filling
- Canning, bottling lines
- Draught dispense system

**HAZARDS**
- Hose/Fitting failure
- Flying objects
- Chemical spray
- Production Shutdown and Product Loss

**CAUSES**
- Lack of pressure protection
  - Secondary regulator
  - Safety valve
- Improper hose, fittings, couplers
- Improper order of opening/closing lines
ENGINEERING CONTROLS

- Secondary regulators and pressure gauges at point of equipment connection
- Safety valves
- Plexiglas panels
- Proper connections
  - Oetiker clamps
  - Factory installed hose fittings
  - DO NOT USE worm clamps

PROCEDURAL & SWP

- Follow an SOP
- Understand how to depressurize system before uncoupling
- Know correct operating pressure of all equipment
- Regularly inspect, cleaning, replace wearable parts
DRY HOPPING FAILS

PRESSURE

ELEVATION

#CraftBrewersCon
<table>
<thead>
<tr>
<th>TASKS</th>
<th>HAZARDS</th>
<th>CONTROLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dry Hopping</td>
<td>• Flying Objects due to Pressure</td>
<td>• Engineering Controls</td>
</tr>
<tr>
<td>• Adding Seasonings or Fruit Flavoring</td>
<td>• CO₂ Overexposure</td>
<td>• Established Procedures</td>
</tr>
<tr>
<td>• PRV Cleaning</td>
<td>• Risk of Falling from Height</td>
<td>• Safe Work Practices</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Working at height</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PPE</td>
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<tr>
<td></td>
<td></td>
<td>• Fall protection</td>
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</tbody>
</table>

DRY HOPPING FAILS, a.k.a. “POPCORNING” or “HOP VOLCANO”
DRY HOPPING

HAZARD CONTROLS

PRESSURE HAZARDS

• Blow down CO₂ head pressure per an SOP
• Keep pressure gauges and PRVs clean, operational
• Consider hop doser or recirculation equip.
• Don’t exceed design volume
• Add ingredients slowly

WORKING AT HEIGHTS

• Choose best ladder or lift your resources allow
  • Scissor lift
  • Rolling platform stairs
  • Extension ladder or step ladder
• Harness, Anchor, Tether
CONFINED SPACES & LOCKOUT/TAGOUT

INCREASE YOUR AWARENESS & SYSTEMATIZE YOUR PROCEDURES
ACCIDENTS

• Confined space accidents are rare
  • Often fatal
  • Often involve more than one person

• Accidents are easily preventable

• Majority of deaths are would-be rescuers
**DEFINITION**

**CONFINED SPACE**
- Large enough to bodily enter and perform work
- Limited means of entry or exit
- Not designed for continuous human occupancy

**EXAMPLES**
- Brewhouse Vessels MT, LT, BK, WP, HLT, CLT
- Fermenters
- Bright Tanks
- CIP Tanks
- Yeast Brink
- Wastewater treatment tanks, sumps
- Grain Silos
PERMIT-REQUIRED CONFINED SPACE

1. Potential to contain hazardous atmosphere
   • O₂ deficient atmosphere
   • Elevated CO₂ levels
2. Engulfment Hazard
   • Water
   • Grain
3. Inwardly converging walls or a floor that slopes downward and tapers to a smaller cross section.
   - Fermenters
   - Silos
PERMIT-REQUARED CONFINED SPACE

4. Contains any other recognized serious safety or health hazards
   • Mash mixer
   • Lauter tun rakes
WHAT CONSTITUTES ENTRY?

Any part of the entrant’s body breaks the plane of an opening into a confined space

Examples

• Inspecting inside of FV/BBT
• Emptying spent grain from LT
• Cleaning FV
• Equipment Repairs
HOW DO YOU PROPERLY ENTER A PERMIT-REQUIRED CONFINED SPACE?

ENTERING MEANS

If any part of the entrant’s body breaks the plane of an opening into a confined space…

YOU MUST HAVE

• Written Program
• Hazard Assessment of Spaces
• Entry Permits
• Atmospheric Testing
• Specific Safe Procedures
• Authorized Entrant, Attendant
• Emergency Rescue Procedures
• Training
HOW DO YOU PROPERLY ENTER A PRCS?

• RETRIEVAL SYSTEM
OSHA: “A mechanical device must be available to retrieve personnel from a vertical space more than 5 feet deep.”

• ATMOSPHERIC TESTING
  • Test all levels/depths, multifunction meter
  • Document readings on the permit or in hazard assessment

• BREWERY ATMOSPHERIC HAZARDS
  • FV/BBTs: Excess CO₂ or N₂, O₂ Deficiency
  • Wastewater treatment: H₂S
  • Near direct flames or propane PITs: CO

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IS THERE AN ALTERNATIVE TO PRCS ENTRY REQUIREMENTS?

RECLASSIFICATION

• Space poses no actual or potential atmospheric hazard
• All hazards within the space can be eliminated without entry into the space (LO/TO)

• Useful for Brewhouse Vessels – MT, LT, BK, WP

• Documentation
  • Written Program
  • Hazard Assessment
  • Written Procedure
  • Training
## CONFINED SPACE SUMMARY

### TASKS
- Brewhouse Vessel Cleaning
- FV/BBT Cleaning
- Water and Waste-water Inspection

### HAZARDS
- O$_2$ Deficiency
- Mechanical Hazards
- High Temperature

### CONTROLS
- Air Monitoring
- Engineering
  - LO/TO
  - Forced Air Flow
- Administrative
  - Hazard Assessment
  - Reclassification
  - SOPs & Training
CONTROL OF HAZARDOUS ENERGY (LO/TO)

LOCKOUT / TAGOUT

• To isolate and control hazardous energy sources
  • Electrical
  • Mechanical
  • Pneumatic, etc.

• LO/TO equipment is specialized
  • Use LO/TO devices only for LO/TO work
WHEN TO USE LO/TO

- Remove or bypass any safety device on a piece of machinery

- Place any part of your body into a point of operation where a danger zone exists during an operating cycle
### WHEN IS LO/TO REQUIRED?

- Risk of unexpected energization or start-up of equipment
- Work with risk of uncontrolled release of hazardous energy

### NOT REQUIRED FOR

- Minor Tool Changes
- Minor Adjustments

#### MUST Meet all three

- Occurs during normal production operations on easily surveyable equipment
- Activities are routine, repetitive and integral
- Performed using alternative measures to safely perform task without being exposed to hazardous energy

<table>
<thead>
<tr>
<th>WHEN IS LO/TO REQUIRED?</th>
<th>NOT REQUIRED FOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High voltage electrical and live electrical work</td>
<td>• Minor Tool Changes</td>
</tr>
<tr>
<td>• Confined space entry</td>
<td>• Minor Adjustments</td>
</tr>
<tr>
<td>• Removal or disabling of safety systems or devices</td>
<td>• Occurs during normal production operations on easily surveyable equipment</td>
</tr>
<tr>
<td></td>
<td>• Activities are routine, repetitive and integral</td>
</tr>
<tr>
<td></td>
<td>• Performed using alternative measures to safely perform task without being exposed to hazardous energy</td>
</tr>
</tbody>
</table>
TYPES OF HAZARDOUS ENERGY

- Electrical
- Mechanical
- Stored or potential (springs, gravity, etc.)
- Thermal
- Hydraulics (fluid) or pneumatic (air)
- Chemical
- Radiation (nuclear gauges)
# ENERGY CONTROL PROCEDURE (ECP)

ECP is an SOP that describes shutdown and startup for systems with multiple energy sources

<table>
<thead>
<tr>
<th>Procedural steps</th>
<th>TRY STEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>• shutting down</td>
<td>• Verifies isolation</td>
</tr>
<tr>
<td>• isolating,</td>
<td>• May release residual or stored energy</td>
</tr>
<tr>
<td>• blocking, and</td>
<td>• Confirms correct energy sources are controlled</td>
</tr>
<tr>
<td>• securing</td>
<td>• Keep persons safe while performing the Try Step</td>
</tr>
<tr>
<td>• restoring</td>
<td></td>
</tr>
</tbody>
</table>

• Procedural steps
  • placement, removal, and transfer of LO/TO devices
  • who has responsibility for them

• Requirement for testing a piece of equipment to verify effectiveness of LO/TO devices – a.k.a. The TRY STEP
ENERGY CONTROL PROCEDURE (ECP)

**EQUIPMENT-SPECIFIC**
- Often includes images
- Color-coded energy control points

**ONLINE ECP GENERATORS**
- Subscription-based
- Some free tools available
LO/TO DEVICES

LOCKS
- Only used for LO/TO
- Only 1 key
- Key kept by operator being protected by LO/TO

TAGS
- Provide a message

HASPS
- Allow multiple locks
LOCK BOXES

- Isolate small equipment from use
- Allow multiple keys to be locked
LO/TO DEVICES

ELECTRICAL TYPES

PLUG LOCKOUT
• Isolates plug end from being plugged in

BREAKER DEVICES
• Isolates energy at electrical panel

DISCONNECT LOCKOUT
LO/TO DEVICES

FLUID CONTROL

VALVE DEVICES
• Ball valve
• Butterfly
• Gate valve
LO/TO DEVICE KITS AND STATIONS
LO/TO SUMMARY - ACHIEVE A ZERO ENERGY STATE

TASKS
- Brewhouse Vessel Cleaning
- Packaging
  - Conveyors
  - Fillers
  - Drop Packers
  - Palletizers
- Single Sources
  - Electric Cords

HAZARDS
- Mechanical Hazards
  - Crush/Pinch
  - Fly Objects
- Electrical
  - Electric shock
  - Electrocution
- Fluid Energy Release
  - Bodily Injury

CONTROLS
- Engineering
  - LO/TO Devices
- Administrative
  - Energy Control Procedures
  - SOPs & Training
Another Great Presentation This Week – Don’t Miss It!

Lockout / Tagout
Tuesday, 1:20-2:20, Rm 505-507
Presenter: Tony McCrimmon
WRAP UP

LARRY QUESTIONS FOR US?

QUESTIONS FOR YOU!

GRAND FINALE
I'm a cellarjack and I'm OK
I work all night and I sleep all day

He's a cellarjack and he's OK
He works all night and he sleeps all day
I clean the tanks, I eat my lunch,
I shine the BBT
On Wednesdays I’m dry-hopping and follow
my SOP

[ALL SING]

He cleans the tanks,
He eats his lunch,
He shines the BBT
On Wednesdays he’s dry-hopping
and follows his SOP
I'm a cellarjack and I'm OK
I work all night and I sleep all day
I clean the tanks, walk like a duck
I like to drink craft beer
I wear my forklift seatbelt and watch for who’ever’s near

He cleans the tanks,
Walks like a duck
He likes to drink craft beer
He wears his forklift seatbelt and Watches for who’ever’s near
[CELLAR BOY]

I'm a cellarjack and I'm OK
I work all night and I sleep all day
I clean the tanks, I sniff dank hops
Secretly I mill the malt
I wish I'd been a brewer, just like my dear friend Walt

[ALL SING]

He cleans the tanks,
He sniffs dank hops?
Secretly he mills the malt?

Oh, he's a cellarjack and he's OK
He works all night and he sleeps all day
He's a cellarjack and he's Okayyyyyyy
He works all night and he sleeps all day!
Social Media Handles

@BrewersAssoc

#CraftBrewersCon

#BrewerySafety

#BrewSafely

Brewery Safety Bootcamp

We Thank You For Your Attention!