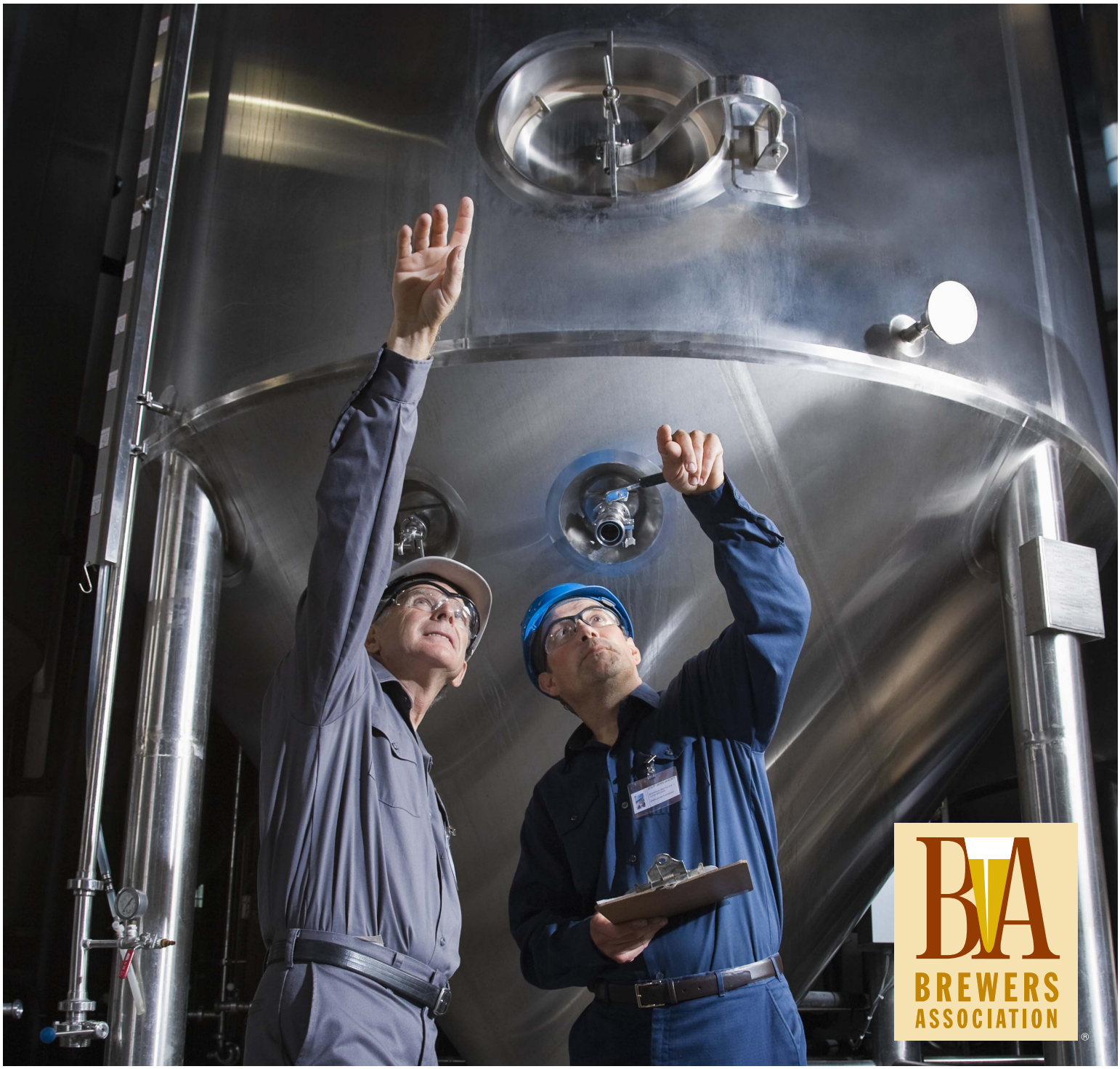
BEST MANAGEMENT PRACTICE (BMP) FOR THE

DEVELOPMENT OF SAFETY PROGRAMS IN BREWERIES

VOLUME I

HAZARD ASSESSMENT PRINCIPLES

PREPARED BY THE BREWERS ASSOCIATION SAFETY SUBCOMMITTEE



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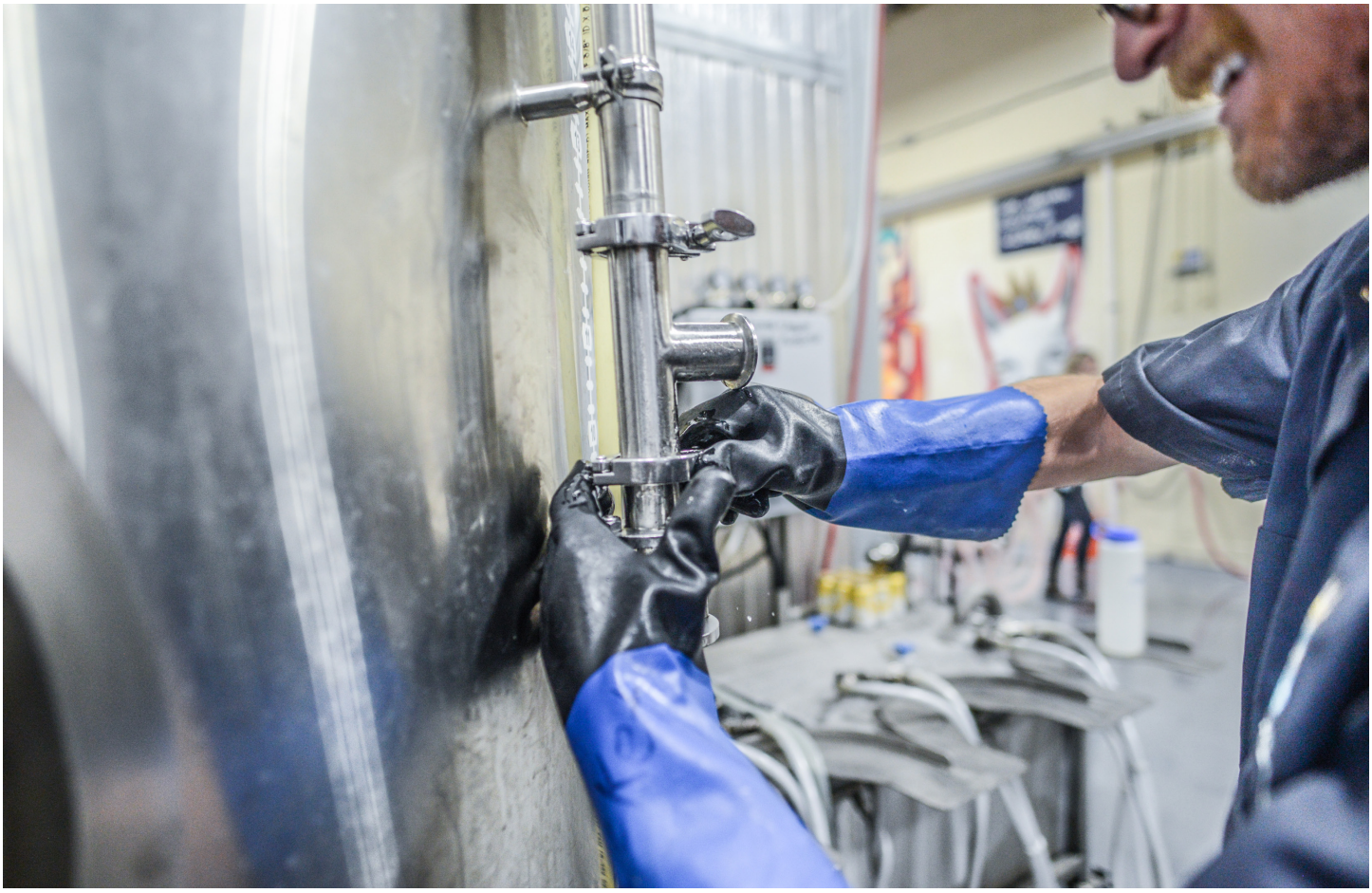
purpose

The purpose of this document is to provide a helpful, consistent guideline for Brewers Association (BA) members to use when developing and improving brewery safety programs, standard operating procedures, and worker safety compliance in the brewery.

Employers and employees must work together to ensure a safe workplace. Employers must perform workplace hazard assessments to identify where hazards exist and then specify engineering controls, administrative controls, personal protective equipment and safe work practices, and provide training and equipment to safely manage workplace hazards. Employees have the responsibility to conduct themselves in a safe manner according to the equipment and training they have received.



summary

The recommendations herein are based on the experiences and expertise of BA Safety Subcommittee (SSC) members, contributing BA members, best practices utilized in trades with hazards similar to those found in breweries, and other resources found among the Occupational Safety and Health Administration (OSHA), trade journals and from the experience of safety professionals. This BMP is not itself a regulation, but is designed to lead breweries towards the development of their own written safety programs and standard operating procedures (SOPs) related to a range of common occupational hazards within the brewing industry.

This BMP is not a substitute for institutionalizing safety culture within your business or developing written safety programs, nor does it any way guarantee compliance with relevant health and safety standards. What it does intend to do is give breweries with limited safety program experience a few conceptual tools, a starting pathway and example forms and checklists, to guide companies on their continuous safety journey in pursuit of workplace safety excellence and worker wellbeing.

The BA believes the recommendations in this BMP are appropriate and essential for protecting the health and safety of the craft beer industry's hardworking, dedicated employees. Proper identification and management of workplace hazards in the brewery can prevent serious injury or death.

osha's general duty clause

OSHA was created by enactment of the Occupational Safety and Health Act within the US Department of Labor in 1970. At the time, the public, workers' unions, legislators, and regulators recognized that workplaces were inherently dangerous places, and that it was in the best interest of both workers and employers to actively work to reduce workplace hazards and to curb the potential for putting workers at undue risk in their workplaces. The Act's fundamental goal is to structure employer requirements that lead to the creation of a safe and healthful workplace.

The General Duty Clause (GDC) is the keystone of OSHA regulations. Unlike many OSHA requirements for recordkeeping and written programs, which may only apply to employers of greater than 10 fulltime employee equivalents, the GDC applies to all employers, regardless of size or number of employees. In summary, it states:

- **EMPLOYER SHALL**
  - FURNISH A PLACE OF EMPLOYMENT WHICH IS FREE FROM RECOGNIZED HAZARDS
  - COMPLY WITH OCCUPATIONAL SAFETY AND HEALTH STANDARDS UNDER THIS ACT
- **EMPLOYEE SHALL**
  - COMPLY WITH OCCUPATIONAL SAFETY AND HEALTH STANDARDS AND ALL RULES & REGULATIONS WHICH ARE APPLICABLE TO HIS/HER OWN ACTIONS AND CONDUCT

It is clear that the employer has a legal responsibility to create a safe workplace for the employee and, importantly, that the employee has the responsibility to follow established safety protocols, utilize safety equipment provided, and ultimately, act in a safe manner. **It takes both employer and employee to achieve a safe working environment.**

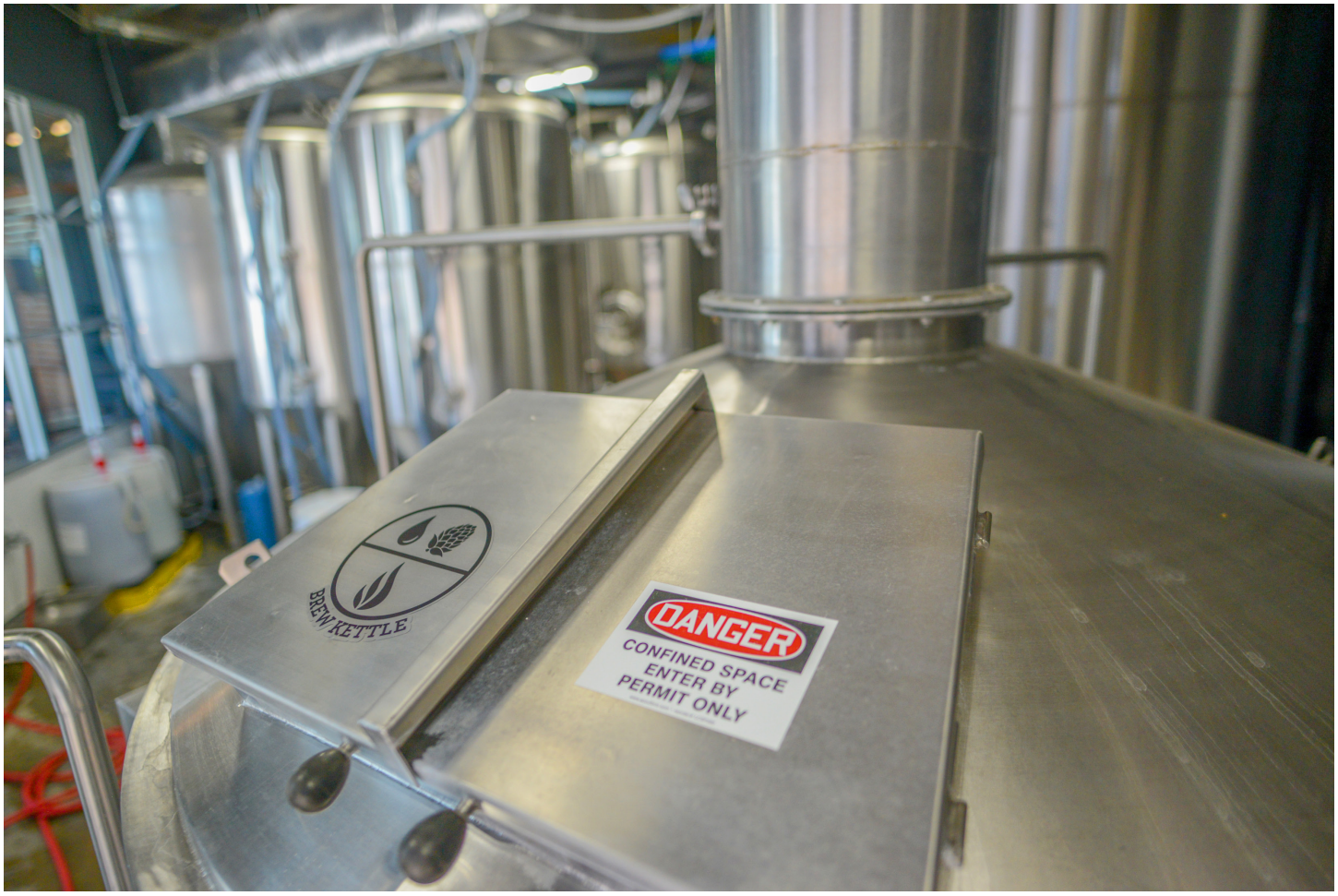
In order to protect workers in the brewery, employees and ownership have to work together to acquire certain skills and policies, including:

- Understanding tasks thoroughly enough to identify the potential for task-related hazards, however unlikely they may be
- Selecting and implementing realistic and sufficient controls for hazards that are identified
- Implementing hazard control strategies consistent with OSHA rules and regulations
- Documenting workplace hazards, required written programs, training, and recordkeeping

When it comes to developing a safety program, it's helpful to start by looking at all of the hazards that are present in your workplace and assessing the likelihood and severity of injury that could result. From there, strategically decide which hazards need to be controlled first and, in turn, which OSHA-style written programs and training materials need

to be developed. In the simplest form, hazard assessment is functionally like the axiom of "seek and destroy." Developing a meaningful brewery safety program and achieving compliance with regulatory requirements can only be achieved after the basic principles of hazard assessment are mastered.

What follows are four sections that outline how to conduct hazard assessments in any brewery-related activity. The content of this BMP guidance is not devoted to any particular hazard - it is a tool for creating an environment of safety around any and all workplace tasks and activities. View it as a multi-tool that you strap onto your belt every day and use in every aspect of your work, and life



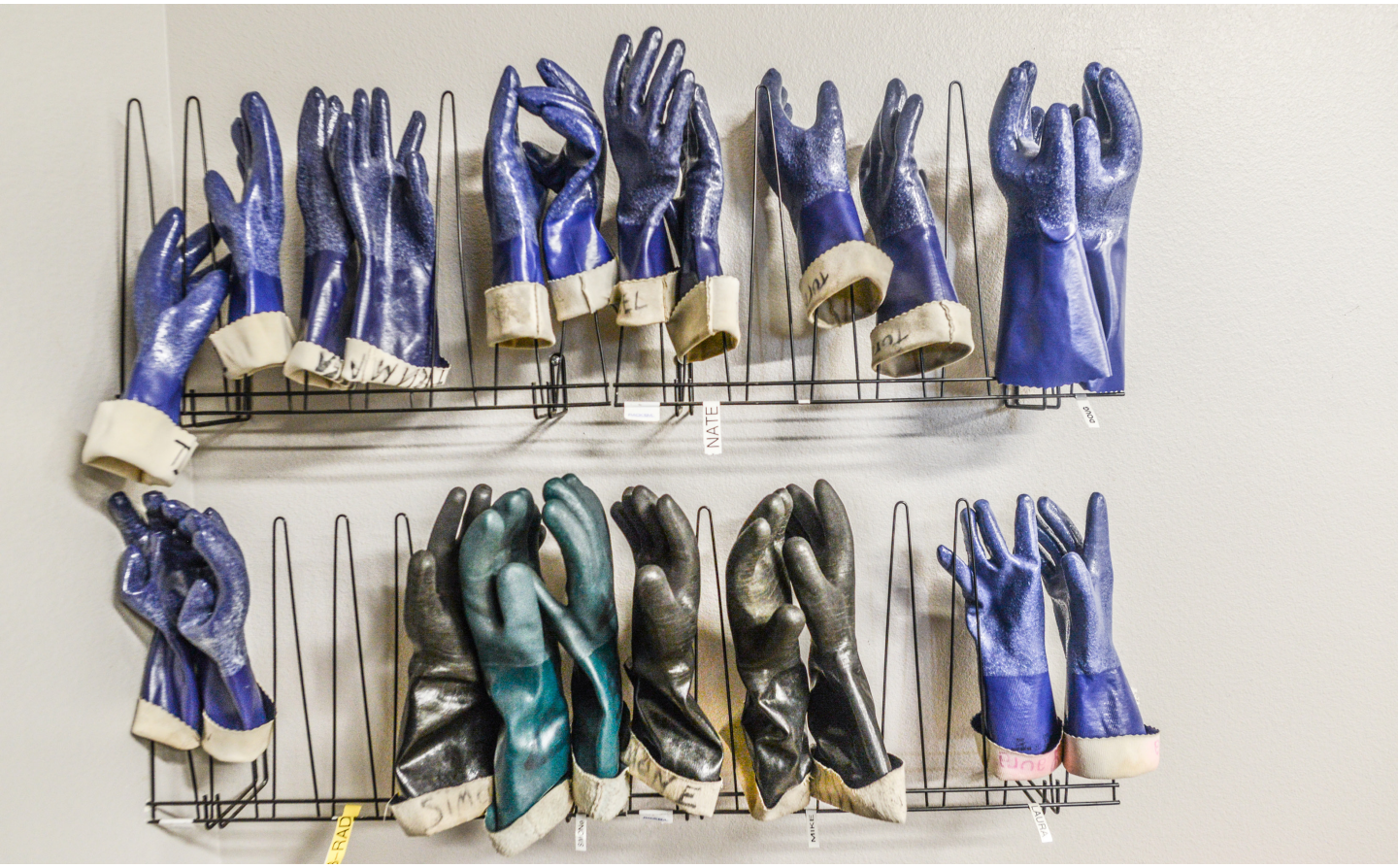
frequently asked questions

1. What is safety?

Safety is the state of being free from harm. In the absolute, it means being in a place free from all circumstances ("hazards") that could result in injury, illness, death, damage to buildings, equipment, or the environment.

In reality, hazards exist in all workplaces, at home and during recreational activities. Safety in the workplace is achieved through day-to-day understanding of hazards and a continuous commitment by ownership, management, and staff to reduce risk.

A cohesive "safety culture" is the glue that binds a company's safety program. Efforts to make safety a company priority, to consider safety a core value attached to the brand, and to value all employees for their contributions and compliance, are key aspects of safety culture. Safety culture takes time, and working with colleagues in the performance of hazard assessments and SOP development will put you on the path to a robust and genuine safety culture.



2. What is hazard assessment?

Many components go into cultivating and supporting a safe work environment, including leadership, accountability, participation, financial investment, etc. The basic formula for achieving safety, however, is a two-step process: first, understand the possible hazards that could exist during an activity, then choose actions that eliminate or control the hazard(s). This process is known by many names, including: "Hazard Assessment" (HA), "Job Hazard Analysis" (JHA), and "Job Safety Analysis" (JSA). The Brewers Association uses the term "hazard assessment."

You can execute a hazard assessment by following these simple steps:

1. List out each step of a process or task in the order in which it is executed. This list can serve as the outline of a standard operating procedure, or SOP.

2. Assess hazards that could occur during each step of the task. List what could go wrong at each step, classifying it by its likelihood, its severity, and its detectability.

3. Develop a means to eliminate, or at least restrict, the potential of each hazard at each step in the task. Know that there may be several potential hazards for a single step. Methods of hazard control generally fall into one of two classes: protection and prevention.

4. Rewrite the list of steps for the task, and state the safety protocols to be performed at each step. A safety-oriented SOP will guide staff in the safest way to perform their duties. The completed hazard assessment and SOP should also be used to identify which OSHA standards apply to each procedure.

3. What are the benefits of hazard assessment?

First and foremost, a hazard assessment (HA) provides a more intimate understanding of each task performed in the brewery and it helps the practitioner identify specific hazards that could be encountered. By planning to avoid identified hazards, through the use of hazard controls, each task can be performed more safely.

Performing a hazard assessment can also lead to the discovery of process improvements or simplifications that benefit the brewer in other ways by identifying procedural, quality, or sustainability improvements.

Finally, hazard assessments provide essential written documentation necessary for complying with OSHA rules. Hazard assessments reduce workplace risks and support the development of SOPs. Documenting the process of evaluating hazards generates written protocols, as required by OSHA. The General Duty Clause requires employers to furnish a workplace "free from recognized hazards." Hazard assessment is the tool that enables brewers to recognize hazards, so that they can be eliminated, reduced, or controlled. Hazard assessment documentation in and of itself does not take the place of a complete written safety program for the business, but it will help prioritize training and written program requirements. This process will guide the development of a comprehensive safety plan.

4. How are hazards categorized by OSHA?

Hazards are categorized in several ways by OSHA. First, there are general safety rules that apply to all industries. The General Duty Clause, quoted above, is an example of such a regulation.

Other regulations may be grouped by industry. There are rules that apply particularly to long-shoring activities, or construction activities, for example. Breweries fall under a group of rules applicable to General Industry, and are found in the Code of Federal Regulations (CFR), written: Title 29 CFR, Part 1910 or also as 29 CFR §1910.

A more common approach is to characterize hazards by the types of injuries they can cause, regardless of the industry involved. For instance, falling from heights is a hazard common to many activities, ranging from building construction to power plants and breweries.

Hazards can also be classified by the way they potentially affect the body. Some such rules

focus on a singular toxic substance, like benzene or asbestos. Others are devoted to a broad group of substances that could affect the body. For example, the Respiratory Protection standard does not focus on any particular chemical, but deals with how respirators can be properly used to reduce respiratory exposure to a wide range of substances.

5. Is there a simpler way to comprehensively assess hazards in the workplace? The way OSHA regulations are written seems confusing to me.

In general, we recommend using the last approach illustrated above when conducting hazard assessments in the brewery. The thinking behind this is that similar types of hazards often have similar hazard control solutions.

Safety professionals commonly categorize hazards by the way the hazard acts and the mechanisms that result in bodily injury. Figure 1 shows one such breakdown of categories of hazards. Appendix B includes a hazard placard developed by the Brewers Association. It is a handy reference to help conduct an effective hazard assessment of the tasks performed in a brewery.

6. What are the next steps after identifying the hazards associated with a task?

After listing the possible hazards at each step of a task, systematically implement ways of eliminating or reducing each hazard. As previously mentioned, hazard controls tend to fall into either *protective* or *preventive* classes. Protective strategies use equipment, clothing, or engineering to reduce the hazard potential. Protective strategies do

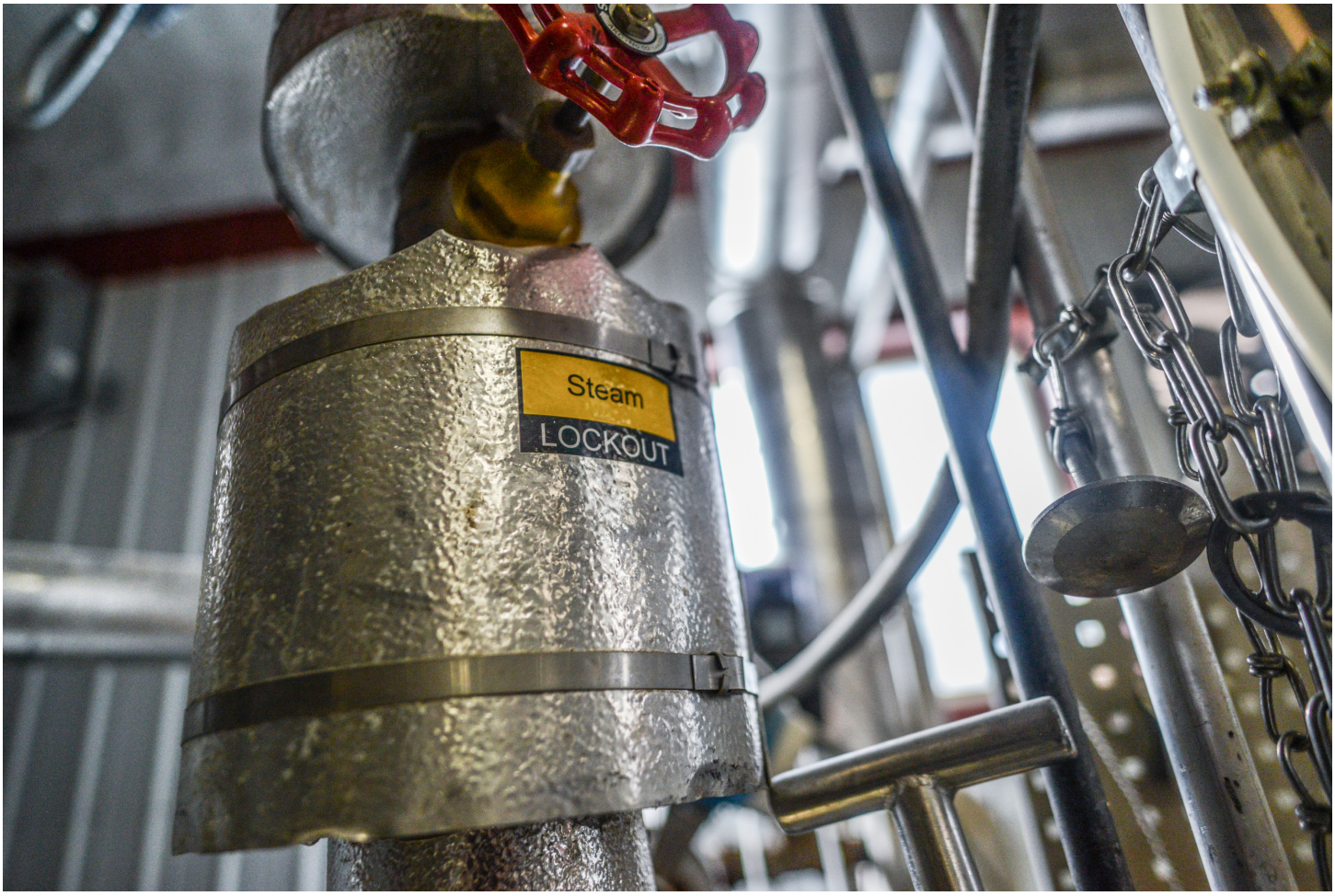


Figure 1 – Hazard Categories and Examples

Hazard Category	General Definition	Hazard Examples
Physical	Conditions that result in acute physical trauma of the body (skin, eyes, bones, organs, etc.).	extreme heat/cold, fires/explosions, crowded walking surfaces, slippery surfaces, falls from heights, workplace noise, poor wiring, unguarded machinery
Chemical	Chemicals and mixtures that damage the body when by inhalation, ingestion or dermal contact.	corrosive cleaners, oxidizing sanitizers, flammable gases and liquids, asphyxiating gases, pesticides
Biological	Disease-causing agents that originate from humans, animals, or plants.	human or animal feces, body fluids (blood, saliva, sexual fluids), toxic plants, fungi and molds, bacteria and viruses
Ergonomic	Working conditions, body positions, and bodily strains that can cause chronic physical ailment.	repetitive motions, poor lifting technique, lifting heavy objects, vibration
Behavioral	Mental, emotional, physical status of self or others that can result in reduced task attention and injury.	alcohol or drug abuse, job stress, overtime and exhaustion, pace of work, workplace violence

not generally eliminate a hazard, but they try to reduce severity. For example, wearing a seat belt is a protective strategy that lessens the injury potential in a car accident, but the seat belt does not reduce or eliminate the chance of a car accident occurring.

Preventive strategies use alternate processes or procedures to eliminate or avoid the hazard altogether. Prevention generally creates a more thorough avoidance of potential harm. For example, with our car accident scenario, one could avoid being in a car accident altogether by working from home, instead of commuting.

While elimination or substitution of hazards with less hazardous materials or processes are best in a perfect world, OSHA has traditionally listed three hazard controls in the following priority:

- **Engineering Controls (ECs) –** These are generally some sort of equipment, other than protective clothing, that serve to reduce or eliminate the hazard. Brewery examples include: automated clean in place (CIP) systems, atmosphere ventilation, hard plumbing instead of using hoses, equipment interlocks, lockout-tagout procedures, and CO_2 monitoring

systems. ECs may be either a preventive or protective strategy, typically relying on one or more of the following principles:

- Enclose the hazard - commonly used with noisy equipment
- Isolate the hazard – involves equipment guards or interlocks
- Remove or redirect the hazards – for example, ventilating CO_2
- Redesign the task - typically involves ergonomic improvements

- **Administrative Controls (ACs) –** ACs include a wide range of written and intellectual tools that are typically preventive in nature. A widely-recognized problem with ACs is that they can easily be ignored by workers. To combat this, safety programs call for new worker orientation, regularly scheduled training and refresher training, safety meetings, etc. Examples of common ACs include:
  - alarms, workplace signage, container labeling, and safety data sheets (SDS),
  - training programs that include hazard control strategies for specified tasks, and
  - scheduling and personnel management approaches, such as shift limiting, buddy system, and break time allowance.
- **Personal Protective Equipment (PPE) –** PPE is specialized clothing or safety gear that is worn directly on the body. PPE is generally required when engineering controls and administrative controls are insufficient to fully control the hazards, and during emergencies when the job tasks "go off script." PPE is the last line of physical defense against many chemical, physical, and biological hazards. PPE is subject to failure due to wear and tear, chemical incompatibility, and selection of the wrong component materials. PPE commonly used in breweries includes:
  - skin protection against physical and chemical hazards, e.g. rubber gloves, vinyl apron, long pants, etc.
  - bone, tissue, and eye protection against physical hazards, e.g. steel-toed boots, safety glasses, hard hats, etc.
  - fall protection, e.g. harness, lanyard, and anchor point
  - respiratory protection, e.g. dust mask, half-face respirator

There is a fourth, and perhaps most important hazard control, that OSHA and some other resources lump in with the administrative controls. These controls are called **Safe Work Practices (SWPs).** SWPs are different from ACs in that ACs are measures that are put before the worker, and which the worker is expected obey. SWPs are embodied in the way the worker thinks, relates to their work activities, and how he/she acts. ACs rely on the employer to lay down rules, procedures, training, and recordkeeping, whereas SWPs are autonomous within the worker. SWPs are powerful, because they usually result in prevention or avoidance of the hazard and they require no special equipment as with ECs and PPE.

Examples of SWPs include:

- deciding to walk around a spill instead of through it
- keeping hoses and cords organized to prevent tripping
- never turning your back to an open kettle that could boil over.

Since it can be expensive to employ the most powerful hazard control strategies, a combination of more realistic and/or cost-effective strategies is often employed. It is critical to employ as many protective and preventive strategies as needed to eliminate, or greatly reduce, the likelihood and severity of each hazard.

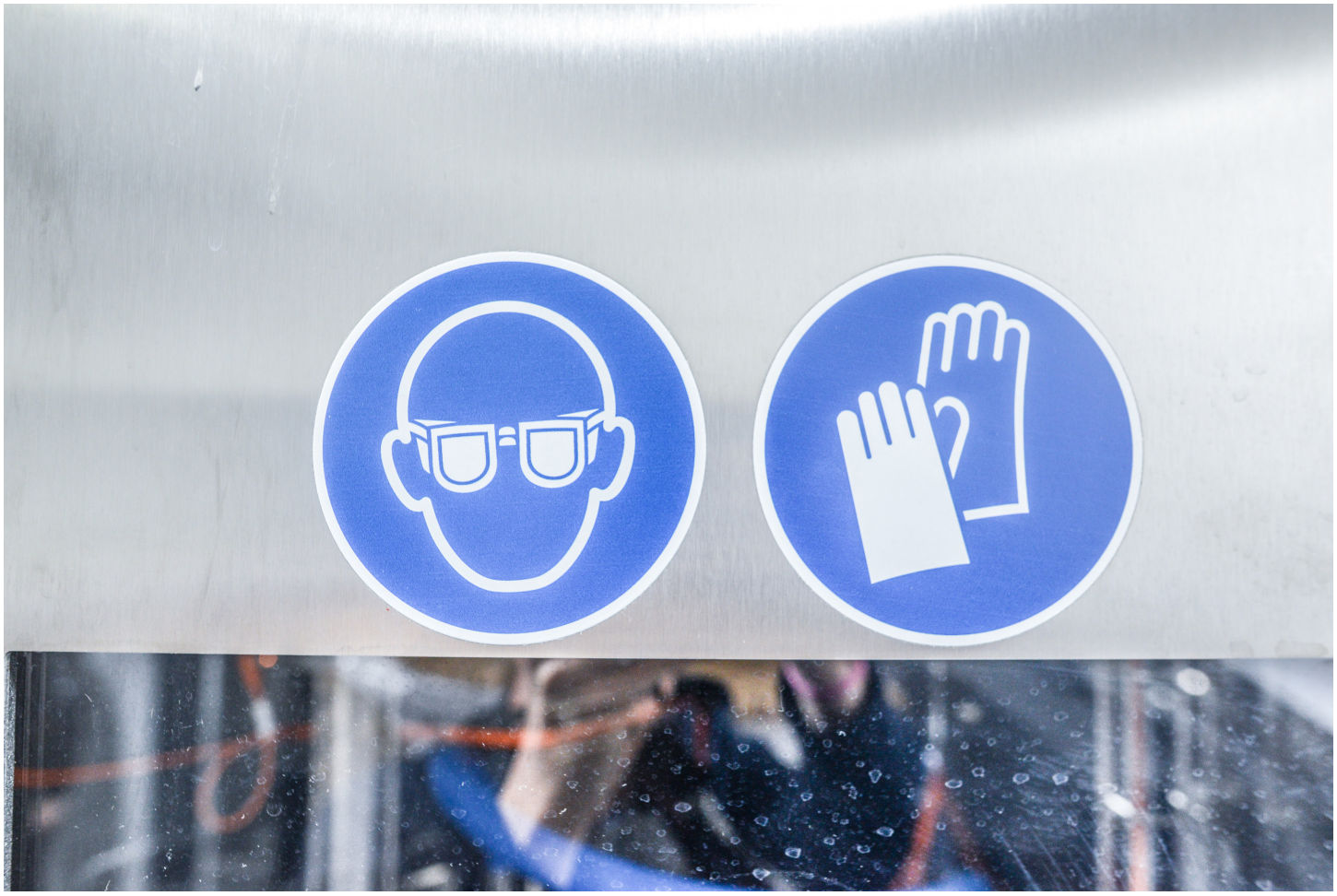
7. I'm overwhelmed with tasks and hazards. How do I prioritize them?

As outlined in question 2 above, it is important to systematically break down each task into a series of steps, and then evaluate what hazards could be present at each step. For each hazard, state the **likelihood (L)** or **frequency** of the hazard occurring, the estimated **severity (S)** if someone were to be exposed to the hazard without protective or preventive hazard controls in place, and the **detectability (D)** of the hazard.

When evaluating many procedures and the associate hazards (when first building a safety program), it helps to prioritize the hazards uncovered. Eliminating the most hazardous then takes priority.

Failure Modes and Effects Analysis (FMEA) is an engineering tool that is commonly used to identify possible failures in a design, a manufacturing process, or a product or service. Since getting hurt is a type of process failure, FMEA is well suited to hazard assessment. After determining the scale of likelihood, severity, and detectability for a hazard, multiply the scales by each other to obtain the overall risk number. **The higher the number, the greater the total risk a hazard presents.** The risk number will range between 1 and 125, using the scale below. Identifying the hazards with the highest risk number helps prioritize safety program strategy.

Risk No. = L x S x D



As an example, let's consider the fall hazard involved in dry-hopping a 50-bbl fermenter using an extension ladder leaning against the tank. Start by identifying one single hazard, in this case, the fall hazard. Next, evaluate the hazards association with CO_2 asphyxiation and the pressurized release of the tri-clamp fitting, separately.

Let's assume dry-hopping with a ladder is done multiple times a week, therefore, it deserved an L-rating of 5.

1.1.1.1 Scale of Likelihood or Frequency

SCALE	MINOR	LOW	MODERATE	HIGH	VERY HIGH
DESCRIPTION	Rare and isolated	Known to occur, perhaps once per year	Known to occur, perhaps once per quarter or month	Frequently encountered, nearly every time task is performed	Very frequently encountered, inevitable every time task is performed
FMEA Rating	1	2	3	4	5

The severity of falling off a ladder from 12 feet above the ground is great, since an operator could come down on his/her head, hit his/her head on a valve or other protrusion, and could break limbs. Falling can be prevented by using well-known control methods, so assign it an S-rating of 4.

1.1.1.2 Scale of Severity

SCALE	MINOR	LOW	HIGH	VERY HIGH, with warning	VERY HIGH, without warning
DESCRIPTION	Minor injury treatable with first aid (or minor disruption to production line)	Injury possibly requiring advanced first aid and medical followup	9-1-1, serious injury involving blood loss, burns, chronic injury, etc.	9-1-1, very serious injury or loss of life	9-1-1, very serious injury or loss of life
FMEA Rating	1	2	3	4	5

For detectability, rate the hazard according to how visible or obvious it is, i.e. how well the worker can identify the danger. Detection can be by eye, by smell, by instrument reading, or similar analysis. In this example, the act of climbing a ladder leaned against a cylindrical tank, without any use of security or fall protection is obviously risky, therefore, the D-rating is 1.

1.1.1.3 Scale of Detectability

SCALE	ALMOST CERTAIN	HIGHLY LIKELY	MODERATE	LOW CHANCE	NOT LIKELY
DESCRIPTION	The hazard is clearly visible or known prior to exposure	The hazard will most likely be detected	The hazard may be detected, depending on worker expertise	Only detected by an expert or with monitoring equipment	Detection is either not possible or only by a stroke of luck
FMEA Rating	1	2	3	4	5

With these individual values in-hand, the overall risk number is calculated:

Risk No. = 4 x 5 x 1 = **20**

At this point, consider the other hazards associated with the task of dry-hopping, and then prioritize all of the hazards. After determining a numerical value for each individual hazard, address the hazards by starting with those with highest risk numbers. Then, develop a plan to mitigate each hazard using some combination of engineering controls, personal protective equipment, administrative controls and safe work practices.

8. Can you provide a hazard assessment example?

HAZARD ASSESSMENT SAMPLE

The task at hand is to make up a caustic cleaner solution for keg cleaning. Outline each step involved with this procedure.

Part 1 - Steps in the Task

1) Add Water

i. Add hot water to the keg cleaner reservoir.

2) Dispense Caustic

i. Dispense a measured amount of concentrated caustic cleaner and add it to the hot water.

3) Clean Up Beaker

i. Rinse the caustic out of the measuring device and close the caustic reservoir.

4) Power On

i. Turn on the power and heat the water to 170ºF.

5) Wash Kegs

i. Operate the keg washer according to manufacturer guidelines.

6) Wrap Up

i. Drain left over caustic cleaner.

ii. Depressurize and power down keg washer.

Part 2 - Hazards by Step

Next, evaluate the steps listed and consider what could go wrong at each step. Think broadly and try not to prejudice results - don't rule out rare or unlikely hazards or failures. Imagine anything and everything that could go wrong at each stage keg cleaning. Try not to account for employee experience or training, or for equipment design, programming or failsafe controls. Consider what could go wrong at each step, no matter how remote the chance.

Once every hazard has been identified for each step, use the likelihood, severity, and detectability tables to determine a risk number. Record the hazard and the risk number for each hazard at each step of the task.

1) Add Water

a. Hoses, power cords as a trip hazard: L=4, S=2, D=2; RN=16

b. Residual pressure in air or CO2 lines: L=2, S=4, D=3; RN=24

2) Dispense Caustic

a. Corrosive to skin and eyes: L=3, S=2, D=3; RN=18

3) Clean Up

a. Corrosive to skin and eyes: L=3, S=2, D=3; RN=18

4) Power On

a. Electric shock/short-circuiting: L=1, S=4, D=4; RN=16

b. Scalding/corrosive liquid contact: L=2, S=2, D=3; RN=12

5) Wash Kegs

a. Splashes/spray of caustic solution: L=2, S=2, D=3; RN=12

b. Failure of hoses/fitting: L=2, S=2, D=4; RN=16

c. Back injury from lifting: L=4, S=3, D=1; RN=12

6) Wrap Up

a. Splashes/spray of caustic solution: L=2, S=2, D=3; RN=12

b. Uncoupling pressured hoses/fittings: L=2, S=4, D=3; RN=24

Part 3 - Procedures Utilizing Hazard Controls

Finally, propose one or more control strategies designed to reduce or eliminate the hazards, for each step of the procedure.

1) Add Water

a. Return hoses to reel as soon as keg washer is filled, or install permanent plumbing to fill keg washer.

b. Check pressures to make sure secondary regulators of air and CO2 do not exceed manufacturer's specification, or 60 psi, whichever is lower. Depressurize keg couplers while holding away from the face of the operator. Wear eye protection to prevent physical injury from pressurized lines.

2) Dispense Caustic

a. Wear approved rubber gloves, chemical splash shield over safety glasses, rubber apron, and rubber boots. Wear long sleeved shirt and long pants to reduce chance of corrosive contact with skin. Walk carefully and deliberately to avoid tripping hazards when carrying caustic to keg cleaner. Always add caustic into a vessel of water to reduce the chance of chemical splash.

3) Clean Up

a. Wear approved rubber gloves, chemical splash shield over face, rubber apron, and rubber boots. Wear long sleeved shirt and long pants to reduce chance of corrosive contact with skin. Rinse caustic beaker out with low pressure water over sink or drain; avoid splashing; rinse gloves and face shield to be free of caustic residues.

4) Power On

a. Assure that the power cable to keg cleaner is sound, with no damaged wiring; all wiring in potentially wet areas is enclosed in fixtures rated for wet areas; all pumps in off position when unit is powered up.

b. Wear approved rubber gloves, chemical splash shield over face, rubber apron, and rubber boots. Wear long sleeved shirt and long pants to reduce exposure to corrosive contact with skin.

5) Wash Kegs

a. Wear approved rubber gloves, chemical splash shield over face, rubber apron, and rubber boots. Wear long sleeved shirt and long pants to reduce chance of corrosive contact with skin.

b. Wear eye protection to prevent physical injury from pressurized lines.

c. Use proper lifting technique when loading and unloading kegs onto washer. Keg with partial contents will be drained while on the floor to reduce lift hazard, or use mechanical lifting aid.

6) Wrap Up

a. Wear approved rubber gloves, chemical splash shield over face, rubber apron, and rubber boots. Wear long sleeved shirt and long pants to reduce chance of corrosive contact with skin. Turn off power to caustic heater. Drain caustic carefully to drain. Rinse caustic reservoir in a manner to reduce splashes/spray of caustic.

b. Depressurize air and CO_2 connections away from face. Wear eye protection to prevent physical injury from pressurized lines.

Part 4 – Revised SOP

Using the findings from the hazard assessment, write, or re-write, the standard operating procedure (SOP) for the task of keg washing. Realize that SOPs need to be tailor-fit to your specific operation, machinery, procedures and policies. SOPs should be detailed enough to be used as training tools and also support ongoing process and quality refinement.

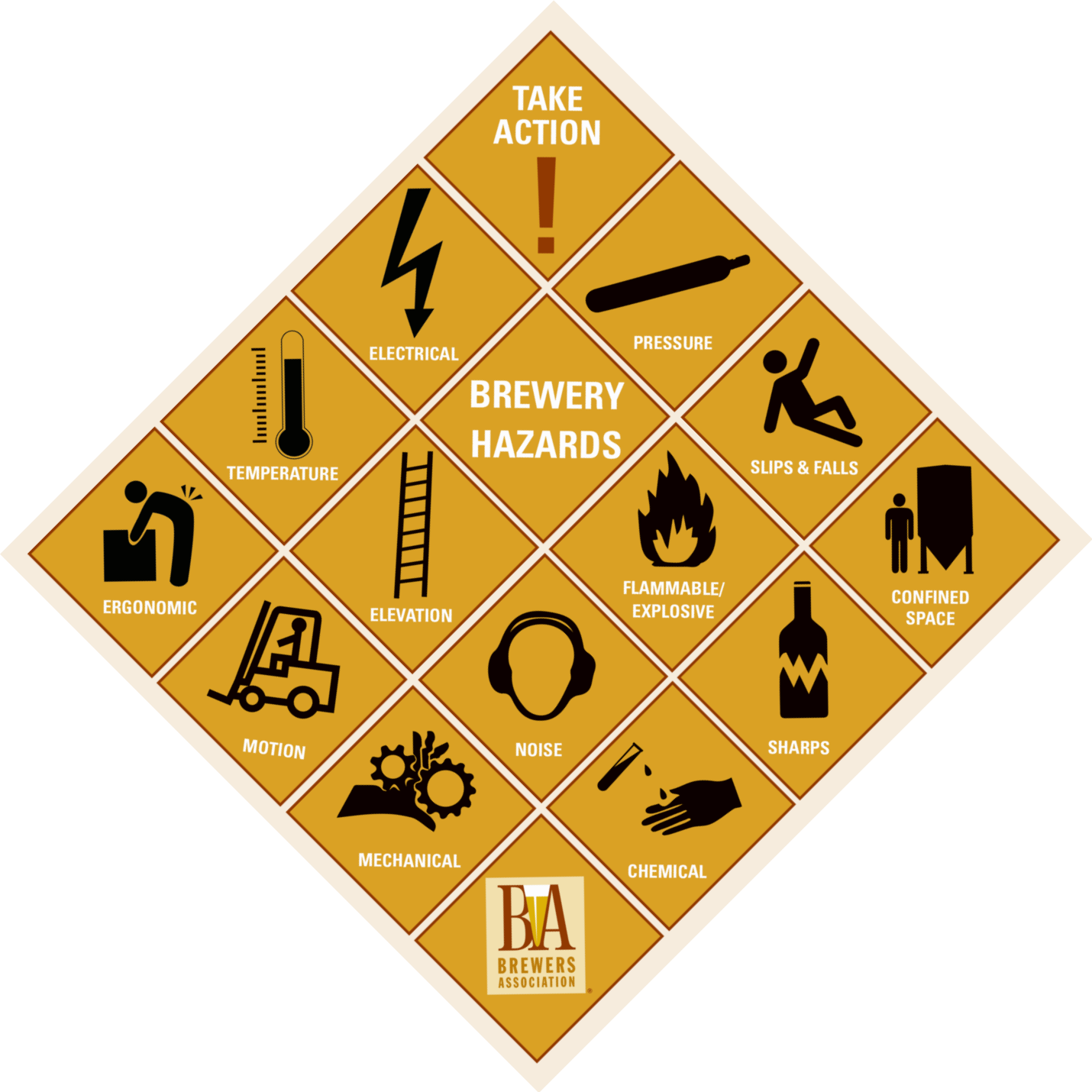
Appendix C includes a sample SOP template and an example SOP for the keg washing. Brewery-specific SOPs should include more details; for example: specific reservoir volumes, caustic concentration, pressure settings for CO_2 and air, program selection, etc.

RESOURCES

The following resources are recommended for further assistance with your hazard assessments:

- Job Hazard Analysis, OSHA Bulletin 3071, 2002, https://www.osha.gov/Publications/osha3071.pdf
- "How to Do a Job Hazard Analysis," Wyoming Department of Workforce Services, http://www.wyomingworkforce.org/_docs/osha/programs/Job-Hazard-Analysis.pdf
- "Job Hazard Analysis," Washington State Department of Labor & Industries, http://www.lni.wa.gov/Safety/Topics/AToZ/JHA/

appendix a
hazard placard



appendix b
sample hazard assessment form

The following sample form should be modified to fit your particular brewery operations. Keep a written record of each hazard assessment you perform, which is an essential part of your compliance documentation.

Hazard Assessment Template

TASK:	HA DATE:
DEPT:	INITIALS:

STEP	DESCRIPTION	HAZARDS	CONTROLS	PPE	FEMA NO.

Hazard Assessment Example

TASK: Caustic keg washing	**HA DATE:** Apr. 10, 2018
DEPT: Packaging Dept.	**INITIALS:** JD

STEP	DESCRIPTION	HAZARDS	CONTROLS	PPE	FEMA NO.
1	connect water to rinse reservoir; add water to caustic reservoir	trip hazards on cords, hoses	walk carefully and deliberately to avoid tripping; return hoses to reel or stow out of the way or install hard lines	standard brewery uniform: long pants & sleeves, rubber boots	16
		residual or excess pressure in gas lines	check pressure on supply and secondary regulator, not to exceed 60 psi; de-pressurize kegs by pointing couplers away from face and others	safety glasses	24
2	connect water to rinse reservoir; add water to caustic reservoir	trip hazards on cords, hoses	walk carefully and deliberately to avoid tripping; return hoses to reel or stow out of the way or install hard lines	standard brewery uniform: long pants & sleeves, rubber boots	16
3	dispense caustic	corrosive to skin and eyes	walk carefully and deliberately to avoid tripping; always add concentrated caustic to water to reduce chemical splash	face shield and safety glasses, apron, heavy nitrile gloves, long pants & shirt, rubber boots	18

continued >

hazard assessment sample, continued >

4	rinse caustic beaker and PPE	corrosive to skin and eyes	walk carefully and deliberately to avoid tripping; avoid splashing; rinse equipment in an appropriate sink or drain	face shield and safety glasses, apron, heavy nitrile gloves, long pants & shirt, rubber boots	18
		skin contact with hot caustic solution	close lid to reservoirs prior to starting pumps	safety glasses, heavy nitrile gloves, long pants & sleeves, rubber boots	12
5	wash kegs	splashes/spray of dilute caustic	de-pressurize kegs, point couplers away from face and others	safety glasses, heavy nitrile gloves, long pants & sleeves, rubber boots	12
		failure of hoses/ fitting	keep hoses and fittings in good working order, inspect regularly	safety glasses, heavy nitrile gloves, long pants & sleeves, rubber boots	16
		back injury from lifting	proper lifting technique; drain kegs with partial contents on the floor to reduce lift hazard, or use mechanical lifting aid	work boots or rubber boots	12
6	wrap up	splashes/spray of dilute caustic	use care in draining waste fluids and rinsing keg cleaner fixtures	safety glasses, heavy nitrile gloves, long pants & shirt, rubber boots	12
		uncoupling pressured hoses/ fittings	de-pressurize kegs, point couplers away from face and others	safety glasses	24

appendix c

standard operating procedure (sop) template

The following SOP template should be modified for your own facility and procedures. Create the general outline from the steps of the task. Where a step involves more than one procedure, add sub-steps to the outline.

Add clear instructions describing how to accomplish each step and sub-step, being sure to include the controls and PPE identified during your hazard assessment.

When done, walk through the SOP with persons familiar with the task and the hazard assessment to make sure the SOP accurately portrays how the task is to be accomplished.

Review/modify the SOP whenever there is an equipment or process change, as well as periodically. SOPs are a valuable tool in training new or transferred employees in the safe and correct procedures for a task.

Following the template is an example SOP for the keg washing example previously discussed. Your brewery's equipment, supplies, and methods will likely differ for the example. SOP's are site-specific for each brewery and each task.

SOP Template

TASK:	SOP NO: REVISION DATE:
DEPT:	INITIALS:

1) Purpose

This SOP describes (Your Brewery Name Here)'s procedure for safe and effective _____.

2) Scope

This SOP is limited to _____.

3) Responsibilities

It is the responsibility of every (Your Brewery Name Here) employee to maintain the highest standards of safety, quality, and sustainability. Any (Your Brewery Name Here) employee who performs the task described herein will be first trained and approved for the use of the equipment and materials specified, according to this SOP. Any changes to this procedure shall be first approved by _____.

4) Equipment and Materials

_____ _____ _____

_____ _____ _____

5) Procedure

1) _____

a. _____

b. _____

c. _____

2) _____

a. _____

b. _____

c. _____

6) Related Documents

SOP Example

TASK: Caustic Keg Washing	**SOP NO:** 117 **REVISION DATE:** 4/10/18
DEPT: Packaging	**INITIALS:** DJ

1) Purpose

This SOP describes (Your Brewery Name Here)'s procedure for safe and effective caustic washing of kegs.

2) Scope

This SOP is limited to the preparation of the machine and cleaning materials needed for caustic washing and rinsing of kegs. See separate SOPs for keg receiving and storage and keg exterior cleaning and residual beer draining.

3) Responsibilities

It is the responsibility of every (Your Brewery Name Here) employee to maintain the highest standards of safety, quality, and sustainability. Adhering to the procedures herein allows us to package our top-quality brews into effectively cleaned kegs, which maximizes shelf life, product consistency, and our company reputation.

Any (Your Brewery Name Here) employee who cleans kegs will be first trained and approved for the use of the equipment and materials specified, according to this SOP. Any changes to this procedure shall be first approved by the Packaging Dept. manager.

4) Equipment and Materials

__ Model 123 programmable keg washer

__ Brand Z sodium hydroxide

__ 5-liter poly beaker

__ face shield

__ safety glasses

__ vinyl apron

__ heavy nitrile gloves

__ oil-free air supply, 60 psi, S/S coupler

__ CO_2 supply, 60 psi, S/S coupler

__ non-reactive barrel pump for caustic

__ steel-toed rubber boots

__ long sleeve, long pant uniform

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5) Procedure

1) Add Water

a. Begin work wearing the standard brewery uniform with heavy rubber gloves, rubber boots, and safety glasses added.

b. Fill the right side (caustic) tank with hot water from the plant service hose. Turn off the hose, then attach it to the rinse water inlet behind the left side tank.

c. Check the wall-mounted regulators for both compressed air and CO_2. Make sure they each read between 40-60 psi. If there is insufficient pressure in either, check the gas supply to resolve the issue.

d. Check to see that the compressed air and CO_2 hoses are properly coupled to the labeled connection points on the back of the keg washer.

e. Depressurize the white knobs of each of the keg couplers while holding away from the face of the operator and others.

2) Dispense Caustic

a. Put on the additional PPE required for handling concentrated caustic - a vinyl apron and a flip-down face shield – in addition to the other protective clothing you are wearing.

b. Using the non-reactive hand pump in the caustic drum and the 5-liter beaker, slowly and carefully pump 1,800 ml (1.8 liters) into the beaker. Avoid splashing. When the correct amount is in the beaker, lift the pump hose in the air to allow excess caustic to drain back into the drum. Do not splash caustic onto the top or sides of the drum.

c. Walk carefully and deliberately to avoid tripping hazards when carrying caustic to keg cleaner. Add caustic into the right-side tank carefully so as to avoid splashing.

3) Clean Up

a. Rinse caustic beaker out with low pressure water over the shop sink or drain; avoid splashing.

b. Rinse gloves and face shield to be free of caustic residues. Set face shield on PPE shelf to air dry.

4) Power On

a. Make sure the keg washer power switch is in the off position (the red wheel switch is straight up and down).

b. Assure that power cable to keg cleaner is sound, with no damaged wiring and solid connections. Reduce trip hazards by keeping the power cable flat on the floor and out of traffic lanes.

c. Plug the power plug in. It must be plugged into the wet area enclosed fixture (the outlet with the clear plastic cover to the right of the air compressor).

d. Turn the red power switch on (a quarter turn clockwise).

e. Turn on the caustic heater, which is preset to 170°F. Allow the water to heat the rest of the way to 170°F, which is when the red light goes off.

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5) Wash Kegs

a. Arrange your work flow so kegs arrive from the right, on pallets. The kegs will have been previously drained of residual beer and have had their keg collars, the outsides and valves previously cleaned with caustic, and externally rinsed.

b. Load the machine with two kegs as follows:

i. Look at the metal circlip to make sure it is not absent or distorted. The circlip is a thin stainless steel retaining ring that holds the valve stem into the keg head. Do not attempt to clean any kegs which do not have a sound circlip. Clearly identify them and set them aside for a qualified technician to repair.

ii. Face each keg and pick it up by the top chime, while bending at the knees, not the lower back.

iii. Place the keg on the keg washer deck, then install the keg coupler. Turn the coupler a quarter turn clockwise to engage the bayonet fitting. Lower the coupler lever until the mechanism engages with the stop tooth.

iv. Invert the keg to an upside-down position and place on the nylon skids.

v. Repeat with the second keg.

c. Press the green "cycle" button on the top panel. The light will turn amber. The cycle proceeds through residue evacuation, pre-rinse, caustic wash, rinse, and CO_2 pressurization in four minutes.

d. When the cycle is complete the "cycle" button will turn from amber back to green.

e. Uncouple the kegs as follows:

i. Select a keg and re-invert it so the coupler is on top.

ii. Pull and lift the couple lever, but do not turn the coupler to remove it.

iii. Find the ball valve that is mounted in one of the two hoses attaching to the keg coupler. Slowly open it to bleed the excess pressure in the line.

iv. After bleeding the line, turn the keg coupler counter-clockwise a quarter turn and remove it.

v. Using good lifting technique, lift the keg from the washer deck and place on a pallet to the left of the machine.

vi. Repeat with the second keg.

vii. Continue repeating step 5b-e until the batch of kegs is cleaned.

f. Label the pallets of washed kegs with the hanging "cleaned inside and out" signs.

g. If the brewery and/or kegs are very cold, the caustic tank may not maintain heat well. Break your task into pieces, so that the caustic can regain heat, or speak to the Packaging Manager for further instructions. Cold caustic does not provide as reliable a method as hot caustic and we do not want to cause a quality problem due to dirty kegs.

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6) Wrap Up

a. When you are done washing kegs, follow these steps:

i. Turn off power to caustic heater.

ii. Drain caustic carefully to drain. Rinse caustic reservoir with spray hose and cool water in a manner to reduce splashes/spray of caustic. Drain the rinse water to drain.

iii. Turn off the cold supply hose attached to the left rinse tank. Stow the hose out of the way.

iv. Drain any rinse water still in the tank.

v. Uncouple compressed air and CO_2 away from face and others.

vi. Double check the depressurization on the coupler lines by carefully opening the two ball valves. Return them to the closed position.

vii. Turn off the power to the keg washer.

viii. Carefully remove the power cable and stow.

b. Report any deviations from procedure, difficulties, or damaged kegs to the Packaging Manager.

6) Related Documents

- Operators Manual for Model 123 Programmable Twin Tank Keg Washer
- SDS for Brand Z sodium hydroxide solution
- (Your Brewery Name Here)'s SOPs 108 and 126