Welcome to the

Brewers Association Brewery Safety Boot Camp 2018

You need the

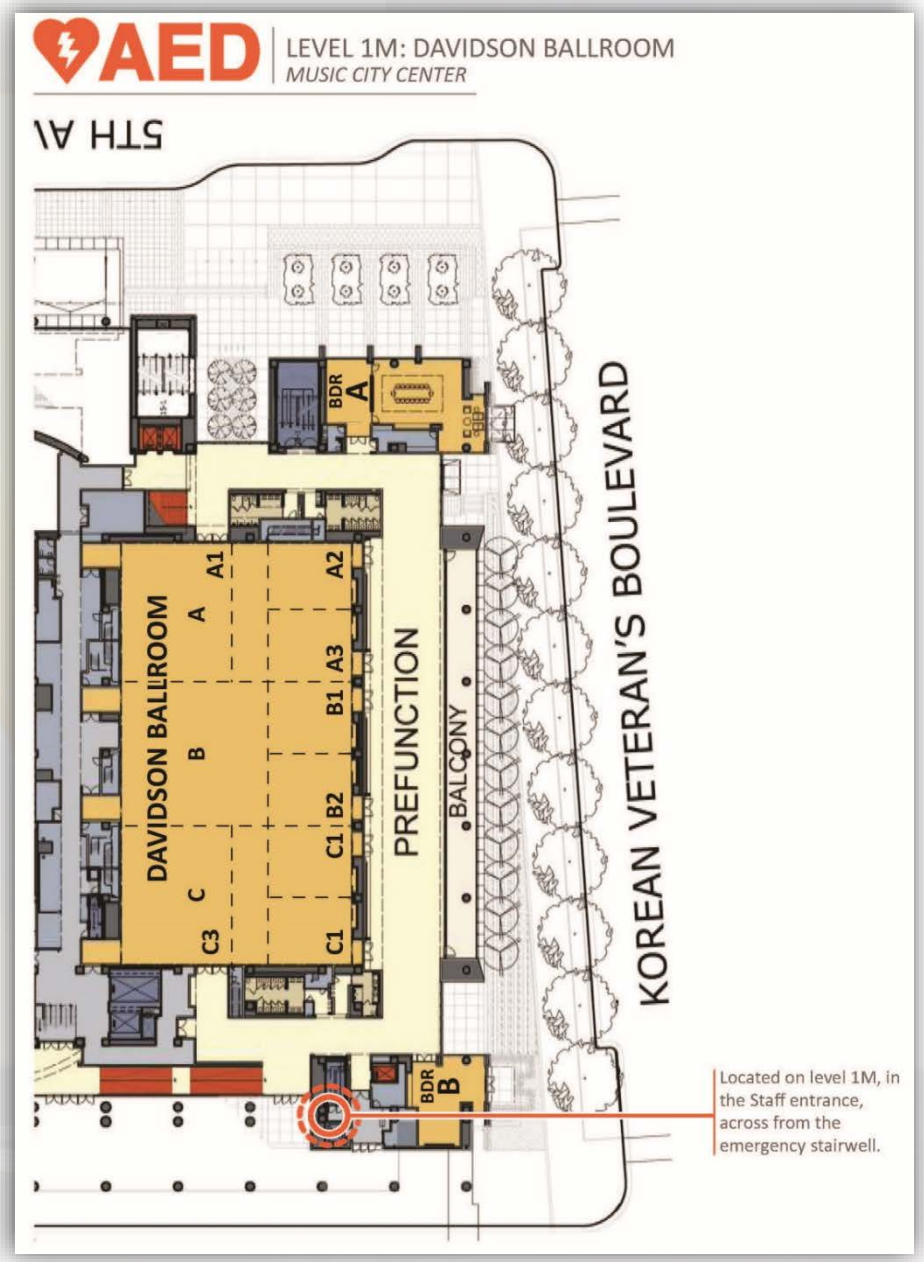
BA Hazard ID Card and Participant Guide

Introduction

- A lot to cover in a short time
- Participant guide?
- Brewery hazards postcard?

Emergencies

- If we have to evacuate…
- Or find an AED
- On site EMTs: Call: 615-401-1300
- REST ROOMS!



Ground rules

- Ask questions right away!
- I may defer to a future slide
- Defer to break time, or after session
- Share with me
- Respect?

The topics

- Cost of safety
- The benefits
- Causal factors
- General duty clause
- Hazard assessment
- Control
- Lessons Learned

- Back injuries, etc.
- Walking working
- Electrical
- Chemicals/ ppe
- Burns
- Lock Out and Control Hazardous Energy
- Confined Space
- Powered industrial trucks

Show of hands

Have you ever worked in a factory?

How long in the brewing industry?

- less than 18 months
- Less than 3 years

How many barrels brewed/ year?

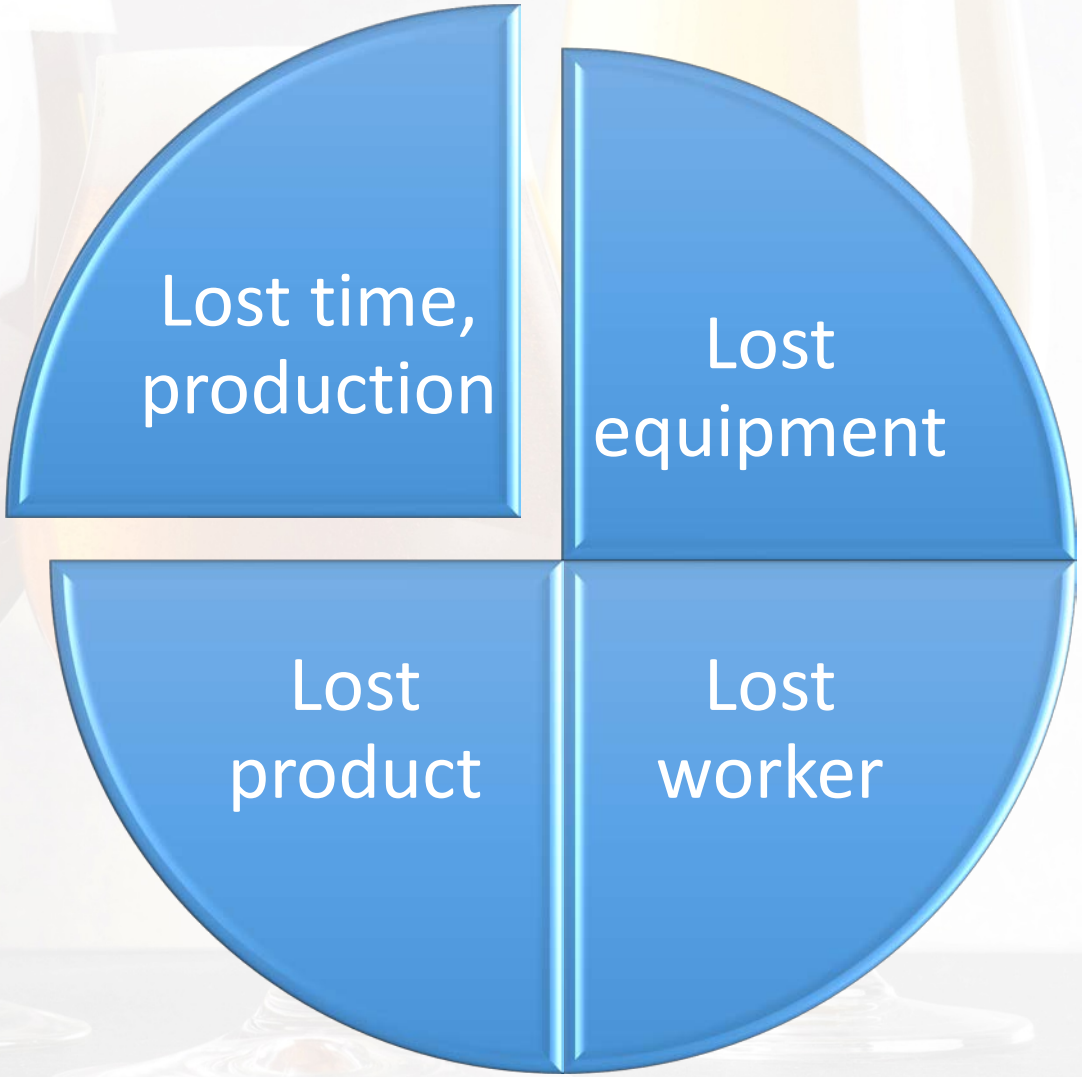
- less than 2,000 bbls
- 2,000 - 5,000 bbls
- > more than 5,000

Do you have a safety program?

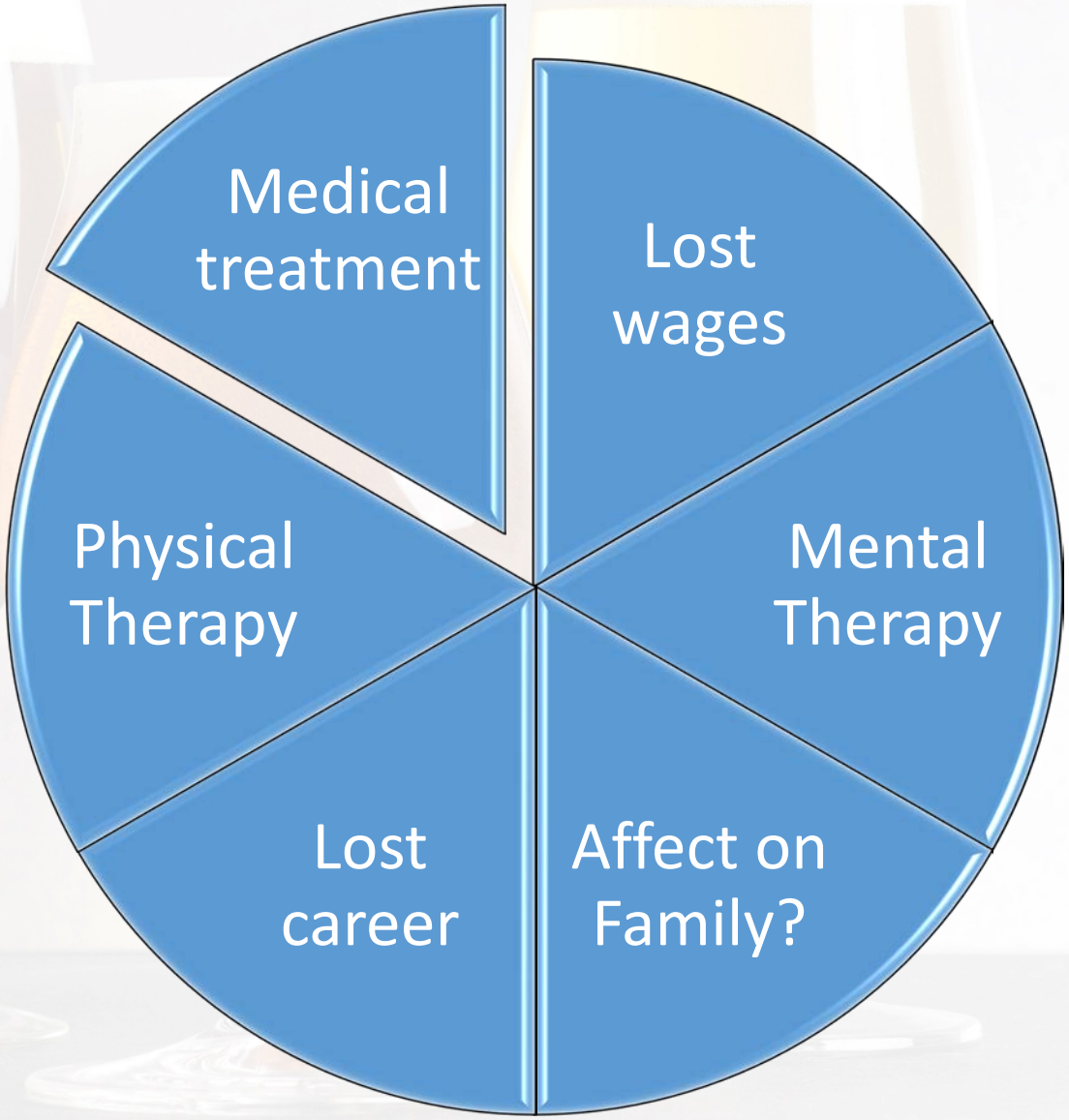
Safety training?

Cost of injuries

What are the costs?



Cost to Person?



Top 10 most disabling work injuries:

1. **Overexertion by lifting, pushing, pulling, holding, carrying, or throwing object.**

   23% of work comp.

2. **Falls on same level.**

   18% of work comp.

3. **Falls to a lower level.**

   9.2% of work comp.

4. **Struck by object or equipment.**

   7.4% of work comp.

5. **Other exertions or bodily reactions.**

   6.5% of work comp.

6. **Roadway accidents, motor vehicles.**

   6.2%.

7. **Slip or trip *without* a fall.**

   3.8%.

8. **Caught in/ compressed by equipment or objects**.

   3.3%.

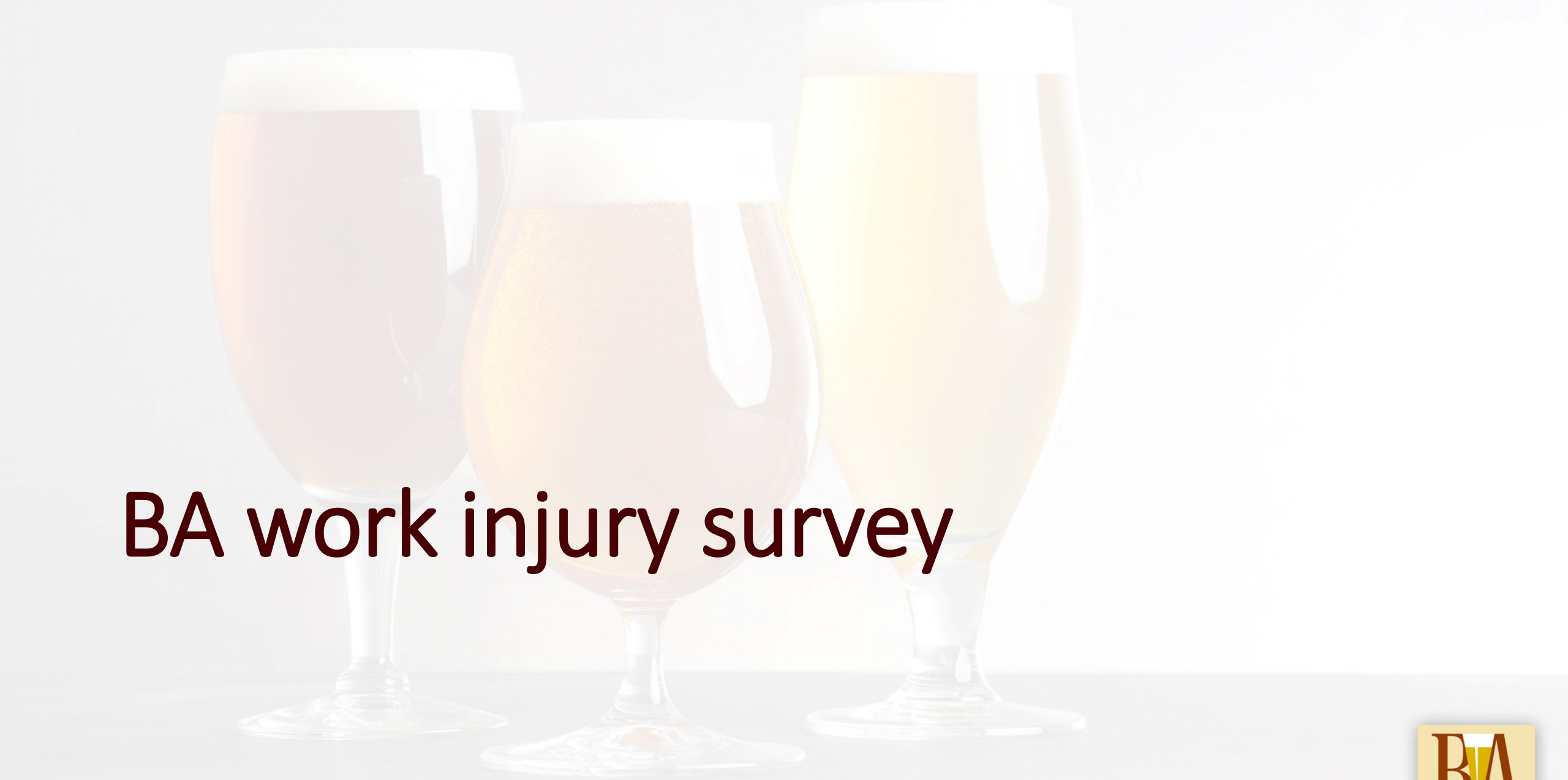
9. **Struck against object or equipment .**

   3.2%.

10. **Repetitive motions, involving micro-tasks.**

    3%.

Liberty Mutual Research Institute for Safety's Workplace Safety Index. $68 Billion
Based on information from Liberty Mutual, U.S. Bureau of Labor Statistics, National Academy of Social Insurance.



BA work injury survey

The extent to which the employer pays the direct costs depends on the policy's [illegible] compensation insurance policy. The employer pays the [illegible]

Estimated Average cost

- Employer shares direct costs through workers' comp policy.
- Employer pays all the indirect costs.
- Additional sales based on 20% profit margin
- “I’ll use my personal insurance coverage”??

Injury Type	Direct Cost Shared	Indirect Cost Employer Only	Total Cost	Additional Sale (Indirect Only)	Additional Sale (Total)
Electric Shock	$ 93,858	$ 103,243	$ 197,101	$ 516,219	$ 985,504
Burn	$ 40,188	$ 44,206	$ 84,394	$ 221,034	$ 421,970

Causal Factors

State of Mind

- Lack of knowledge; Training
- Distracted
- Rushing
- Frustrated
- Angry
- Fatigued
- Complacent

Risky Behavior

- Oblivious
- Eyes not on task
- Mind not on task
- In Line of fire
- Balance/ traction/ grip
- Normalized Hazards

Quality and Safety

Can feel distraction, rushing, frustration, anger, fatigue…

Be self aware to recognize

Stop work, and change state of mind

Self-trigger to correct behavior

Reasons for safety

- Value of your time?
- How much can you lose?

- Employee Well being
- Direct Loss against profit
- Insurance premiums
- Control business risks
- Compliance

Affect on employee

- Feels wanted
- Feels cared for
- Are happier
- Quality improves

- Employee/ asset
- When injured, work stops
- If hurt, can’t work
- No product, no profit

Profit/ Loss: Safety Saves Money

- 1 burn will cost:
- Direct Cost: **$40,188**
- **Indirect** Cost: **$44,206**
- Total Cost: **$84,394**

- At **10% profit**,
- Sales to cover **indirect** cost: **$442,068**
- Sales for total cost: **$843,940**

- Employer pays **indirect** costs
- Worker comp co-pays **Direct costs**
- Worker comp **premiums increase**
- Injuries cost more than safety program
- OSHA fine?

Our experience…

- Lidding machine
- Lids stick together
- Can’t let 2 lids in
- Reach in with fingers
- Can is spinning

Spinning Can cuts a finger!

Spinning Can cuts a finger!

- Shut down line
- First aid, or stitches?
- Lost time for canning team
- Clean can line of flesh
- Throw out impacted cans
- Can cost
- Lost product
- Product cost
- What costs did I miss?

Corrective actions?

- PPE?

- “Kick out” device
- “Lid picker”
- Accumulation table
- S- curve

- Outsource canning

Consider Risk to my business

If I break me

If I break others

If I break the recipe

If I break equipment

If I break product

If I sell something contaminated

SEC. 5. Duties (OSHA General Duty Clause)

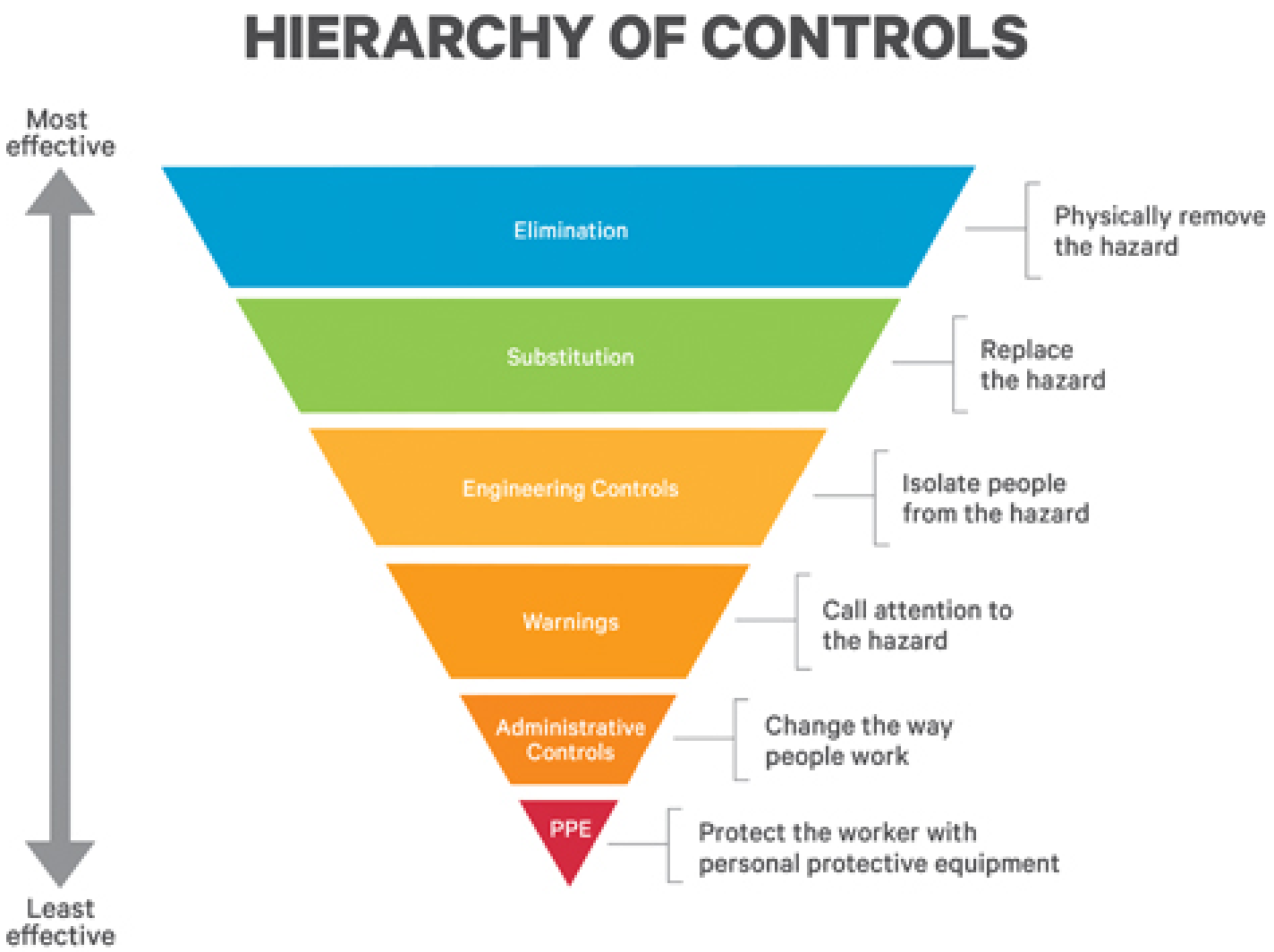
(a) **Each employer:**

(1) **shall furnish…** a place of employment…free from recognized hazards likely to cause, death or serious physical harm;

(2) shall comply with occupational safety and health standards in this Act.

(b) **Each employee:**

shall comply with occupational safety and health standards and all rules, regulations…, which apply to your own actions and conduct.


HIERARCHY OF CONTROLS
Most effective
Least effective
Elimination
Physically remove the hazard
Substitution
Replace the hazard
Engineering Controls
Isolate people from the hazard
Warnings
Call attention to the hazard
Administrative Controls
Change the way people work
PPE
Protect the worker with personal protective equipment

- Move hoses

OSHA to BA Safety Member

OSHA can lock your doors just as quickly as TTB

Safety by Design

- During brewery pre-planning and design
- During equipment purchase
- During renovation or re-model
- Before code enforcement
- Before injury
- Before damage

- Grates to cover drains
- Handrails and Stair rails
- Grippy floors
- Hooks to anchor ladder to tank
- Outlets close enough to eliminate extension cords
- “Rollers” to move heavy loads

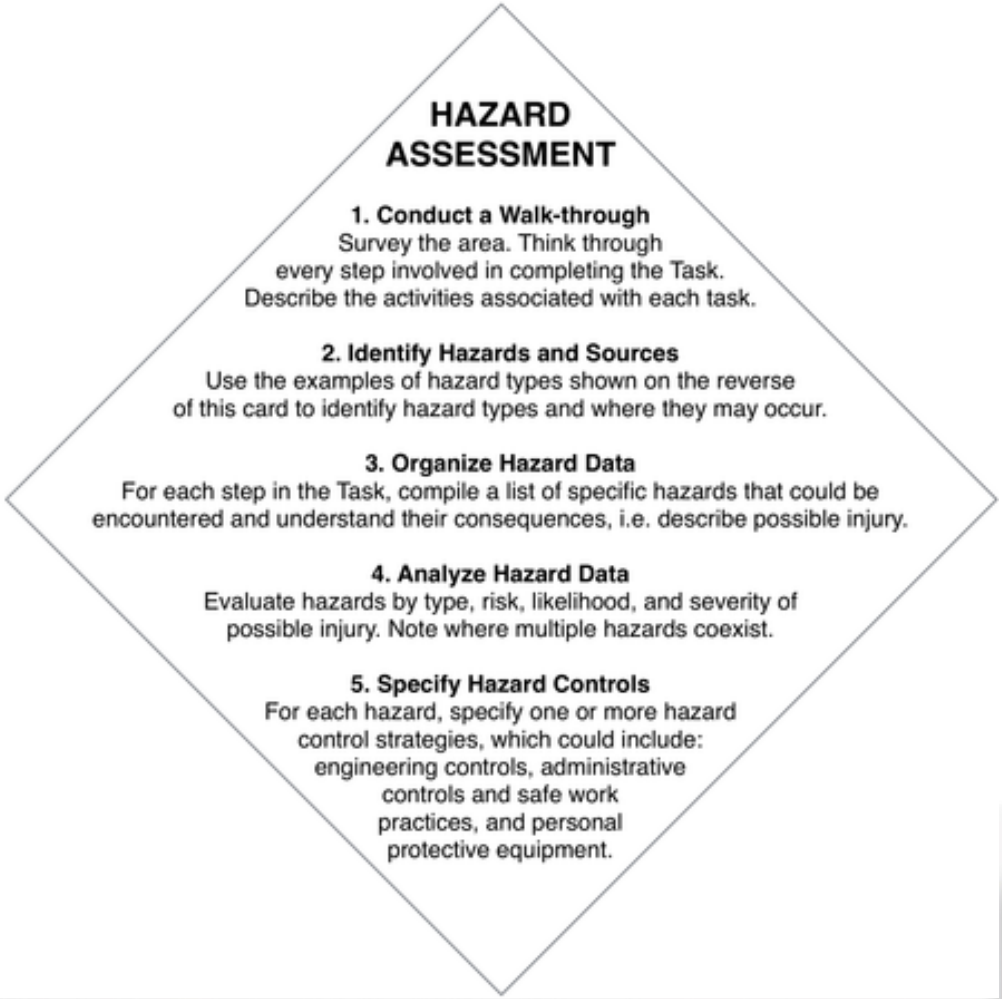
Hazard Assessment Process

BA Hazard ID & Evaluation Tool Card

- Hazards are ***what can hurt me***
- What in brewery can hurt me?
- **Not** how likely will it happen
- How do I use the card?

BA Hazard Card & Hazard Assessment Tool

- Conduct a walk through
- Identify hazards and sources
- Organize hazard data
- Analyze hazard data
- Specify hazard controls



Hazard assessment for tasks with Back injury risk

- Lifting grain sacks
- Manually palletizing newly bottled product

1. Conduct a walk through

- Look at Area
- What are steps of the task
- What activities in each step

2. ID hazards and sources

- Use the Hazard Card to help
- What hazards are in each activity?
- What can go wrong in activity?
- Is it always part of that activity?
- If Reposition the activity, can it still go wrong?

3. Organize hazard data

- Create a list
- List each step in task
- List each activity in step
- List all hazards in each activity
- What injuries can each hazard cause?

Risk Rating Matrix

	Consequence				
	1	2	3	4	5
	Insignificant	Negligible	Moderate	Extensive	Significant
People	Minor injury or first aid treatment	Injury requiring treatment by medical practitioner and/or lost time from workplace.	Major injury / hospitalization	Single death and/or multiple major injuries	Multiple deaths
Information	Compromise of information otherwise available in the public domain.	Minor compromise of information sensitive to internal or sub-unit interests.	Compromise of information sensitive to the organizations operations.	Compromise of information sensitive to organizational interests.	Compromise of information with significant ongoing impact.
Property	Minor damage or vandalism to asset.	Minor damage or loss of <5% of total assets	Damage or loss of <20% of total assets	Extensive damage or loss <50% of total assets	Destruction or complete loss of >50% of assets
Ecomonic	1% of budget (organizational, division or project budget as relevant)	2-5% of annual budget	5-10 % of annual budget	> 10% of budget	> 30% of project or organizational annual budget
Reputation	Local mention only. Quickly forgotten. Freedom to operate unaffected. Self-improvement review required	Scrutiny by Executive, internal committees or internal audit to prevent escalation. Short term local media concern. Some impact on local level activities	Persistent national concern. Scrutiny required by external agencies. Long term 'brand' impact.	Persistent intense national public, political and media scrutiny. Long term 'brand' impact. Major operations severely restricted.	International concern, Governmental Inquiry or sustained adverse national/international media. 'Brand' significantly affects organizational abilities.
Capability	Minor skills impact. Minimal impact on non-core operations. The impact can be dealt with by routine operations.	Some impact on organizational capability in terms of delays, systems quality but able to be dealt with at operational level	Impact on the organization resulting in reduced performance such that targets are not met. Organizations existence is not threatened, but could be subject to significant review.	Breakdown of key activities leading to reduction in performance (eg. service delays, revenue loss, client dissatisfaction, legislative breaches).	Protracted unavailability of critical skills/people. Critical failure(s) preventing core activities from being performed. Survival of the project/activity/organization is threatened.

Likelihood	Chance	Probability	Frequency			1 Insignificant	2 Negligible	3 Moderate	4 Extensive	5 Significant
↑	Is expected to occur in most circumstances	>95%	Has occurred 9 or 10 times in the past 10 years in this organization or circumstances are in train that will almost certainly cause it to happen	E	Almost Certain	6	7	8	9	10
	Will probably occur in most circumstances	>65%	Occurred more than 7 times over 10 years in this organization or in other similar organizations or circumstances have such that it is likely to happen in the next few years	D	Likely	5	6	7	8	9
	Might occur at some time	>35%	Has occurred in this organization more than 3 times in the past 10 years or occurs regularly in similar organizations or is considered to have a reasonable likelihood of occurring in the next few years	C	Possible	4	Slip on wet surface	6	7	8
	Could occur at some time	<35%	Has occurred 2 or 3 times over 10 years in this organization or similar organizations	B	Unlikely	3	4	5	6	7
↓	May occur only in exceptional circumstances	<5%	Has occurred or can reasonably be considered to occur only a few times in 100 years.	A	Rare	2	3	4	5	6

Very High (VH)	Immediate action required by the Executive with detailed planning, allocation of resources and regular monitoring
High (H)	High risk, senior management attention needed
Medium (M)	Management responsibility must be specified
Low (L)	Monitor and manage by routine procedures
Very Low (VL)	Managed by routine procedures

4. Analyze hazard data

1. **Evaluate each hazard of**

“stepping onto the pallet,

and placing the case of bottles”

Hazard Assessment Template

TASK: Manually palletize filled case of bottles	HA DATE: April 30, 2018
DEPT: Packaging	NAMES:

STEP	DESCRIPTION	HAZARDS	CONTROLS	PPE	FMEA NO.
Pick up case	Case is on table at end of bottling line	Wet cardboard box, or tape is loose	Pick up from under the case box	Grippy palm gloves to minimize fatigue	
Pick up case	Case is on table at end of bottler	Broken glass on outside of case box	Look before grabbing	Wear gloves as additional protection	
Turn around and walk toward pallet	Need to look in the direction I am walking	Slick floor	Grippy shoes and slow steady pace, squeegee the floor to limit soap and water		
Place case on pallet	Step onto pallet to place case	Pallet	Inspect for pallet for damage	Yeah, sure!	
Place case on pallet	“”	Height at which have to place case	Bend over	Aspirin, more beer	

4. Analyze hazard data

1. **Evaluate each hazard by**
   - Type: slip and fall
   - Risk: break pallet slat and twist ankle; or break ankle?
   - Likelihood: low
   - Severity: lower

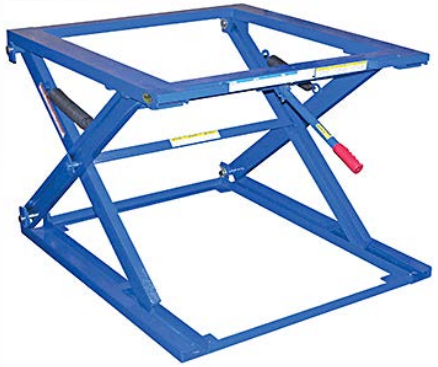
4. Analyze hazard data

2. **Note co-existing hazards:**
   - Type: sharps
   - Risk: break pallet slat and drop bottles
   - Likelihood: low
   - Severity: medium to high

4. Analyze hazard data

3. **Note co-existing hazards:**
   - Type: ergonomic
   - Risk: strain back muscles
   - Likelihood: medium, increases if pallet breaks
   - Severity: low to high, increases if pallet breaks

5. Specify hazard controls



- For each hazard, list all controls
- Is adjustable height stand a “control”?
- How does it work?
- How many hazards can it eliminate?

On your forklift?

Or on an adjustable height pallet jack?

Back safety and ergonomics

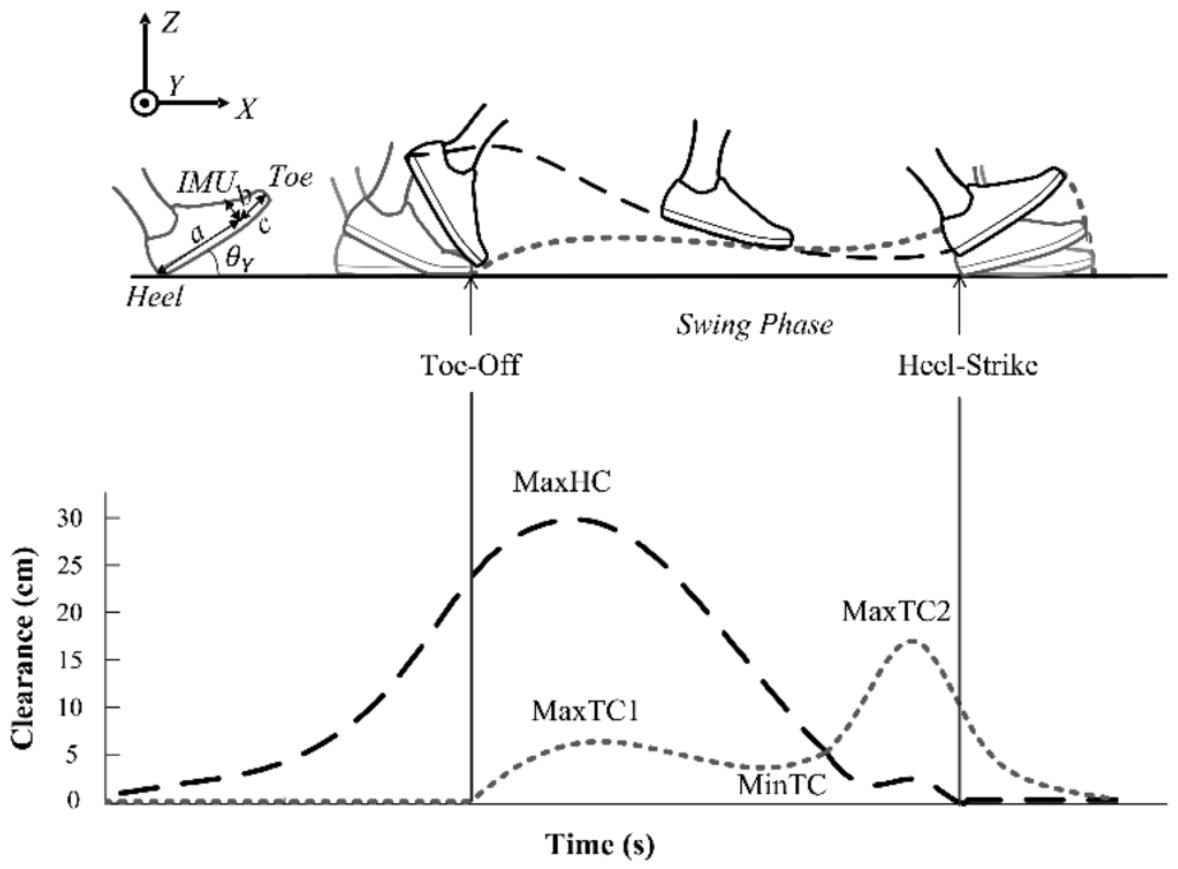
Walking and Working surfaces

Walking and working surfaces

- Fall hazard: ***condition*** that can hurt me
- Fall on same level, or to a lower level
- Slips or trips

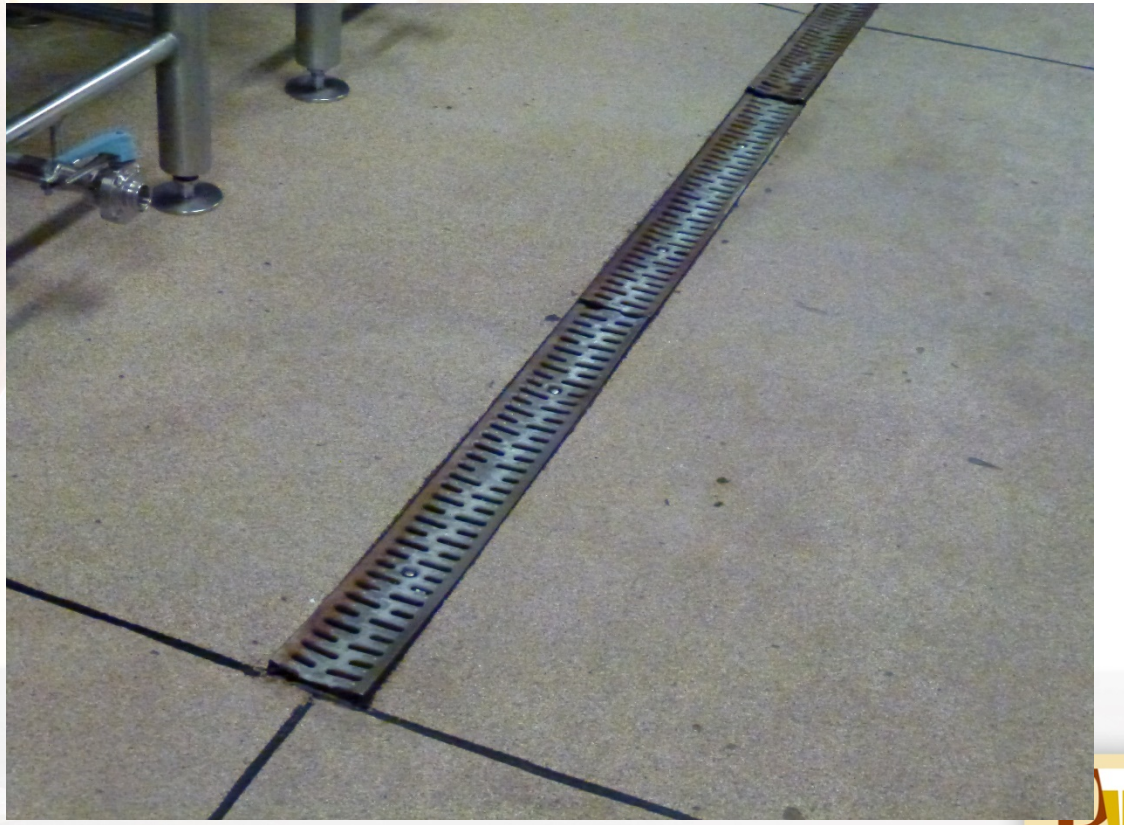
The Magic Half Inch!

Walking gait: Minimum Foot Clearance



- Brain seeks energy efficiency
- Brain learns **Minimum Foot Clearance**
- 1/2 inch
- Thicker than a 1/2 inch?
- Clearance decreases with fatigue
- Trip on it

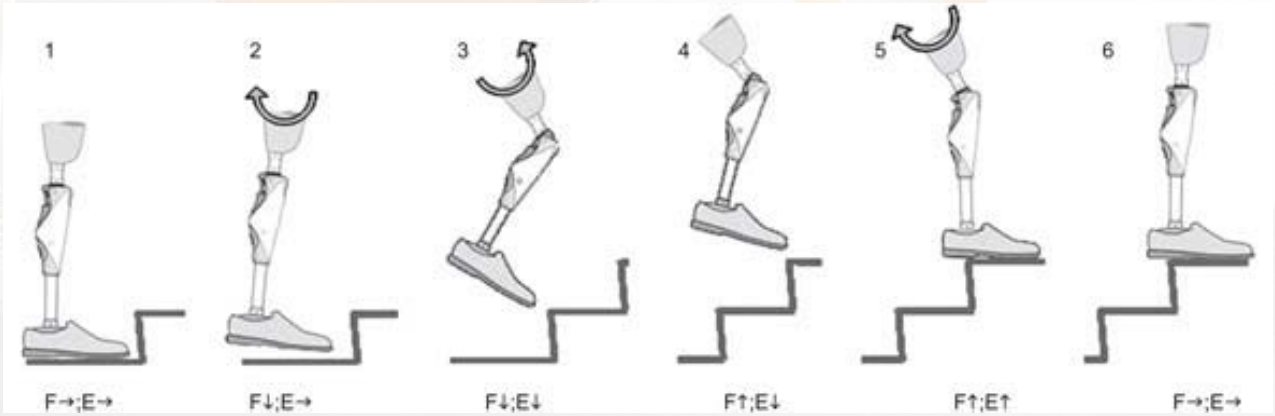

FV1



Steps and stairs and MFC

- Brain sees lowest 3 steps, and top step
- By 3rd step, brain knows exact step
- Brain acts to barely clear step

- Brain thinks all steps are consistent
- If a step is off by a 1/2 inch…
- Fatigue decreases lift



Housekeeping 1910.22

- Clean, orderly, sanitary
- Must be Dry
- If wet, drain it
- Dry standing place: platforms, mats
- Inspect, maintain, and repair
- Includes: parking lot, loading area

Free Control of Hazard

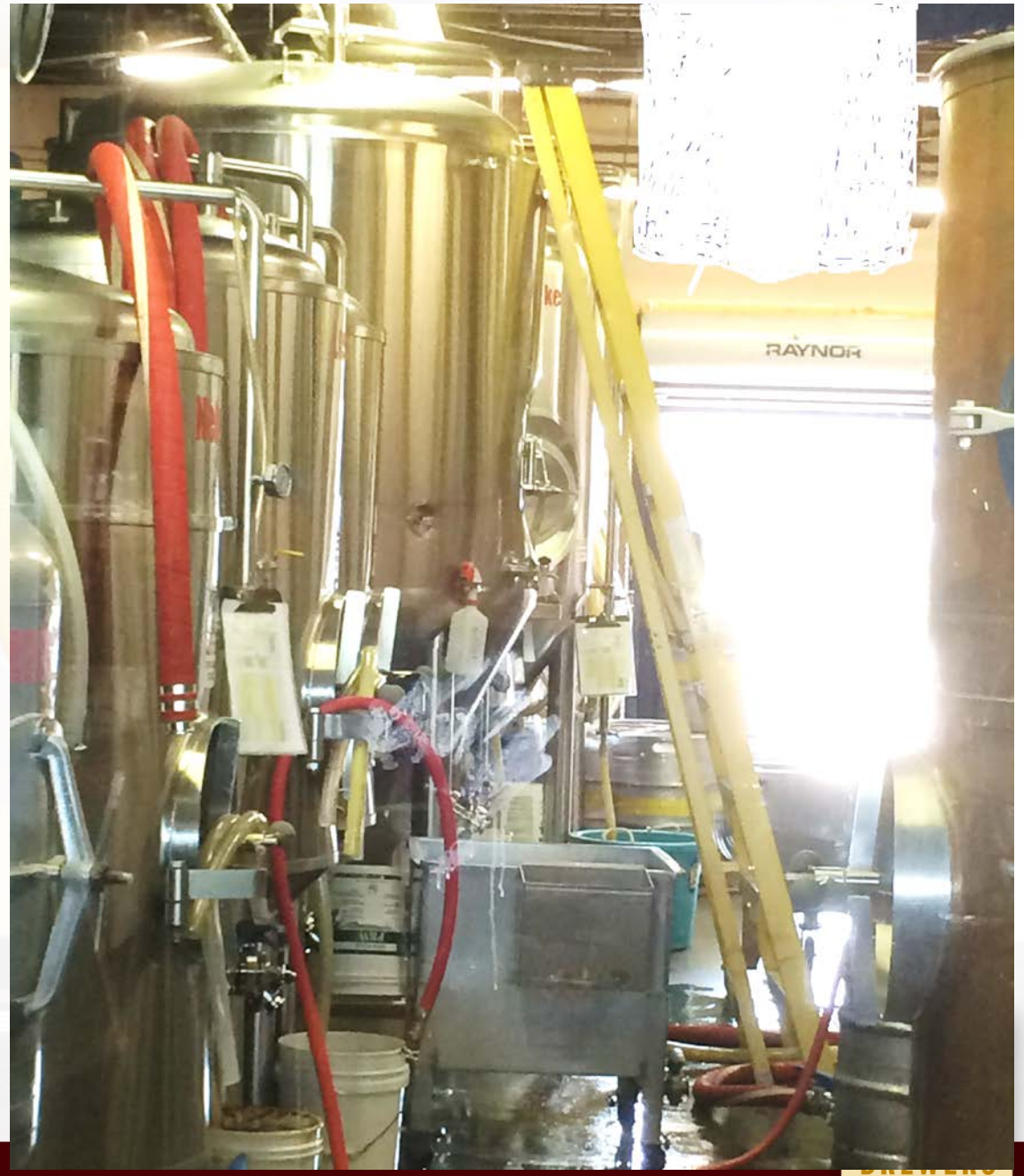
Free Control of Hazard

Ladder

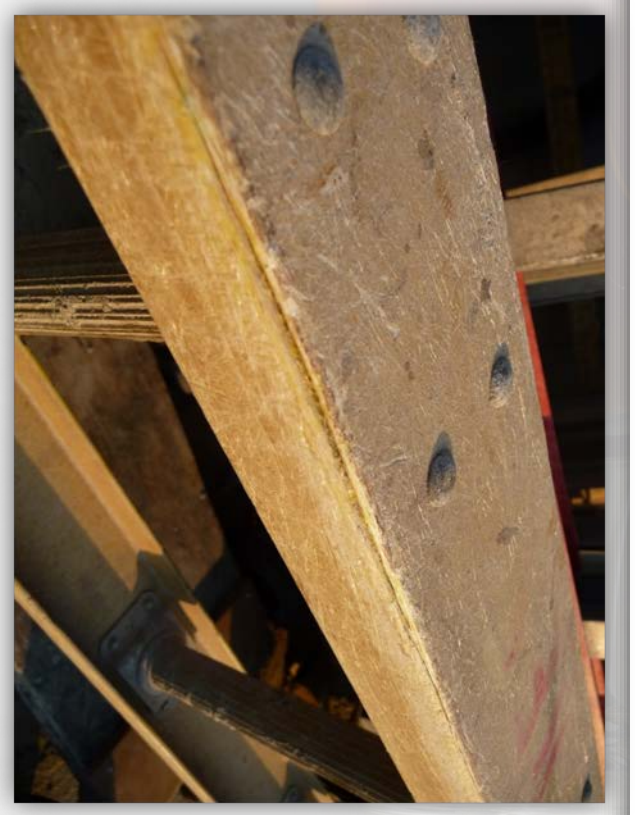

TAKE ACTION
!
ELECTRICAL
PRESSURE
BREWERY HAZARDS
TEMPERATURE
SLIPS & FALLS
ERGONOMIC
ELEVATION
FLAMMABLE/ EXPLOSIVE
CONFINED SPACE
MOTION
NOISE
SHARPS
MECHANICAL
CHEMICAL
BA BREWERS ASSOCIATION

Ladders

- Face all ladders to balance on toes
- Tie ladders so they don’t slip away



CORROSION RESISTANCE GUIDE FOR FIBERGLASS



Chemical	75°F	150°F
Acetic Acid, 5%	R	R
Acetic Acid, 10%	R	NR
Aluminum Sulphate	R	R
Ammonium Hydroxide, 5%	R	NR
Aluminum Nitrate	R	R
Benzene Sulfonic Acid, 5%	R	R
Calcium Chloride	R	R
Chlorine Dioxide, 15%	R	NR
Chromic Acid, 5%	R	R
Copper Sulphate	R	R
Ethylene Chlorhydrin	R	R
Ethylene Glycol	R	R
Ferrous Sulphate	R	R
Fatty Acids, 100%	R	R
Fluosilicic Acid, 10%	NR	NR
Hydrochloric Acid, 1%-10%	R	R
Hydrochloric Acid, 37%	R	NR
Kerosene	R	R
Magnesium Chloride	R	R
Methyl Alcohol	R	NR
Naptha	R	R

Chemical	75°F	150°F
Nitric Acid, 5%	R	NR
Phosphoric Acid, to 85%	R	R
Sodium Bicarbonate	R	R
Sodium Bisulfate	R	R
Sodium Carbonate	R	NR
Sodium Chloride	R	R
Sodium Hydroxide, 5%	NR	NR
Sodium Hypochlorite, 5%	R	R
Sodium Nitrate	R	R
Sodium Silicate	R	NR
Sodium Sulfate	R	R
Sour Crude Oil	R	R
Sulfuric Acid, to 10%	R	R
Sulfuric Acid, 30—50%	R	NR
Trisodium Phosphate	R	NR
Xylene	R	NR

NOTE:
1) "R" is recommended
2) "NR" is not recommended

SOLVENTS NOT RECOMMENDED FOR IMMERSION

Acetone
Carbon Disulphide
Carbon Tetrachloride
Ethylether
Methyl Ethyl Ketone
Toluene

Mobile Ladder stand and Mobile Ladder platform

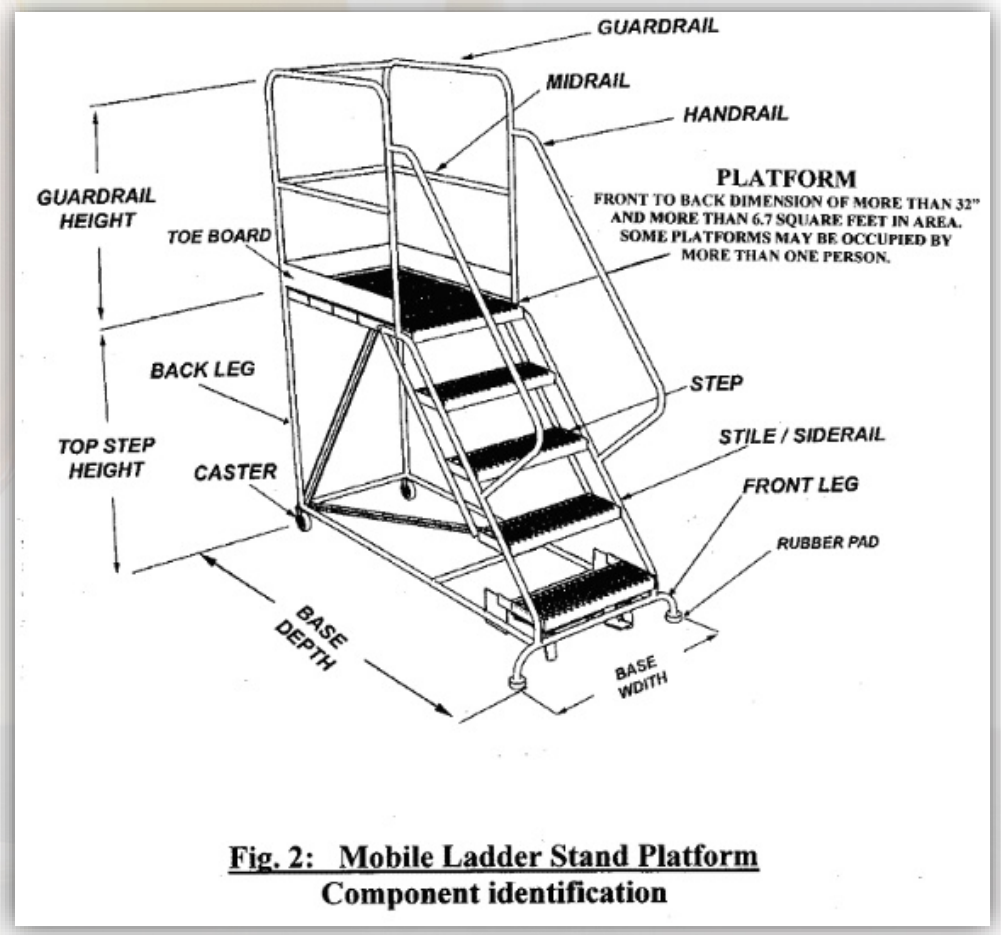


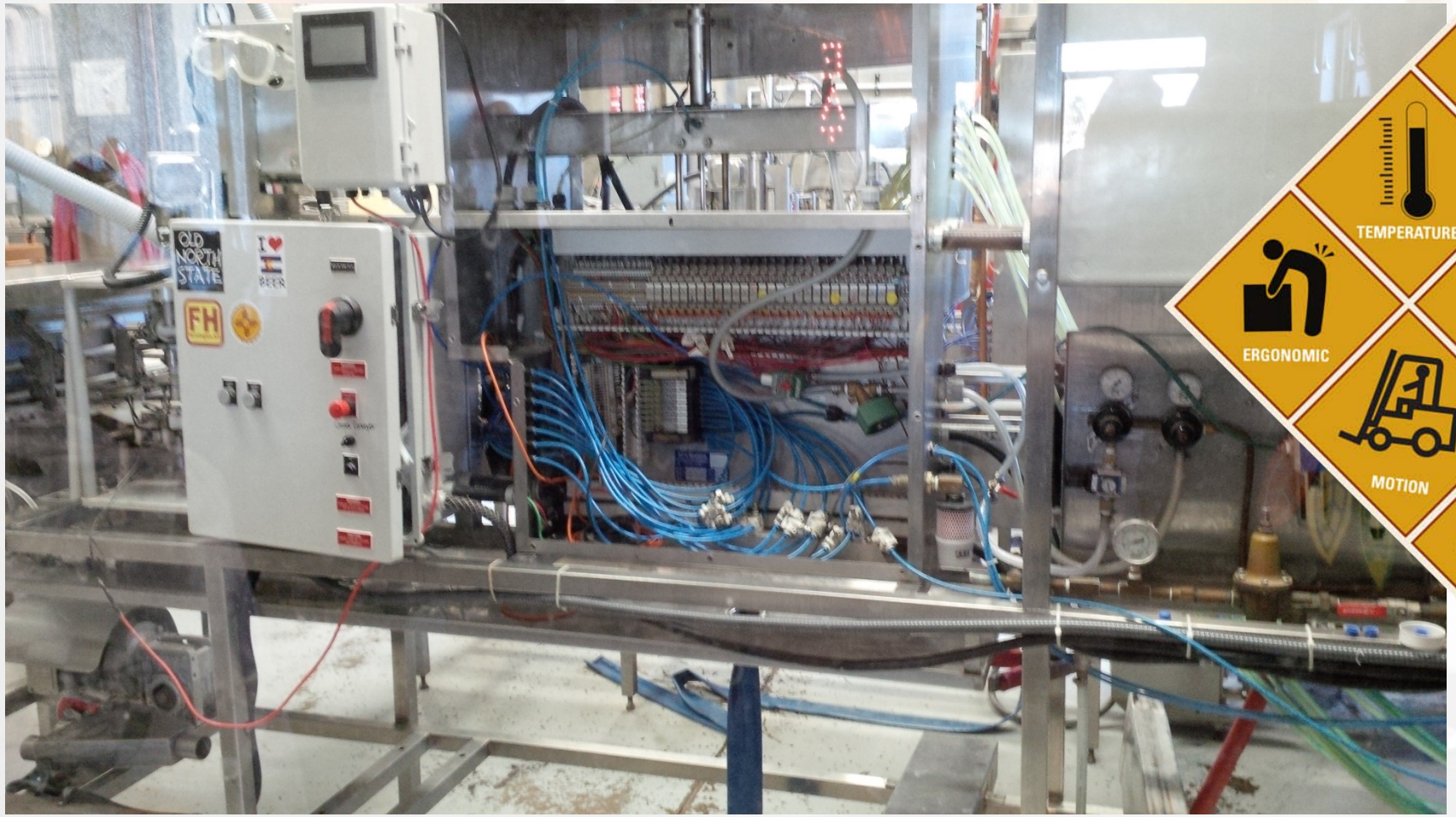
Fig. 2: Mobile Ladder Stand Platform
Component identification

Take a risk of losing your way of life? Or…

Electrical

National Electrical Code
NFPA 70
NFPA 70e
UL listing

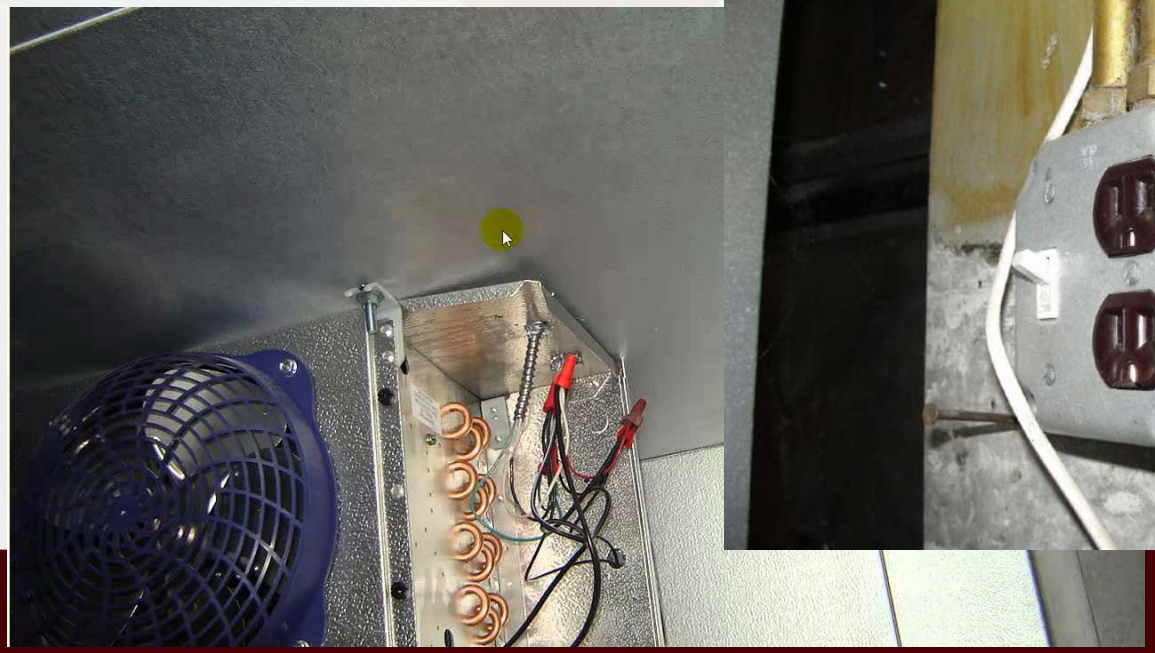
Electrical safety

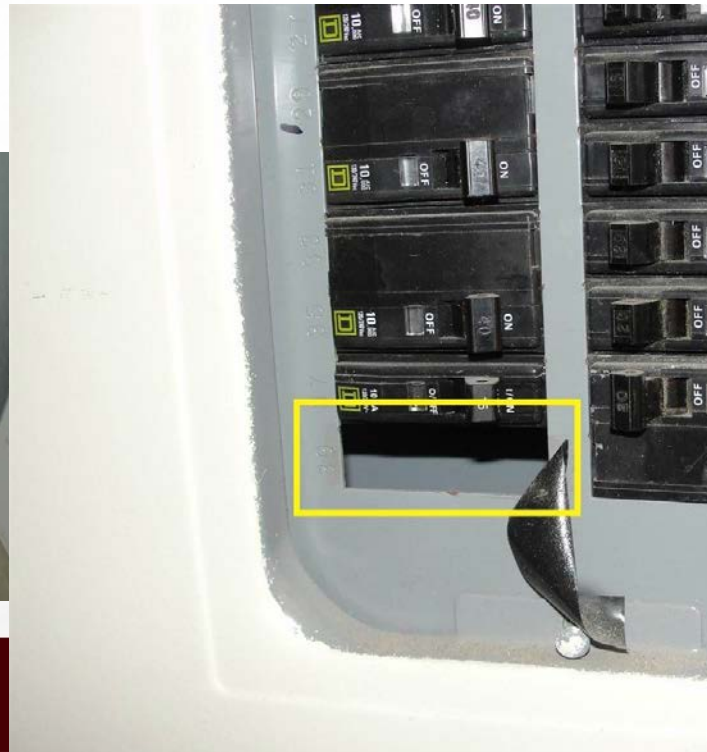


BA BREWERS ASSOCIATION

Subpart S Electrical 1910.303 to 1910.399

- Regulates fixed equipment
- Cover openings in boxes
- Use it as it was designed
- Switches vs. Disconnects
- Equipment access in emergency





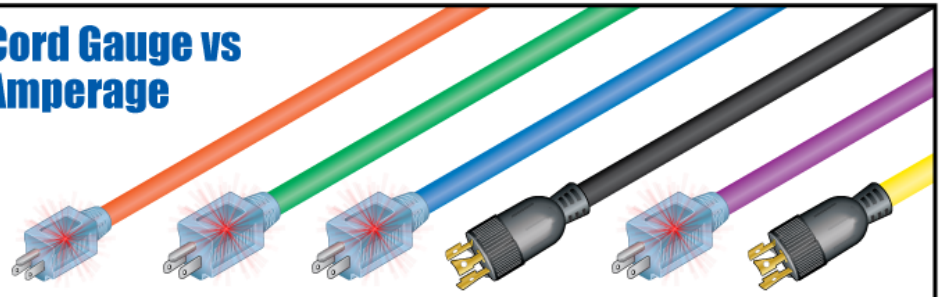
1910.307 Hazardous locations

- Electrical in dust environments
- Includes exit signs, lights, motors, cords
- Emergency lights, signs, etc.
- Dust traps heat in motors

Cord safety

- Rated for amps is used for
- Outlet and cover plate get hot
- Cord plug gets hot at outlet box
- Two plugs get hot
- Cord gets hot

Cord Gauge vs Amperage



16 Gauge U-Ground	14 Gauge U-Ground	12 Gauge U-Ground	12 Gauge Twistlock	10 Gauge U-Ground	10 Gauge Twistlock

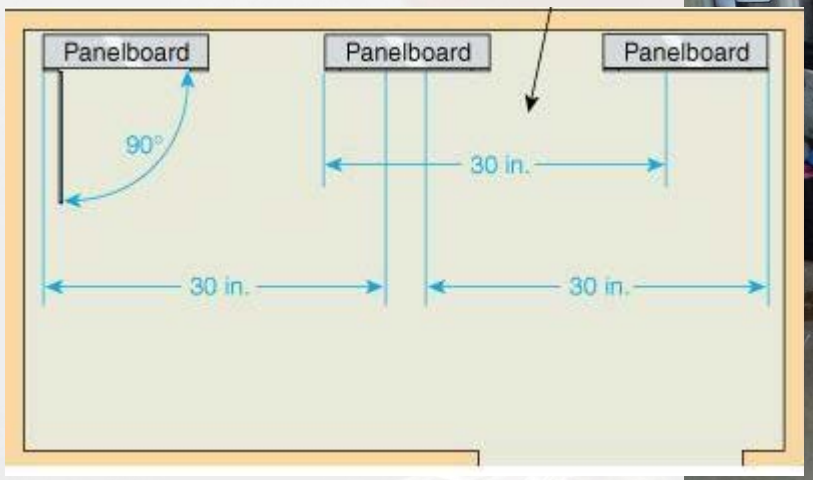
Usage Guide

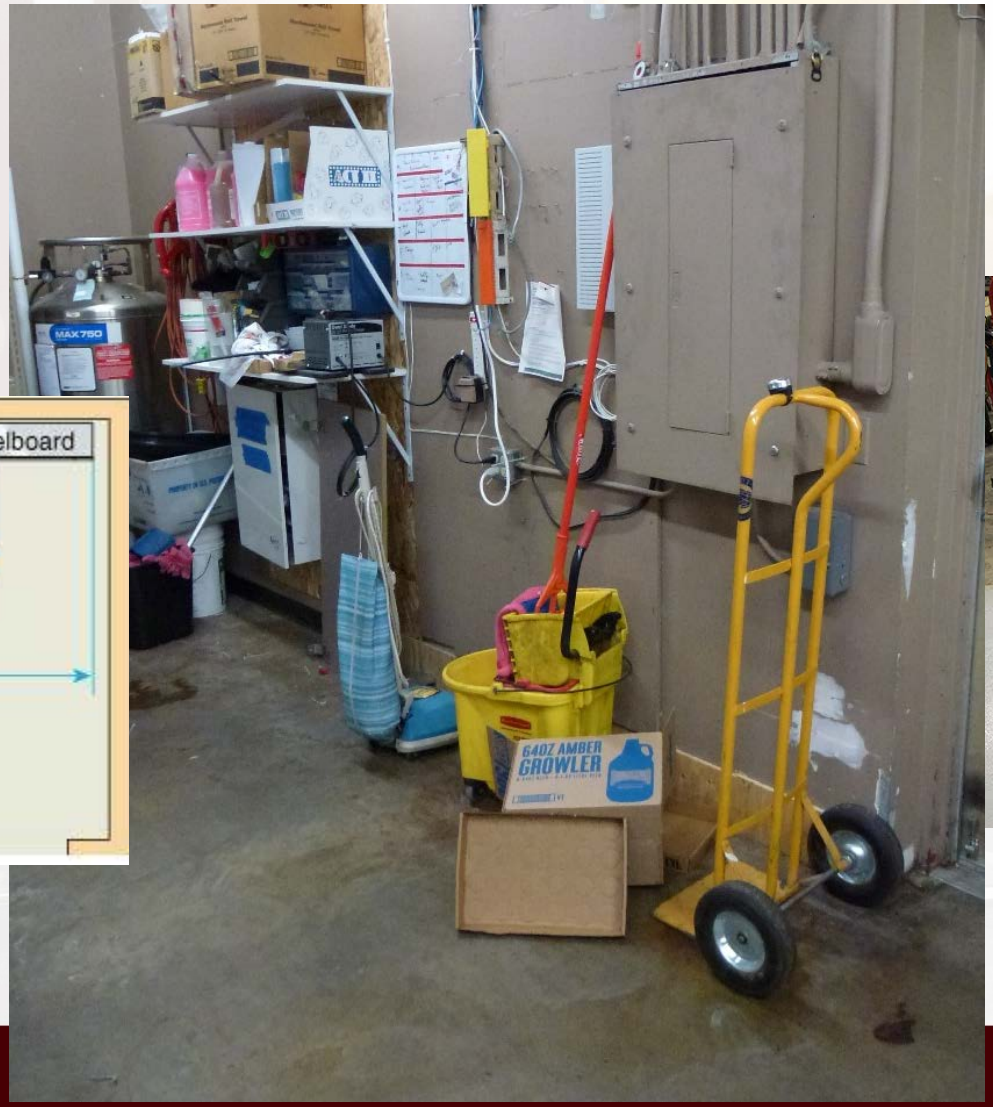
MEDIUM DUTY	HEAVY DUTY	EXTRA HEAVY DUTY	EXTRA HEAVY DUTY	ULTRA HEAVY DUTY	ULTRA HEAVY DUTY
Fans	Drills	Impact Hammers	Circular Saws	Generators	Generators
Small Appliances	Belt Sanders	Chain Saws	Chain Saws	Recipro Saws	Chop Saws
Stereos	Routers	Recipro Saws	Table Saws	Rotary Hammers	Rotary Hammers
Household Tools	Hedge Trimmers	Grinders	Worm Drives	Compressors	Tile Saws

Amperage Chart

	16 GAUGE	14 GAUGE	12 GAUGE U-GROUND	12 GAUGE TWISTLOCK	10 GAUGE U-GROUND	10 GAUGE TWISTLOCK
25ft.	13 Amps	15 Amps	15 Amps	20 Amps	15 Amps	20 Amps
50ft.	13 Amps	15 Amps	15 Amps	20 Amps	15 Amps	20 Amps
100ft.	10 Amps	13 Amps	15 Amps	15 Amps	15 Amps	20 Amps

Keep access clear

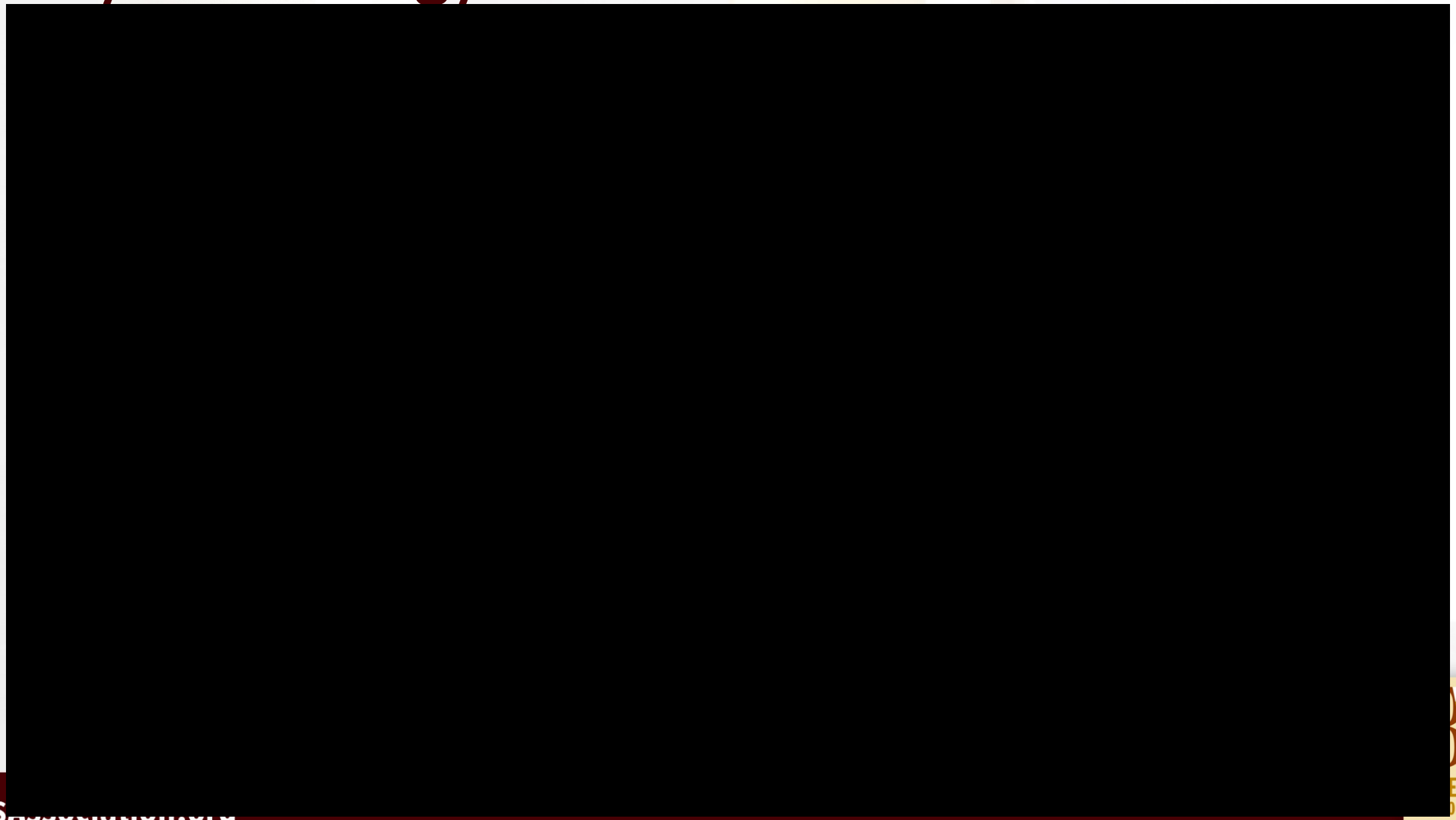




NFPA 70e: HOST AND CONTRACTOR RESPONSIBILITIES

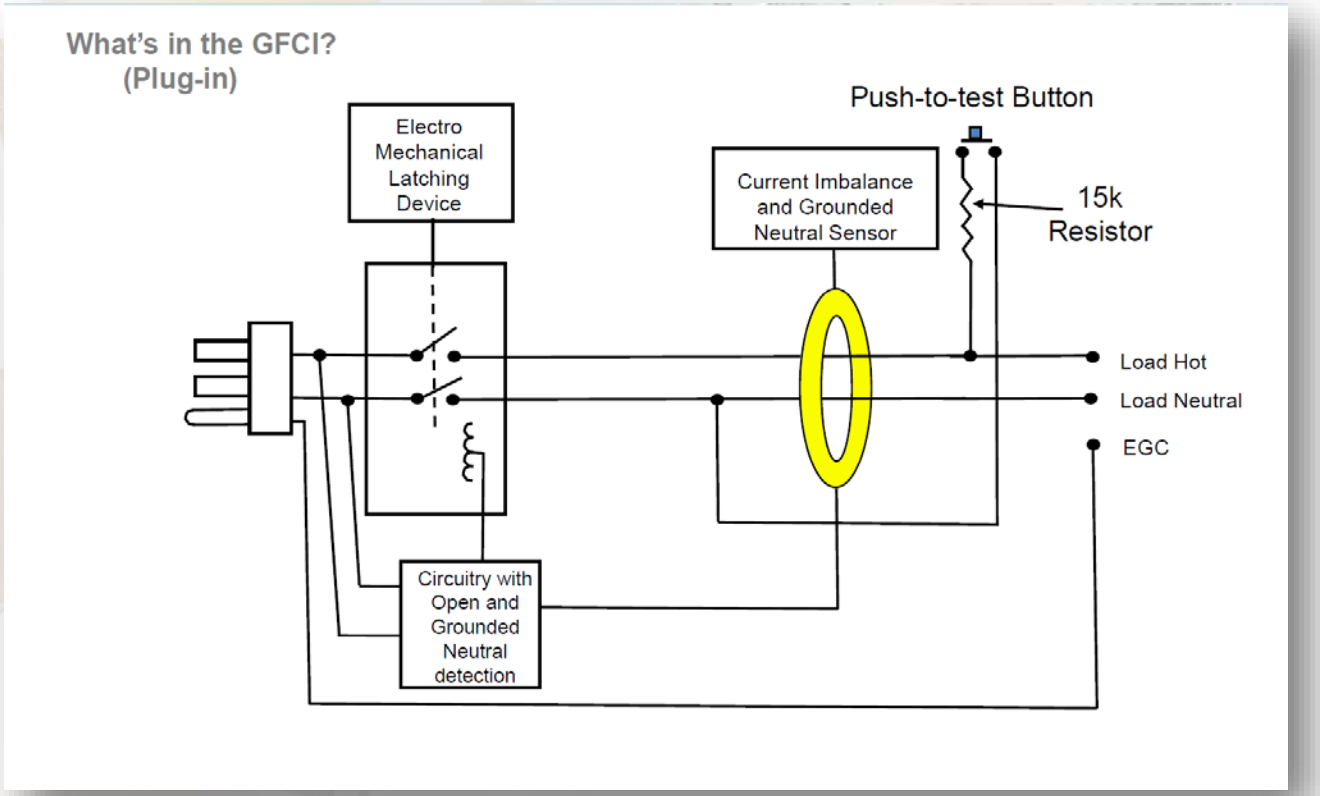
- **110.3(A) Host employer tells** hazards to contract employer
- Include all info the contractor needs to assess safety
- **110.3(B)** Contractor trains employees on electrical safety
- Communicates **hazards identified by the host**
- Contractor must report to host, any new hazards found
- **110.3(C)** "…shall be **documented meeting (with host)"**

Very low energy arc



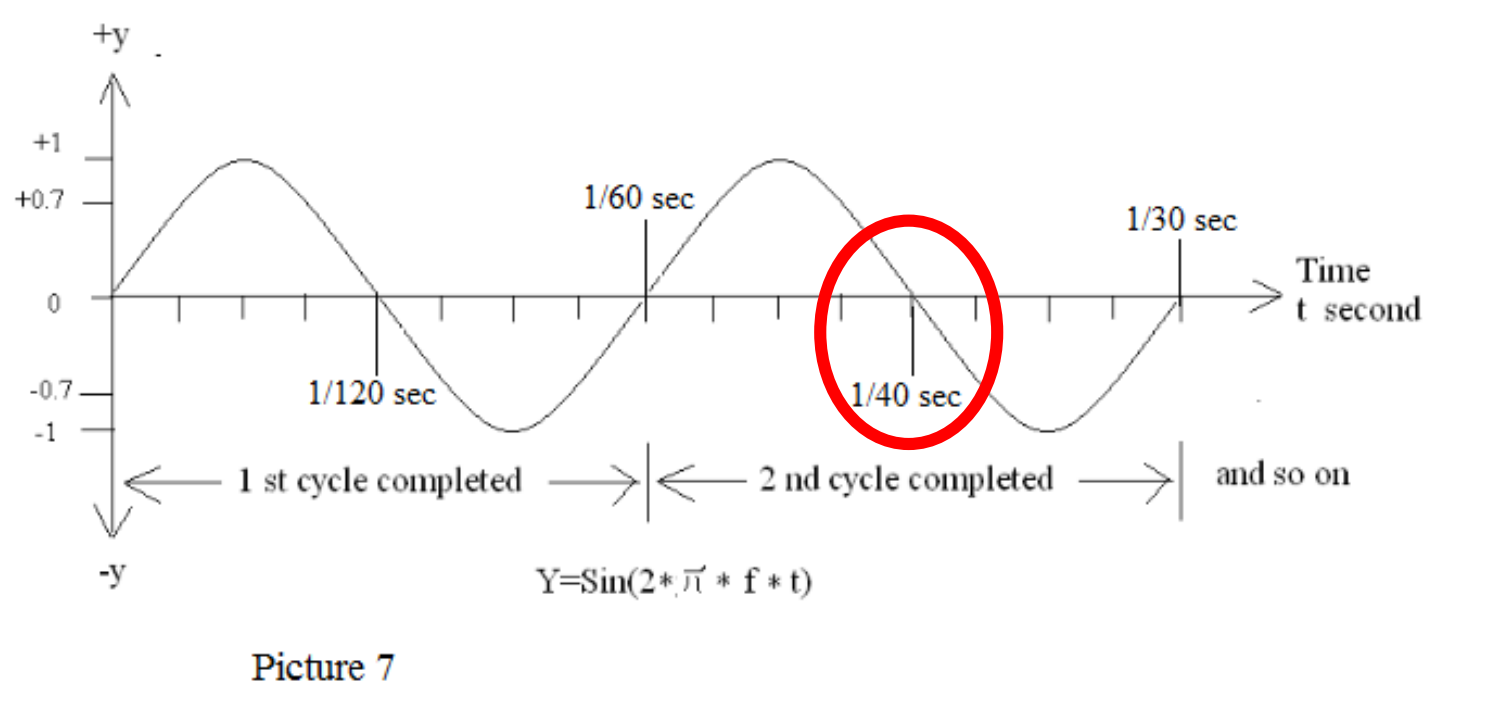
Ground Fault Circuit Interrupters

- Require GFCI in all **wet area** circuits
- Measures **difference in current**
- Causes “ZERO POWER”
- Check by “test” button

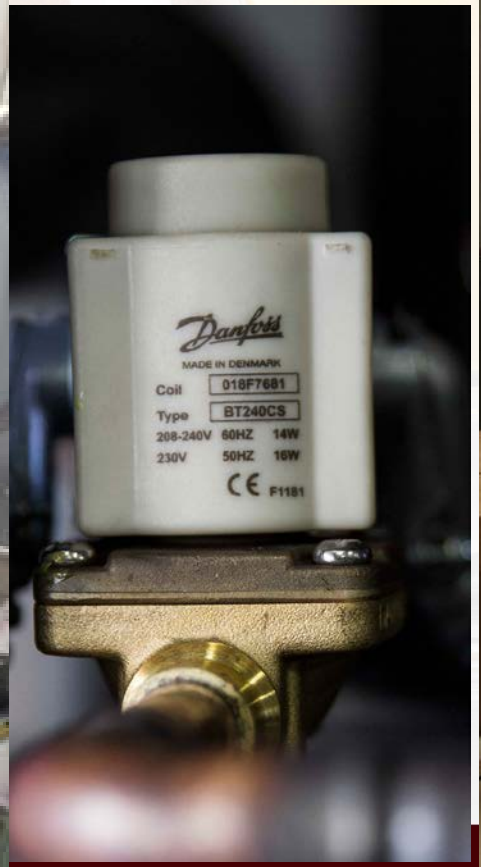


National Electrical Code and OSHA

Will I still get shocked? 1/40 second



Picture 7


Danfoss
MADE IN DENMARK
Coil 018F7681
Type BT240CS
208-240V 60HZ 14W
230V 50HZ 16W
CE F1181

Burns


TAKE ACTION
!
ELECTRICAL
PRESSURE
TEMPERATURE
BREWERY HAZARDS
SLIPS & FALLS
ERGONOMIC
ELEVATION
FLAMMABLE/ EXPLOSIVE
CONFINED SPACE
MOTION
NOISE
SHARPS
MECHANICAL
CHEMICAL
BA BREWERS ASSOCIATION

Scalding liquids

I asked:

What are Top 5 ways
to get a boot full of hot wort?

First answer from everyone!

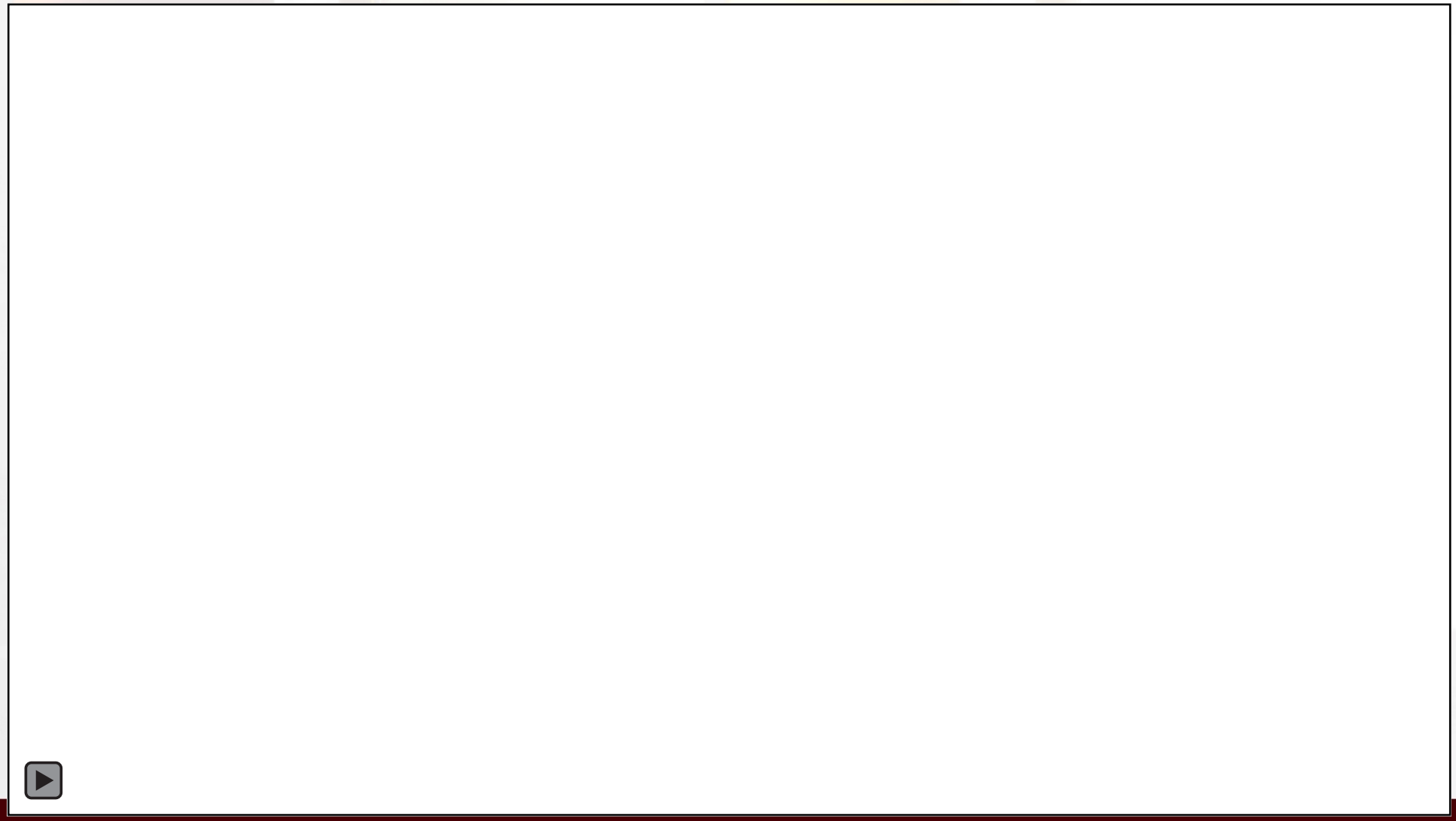
1. Tuck your pants into your boots

2. Wear shorts

What are your top 5 ways to get a bootful?

- How do you prevent burns?
- Do we have procedures?
- Do we follow them?
- Do we share lessons learned?
- What do I tell “the new guy”?

Control of Hazardous Energy and a Confined Space



Hazardous Energy

Energy:

- Air pressure
- Heat or cold
- Steam: Pressure and Heat
- Gravity
- Mash rake?
- Water
- Electricity

Non-energy?

- Gas vapors: O2, CO2

Control Hazardous Energy

- Why use a lock?
- Only one key for my lock
- Never give away my key

- No one else can use my key
- No one else can remove my lock

Control Hazardous Energy

- **Annual visual observation of a LOTO**
- Annual training required
- Methods of energy isolation
- Recognize sources of energy

- Written procedure required
- **Close** valves
- **Shut off** circuits
- **Disconnect** lines
- Written procedure to remove LOTO

Description: Boiler #1			Equipment #	160-0012
Location: Boiler Room	Bldg: GHO	Revn: 0	Date: N/A	Origin Date: 9/3/08

4 LOCKS & TAGS NEEDED

DANGER

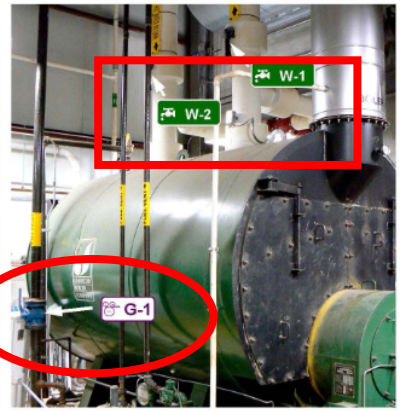
Steam pressure and burn hazard. Ensure steam and heat have dissipated before proceeding.

NEXT AUDIT DUE SEP 2009 | NEXT AUDIT DUE SEP 2010 | NEXT AUDIT DUE SEP 2011 | NEXT AUDIT DUE SEP 2012

North Wall

South Side View

North West Side View



ALWAYS PERFORM A MACHINE STOP BEFORE LOCKING OUT DISCONNECTS

ID	Source	Location	Method	Check	Device
E-1	Electrical 480V	Disconnect located at the MCC located on North Wall	Move E-1 disconnect to off. Lock out.	Attempt restart at CP-1.	Lockout Hasp and Lock
W-1	Hot Water Supply	Disconnect Above the Boiler. Valve on West Side.	Turn W-1 valve off. Lock out.	Verify pressure has bled off.	Cable Lockout
W-2	Hot Water Return	Disconnect Above the Boiler. Valve on West Side.	Turn W-2 valve off. Lock out.	Verify pressure has bled off.	Cable Lockout
G-1	Gas Natural Gas	Disconnect on West side of Boiler unit.	Turn G-1 valve off. Lock out.	Verify pressure has bled off.	Universal Ball Valve Lockout

CP = CONTROL PANEL | E = ELECTRICAL | W = WATER | P = PNEUMATIC | C = CHEMICAL | V = VALVE | G = GAS | S = STEAM

OPENING A GUARD DOES NOT CONSTITUTE A LOCKOUT!

DANGER — Any machine modifications must be shown in procedure. Contact facilities to update procedure. — DANGER

Enforcement: Failure to properly follow lockout-tagout procedure may result in disciplinary action.

SHUTDOWN, LOCK, TAG & TEST SEQUENCE

#	STEP	DESCRIPTION
1	*Notify*	Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.
2	*Review Lockout Procedure*	The authorized employee shall refer to the company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.
3	*Perform Machine Stop*	If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).
4	*Isolate Energy*	De-activate the energy isolating device's) so that the machine or equipment is isolated from the energy sources).
5	*Lockout Energy*	Lock out the energy isolating device's) with assigned individual lock's).
6	*Dissipate Energy*	Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc
7	*Attempt Restart*	Ensure that the equipment is disconnected from the energy sources) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control's) or by testing to make certain the equipment will not operate. **Caution**: *Return operating control's) to neutral or "off" position after verifying the isolation of the equipment.*

RESTORE TO SERVICE SEQUENCE

#	STEP	DESCRIPTION
1	*Check Machine*	Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
2	*Check Area*	Check the work area to ensure that all employees have been safely positioned or removed from the area.
3	*Verify Machine*	Verify that the controls are in neutral.
4	*Remove Lockout*	Remove the locks, tags and lockout devices and re-energize the machine or equipment. Reverse the order of all lockout-tagout procedure steps from bottom to top starting from the last page. Note: The removal of some forms of blocking may require re-energization of the machine before safe removal.
5	*Notify*	Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for used.

Reference: OSHA CFR 1910.147, Appendix A, "Typical minimal lockout procedures - 1910.147 App A"

LOTO this too

Confined space

- Hard to get in and out
- Big enough to get into
- Not meant to stay in it

Permit Required Confined Space?

- Unsafe atmosphere
- Hot mash
- Liquids
- Hot vessel
- Mash rake
- Grain silo

Confined space

- **Eliminate** what can hurt me
- **Control** what can hurt me
- Perform **lock out**
- **Isolate** from “Inflow and Outflow”

- §1910.146,
- BA Confined Space BMP
- OSHA eTool,
- OSHA Confined Space Advisor

Effective Ventilation: Research

- U of MICHIGAN study: Confined Space ventilation.
- Studied gases, shapes, other variables.
- Results: 20 ACH so entrant can breathe.
- Purge time: Cubic feet / blower CFM
- Purge time equals 1 single air exchange.

20 ACH

No matter your plan, a gas monitor must verify

Calculating "AIR CHANGES *Per* HOUR"

- $Feet^3$ / CFM_{Blower} = purge time
- 10 barrel tank: $45Ft^3$ roughly
- 45 cfm should clear in 1 min

- Bathroom fans:

  50 cfm to 120 cfm

How long to clear the smell?

I need a Carbon Dioxide sensor!

- Oxygen is 20% of air, **1 in 5**
- It takes **5%** CO2 to displace **1%** O2
- PEL of CO2 is 5,000 ppm, or 0.5%
- Or only displaces 0.1% Oxygen
- Causes fatigue
- Heart skips beats

Confined space rescue Plan

- Must have a rescue plan for entries
- If 911 is your plan, refer to OSHA Fact Sheet
- Talk to your fire department
- Do they have the **right equipment**?
- Will they be **available** if you call?
- Or rescuing a cat from a tree?

OSHA® FactSheet

Is 911 your Confined Space Rescue Plan?

Permit-required confined spaces can present conditions that are immediately dangerous to workers' lives or health if not properly identified, evaluated, tested and controlled.

OSHA has developed a standard for Confined Spaces in Construction (29 CFR 1926 Subpart AA) for any space that meets all of the following criteria:

- Is large enough for a worker to enter;
- Has limited means of entry or exit; and
- Is not designed for continuous occupancy.

One provision of the standard requires employers to develop and implement procedures for summoning rescue or emergency services in permit-required confined spaces. An employer who relies on local emergency services for assistance is required to meet the requirements of §1926.1211 — *Rescue and emergency services.*

OSHA recognizes that not all rescue services or emergency responders are trained and equipped to conduct confined space rescues. When employers identify an off-site rescue service, it is critical that the rescuers can protect their employees. The emergency services should be familiar with the exact site location, types of permit-required confined spaces and the necessary rescue equipment.

For Employers

Calling emergency responders to provide rescue services can be a suitable way of providing for rescues in a permit-required confined space. Pre-planning will ensure that the emergency [illegible] and prepared.

Emergency service workers perform a practice rescue inside a manhole.

- The ability to respond and conduct a rescue in a timely manner based on the site conditions and is capable of conducting a rescue if faced with potential hazards specific to the space. Such hazards may include:
  - Atmospheric hazards (e.g., flammable vapors, low oxygen)
  - Electrocution (e.g., unprotected, energized wires)
  - Flooding or engulfment potential
  - Poor lighting
  - Fall hazards

Powered industrial trucks

Reference PIT Best Management Practices found on BA site

Overload, unbalanced, incorrect use


OVERHEAD DOOR
FU 8
CAP 15,000
BRIGHTEST YOUNGTHINGS .com

Chemical safety

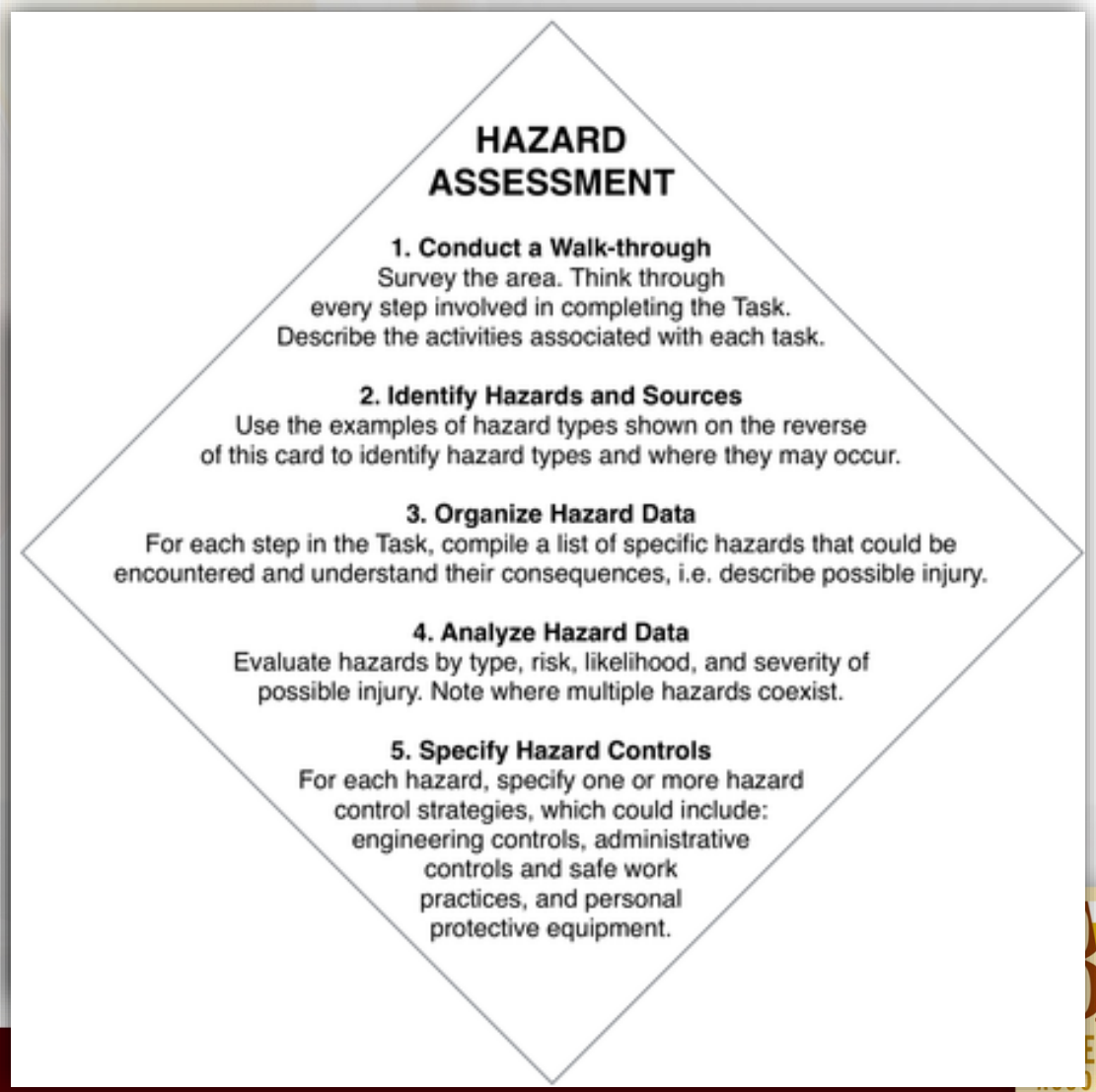
Chemicals/ ppe

Common chemical hazards in breweries

- **Written program is required**
- **Trained before works with every chemical**
- **Proper label on every container**
- **SDS for every chemical**
- **SDS always available**

Common chemical hazards in breweries

- Acid
  - Acid-Based Detergents, Nitric, Phosphoric
- Base/ Alkaline
  - Sodium hydroxide (NaOH), “caustic soda”
  - Caustic/ Hypochlorite Solutions
- Oxidizer
  - Most sanitizers are oxidizers
- Flammable
  - Oxygen
- Asphyxiant
  - Carbon Dioxide
  - Nitrogen



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- Acid
  - Acid-Based Detergents,

GHS Classification

Skin Corrosion/Irritation:	Category 1
Serious Eye Damage/Eye Irritation:	Category 1
Specific Target Organ Toxicity (Single Exposure):	Category 3
Oxidizing Liquids	Category 2

GHS Label Elements

Signal Word: **Danger**

Symbols:

Hazard Statements:
Causes severe skin burns and serious eye damage.
May cause respiratory irritation
May intensify fire; oxidizer

Precautionary Statements:

Prevention:
Do not breathe mist, vapors or spray.
Wash hands and any exposed skin thoroughly after handling.
Wear protective gloves. Wear eye / face protection. Wear protective clothing.
Use only outdoors or in a well-ventilated area.
Keep away from heat
Keep away from clothing/combustible materials.
Take any precaution to avoid mixing with combustibles .

Response: **IMMEDIATELY CALL A POISON CENTER OR PHYSICIAN.**

-Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

-Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse.

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  - Caustic/Hypochlorite Solutions

Classification

Skin corrosion/irritation	Category 1 Sub-category B
Serious eye damage/eye irritation	Category 1

Hazards Not Otherwise Classified (HNOC)
May be harmful in contact with skin

Signal Word
Danger

Hazard Statements
Causes severe skin burns and eye damage

Precautionary Statements - Prevention
Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection

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  - Nitrogen

- Oxidizer
  - Most sanitizers are oxidizers
  - Don’t use Nitrile gloves

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- Nitrogen

label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Open valve slowly. Use only with equipment cleaned for Oxygen service.

Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves, valves and fittings free from oil and grease.

In case of fire: Stop leak if safe to do so.

Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-

“Nitric acid got too hot in the kettle… A thick, yellow cloud of Nitric haze formed”

Avoid: Extreme temperatures.

Fatal by: spasm, inflammation, larynx and bronchi edema, chemical pneumonitis, pulmonary edema.

Aspiration causes pulmonary edema.

Inhalation effects delayed; respiratory chemical burns

Doctors: inhalation damage to 30 hours.

Causes systemic effects; acute pulmonary edema, asphyxia, chemical pneumonitis; upper airway edema obstruction.

Hazardous materials Storage

Chemical safety & Emergency Response Plan

6. Accidental release measures	
Personal Precautions	Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Use personal protective equipment.
Environmental Precautions	Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.
Methods for Containment and Clean Up	Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Sweep up and shovel into suitable containers for disposal.

7. Handling and storage

- What is your plan?
- Special equipment to use?
- Sorbants?
- Neutralizer?

- Plan for safe disposal
- Not for down the drain

Plan to follow!

- Dogfishhead spilled nitric acid
- They followed their **plan.**
- Workers were **evacuated.**
- The tasting room was **evacuated.**
- The day's schedule was **postponed.**
- No one was hurt.
- **Complements** from OSHA!

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Chemical leaks at Dogfish Head in Milton

A decontamination tent sits in the middle of the road in front of Dogfish Head Brewery. Workers discovered a 300-gallon tank was leaking nitric acid Aug. 7, and the brewery was evacuated. No one was injured. BY NICK ROTH

August 7, 2013

Workers at Milton's Dogfish Head brewery discovered a 300-gallon tank was leaking nitric acid about 2:20 p.m., Wednesday, Aug. 7. The Milton Fire Department was dispatched and called for the assistance of the Department of Natural Resources and Environmental Control.

"DNREC has made entry found that the leak is contained," said Joseph P. Hopple, public information officer for Sussex County EMS. "We evaluated six workers who were in the area of the leak; none of them had any complaints of

Eye wash and showers

- Within **10 seconds, or 55 feet**
- On same level, **no stairs**
- Low water velocity to limit damage
- Temperature from **60ºF to 80ºF**
- Hotter increases corrosive actions
- **20 min**ute water supply

Minimum flow rates of:

- **0.4 gallons/min** for eyewash
- **3 gpm** eye/face wash
- **20 gpm** showers; **400** gallons/ 20 min.

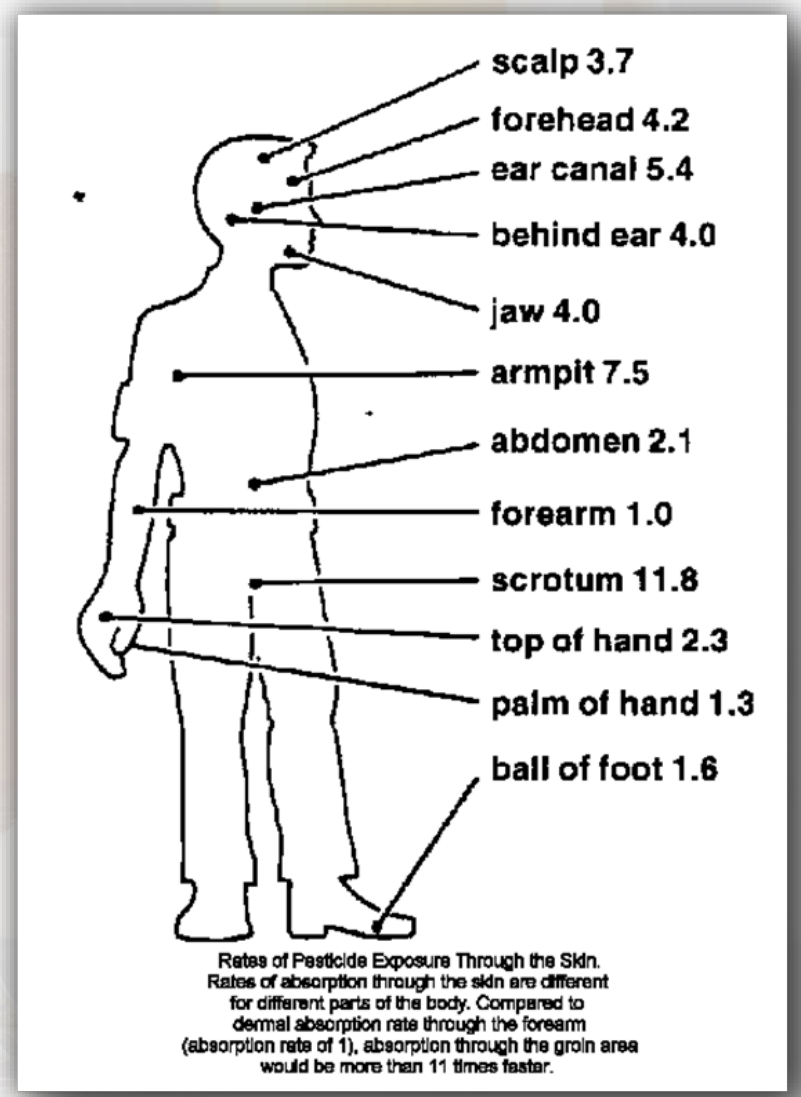

WASH
TATION

PPE for brewers

- BA Best Management Practice PPE
- 1910 Subpart I
- Note the glasses
- Gloves
- Pants outside boots

Face Protection

- If face can be injured, protect it
- If can absorb, protect it
- Inspect for scratch, crack, pits
- Dirty shield fogs up faster



Rates of Pesticide Exposure Through the Skin.
Rates of absorption through the skin are different for different parts of the body. Compared to dermal absorption rate through the forearm (absorption rate of 1), absorption through the groin area would be more than 11 times faster.

Chemical glove example: nitrile

EDITION

The first square in each column for each glove type is color coded to provide an overall rating for both Degradation and Permeation. The letter in each colored square is for Degradation alone.

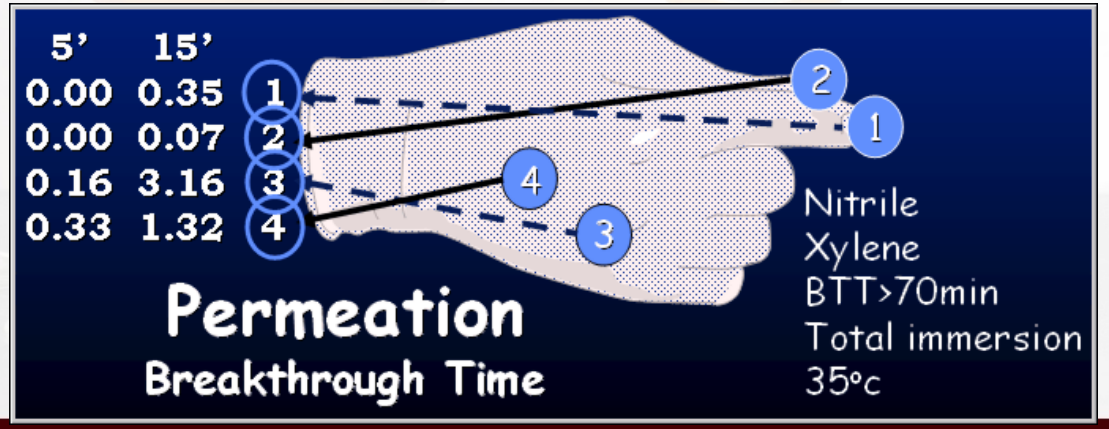
GREEN: The glove is very well suited for application with that chemical.

YELLOW: The glove is suitable for that application under careful control of its use.

RED: Avoid use of the glove with this chemical.

SPECIAL NOTE: The chemicals in this guide highlighted in BLUE are experimental carcinogens, according to the ninth edition of Sax' *Dangerous Properties of Industrial Materials*. Chemicals highlighted in GRAY are listed as suspected carcinogens, experimental carcinogens at extremely high dosages, and other materials which pose a lesser risk of cancer.

CHEMICAL	LAMINATE FILM BARRIER™			NITRILE SOL-VEX®			UNSUPPORTED NEOPRENE 29-SERIES			SUPPORTED POLYVINYL ALCOHOL PVA™			POLYVINYL CHLORIDE (Vinyl) SNORKEL®			NATURAL RUBBER *CANNERS AND HANDLERS™			NEOPRENE/ NATURAL RUBBER BLEND *CHEMI-PRO®			BUTYL UNSUPPORTED CHEMTEK™ BUTYL			VITON/BUTYL UNSUPPORTED CHEMTEK™ VITON/BUTYL		
	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate	Degradation Rating	Permeation: Breakthrough	Permeation: Rate
114. Naphtha, VM&P	▲	>480	E	E	>360	E	G	103	G	E	420	E	F	120	VG	NR	—	—	NR	—	—	—	—	—	—	—	—
115. Nitric Acid, 10%	▲	>480	—	E	>360	—	E	>480	—	NR	—	—	G	>360	—	G	>360	—	E	>360	—	—	—	—	—	—	—
116. Nitric Acid, 70% (Concentrated)	E	>480	—	NR	—	—	▲	>480	—	NR	—	—	F	109	—	NR	—	—	NR	—	—	—	—	—	—	—	—
117. Nitric Acid, Red Fuming	▲	>480	E	NR	—	—	NR	—	—	NR	—	—	P	—	—	P	—	—	NR	—	—	—	—	—	—	—	—
118. Nitrobenzene	▲	>480	E	NR	—	—	NR	—	—	G	>360	E	NR	—	—	E	15	G	E	42	G	E	>480	—	E	>480	—



Hand Protection

- 1.1 million hand injuries
  - 2014 ER visits and lost time from work
-

1.
2. Crushes,
3. Avulsions or detachments,
4. Punctures,
5. Fractures

- Affect ability to perform tasks.
- Slow to heal
- Heal poorly

joint cartilage, and fingernails work together

DO WE GO RIGHT TO CHOOSING PPE?

Blade Safety

- What gets cut?
  Free hand, Leg, Side of body

- In-appropriate cutting tools.
- It’s a drywall knife, not box cutter
- Remove regular knives, replace with approved cutting tools.

- Use tools designed for specific job
- Use scissors to cut grain bags
- Inspect: sharp blade, solid mount, spring action
- Dull blades increase risk

Back safety and ergonomics

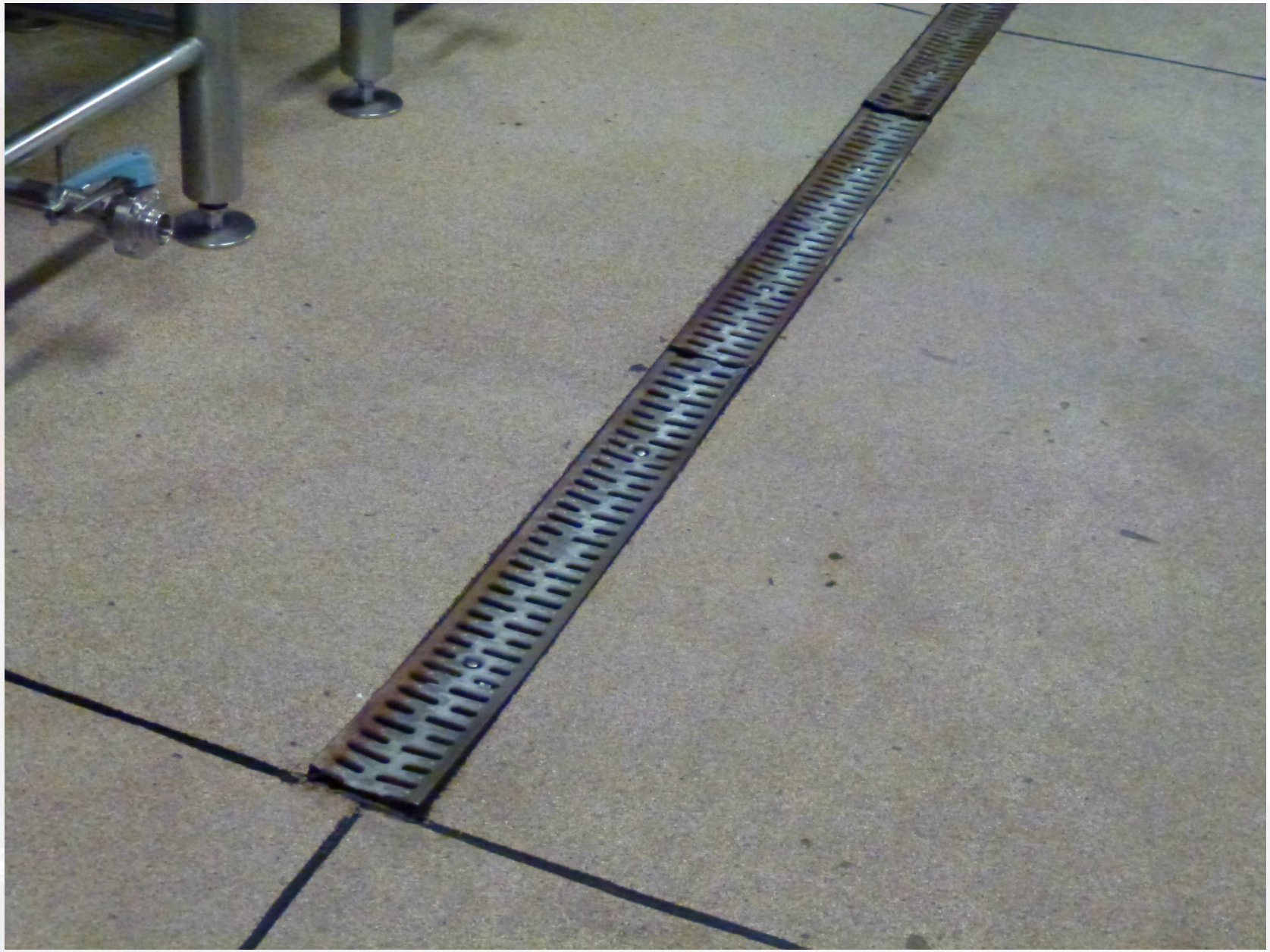
1. Keep your spine neutral
2. Keep your spine neutral
3. Keep your spine neutral

Protect your back, and shoulders


150 years, 5 g
home of
DANGER


Honeywell

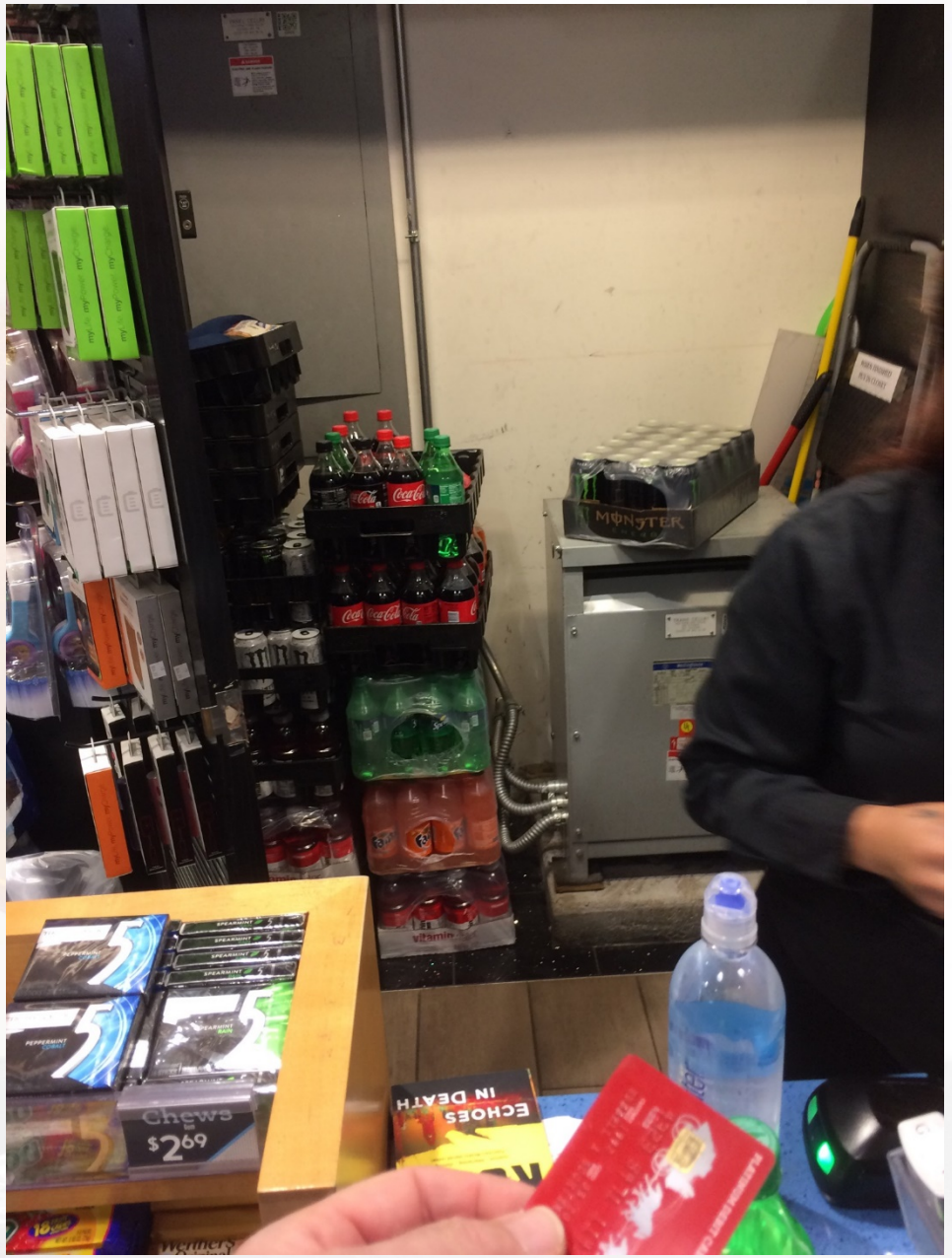

MASH TU

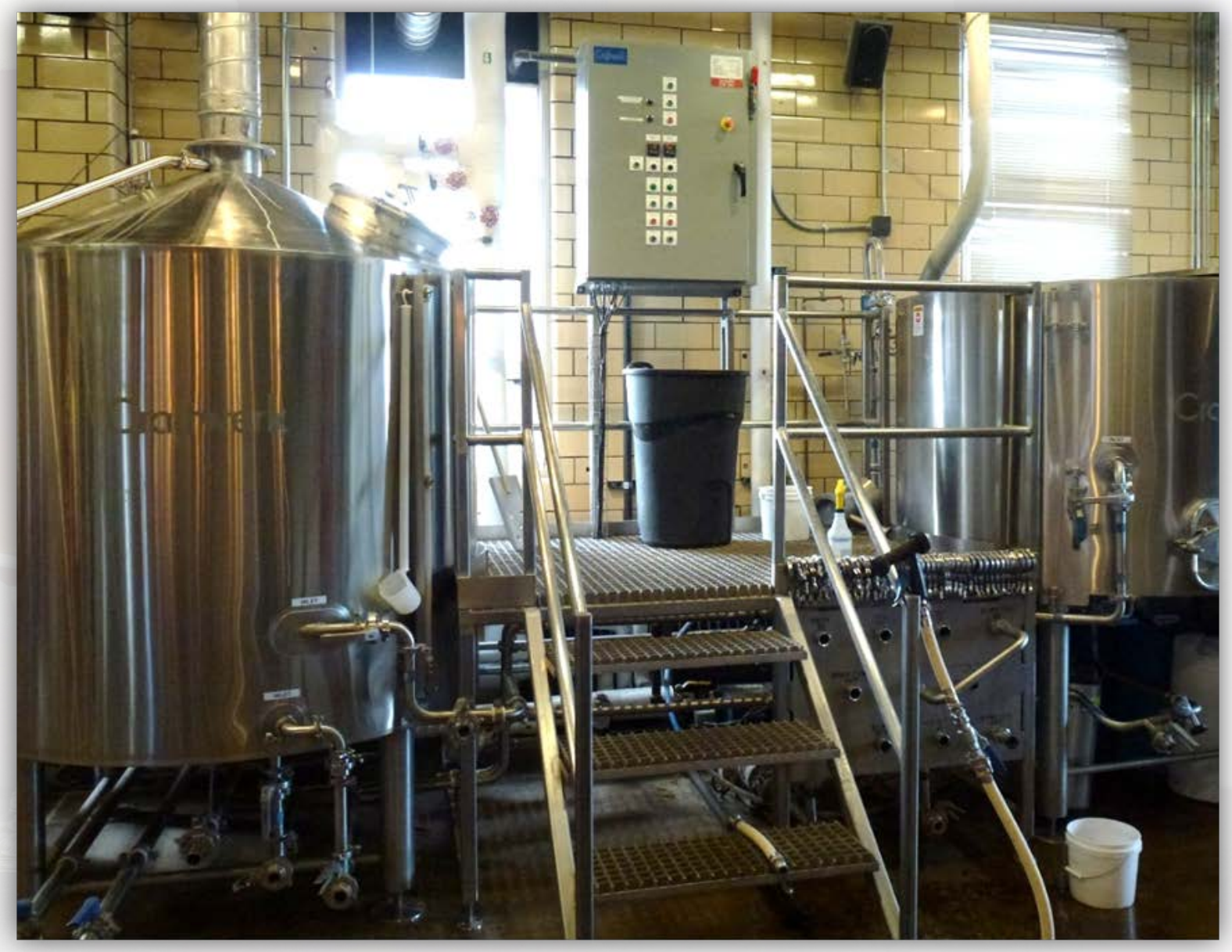


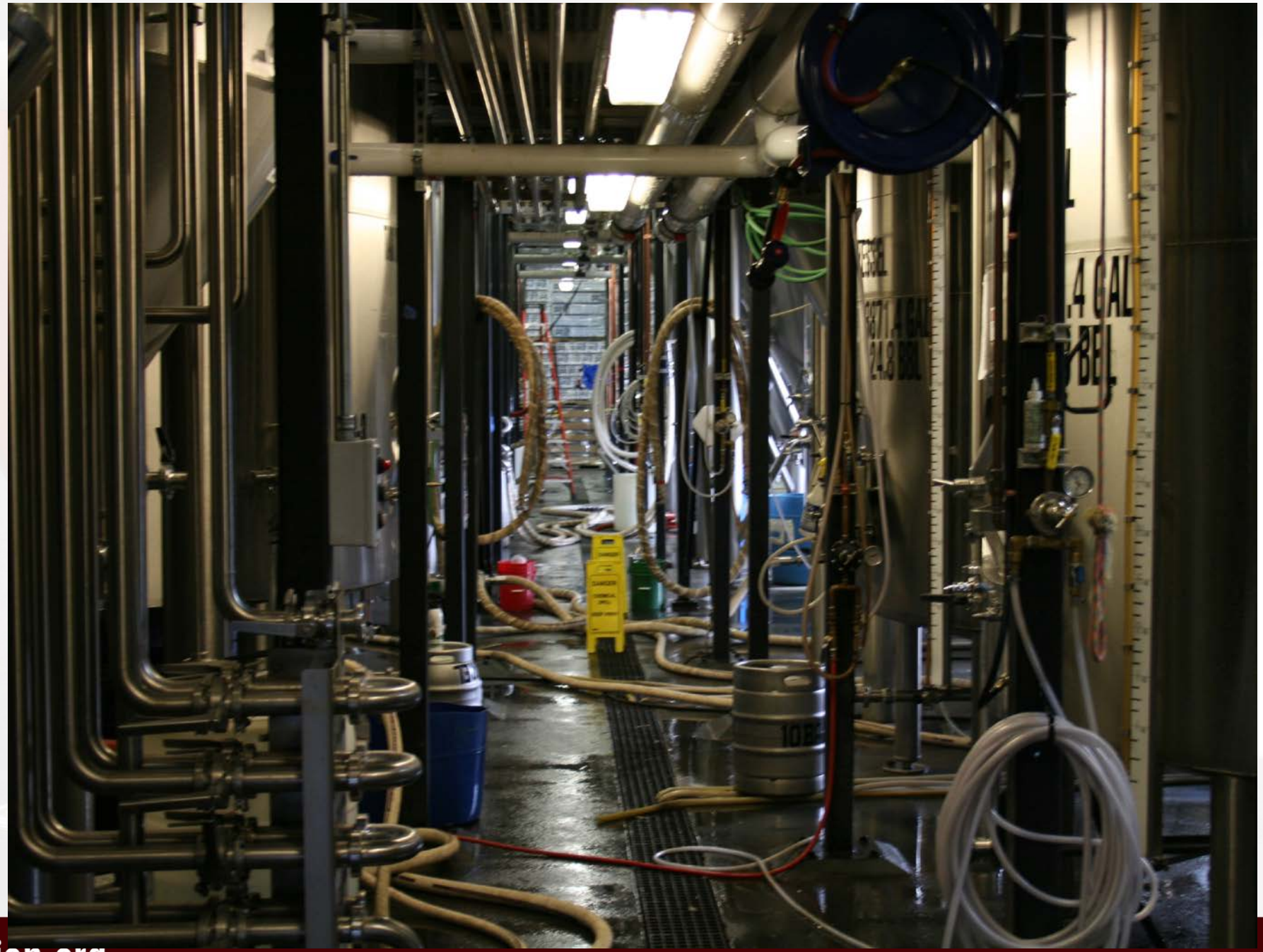

ACID BRITE #2


crown.com


FIVE STAR
PBW


MONSTER
Chews
$2.69
ECHOES IN DEATH




.4 GAL