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HazMat Spill Risk and Exposure Assessment

Establishing a safety culture improves compliance.

Overview

Hazard Assessment

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Hazard Assessment Topics

- Internal hazmat spill
  - Preliminary Hazard List (PHL)
  - Preliminary Hazard Analysis (PHA)

- Emergency Eyewash Station:
  - Exposure assessment
    - Occupational exposure hazard assessment
    - Eyewash station assessment
  - Emergency eyewash stations
    - Best management practice

Internal HazMat Spills

Context, challenges

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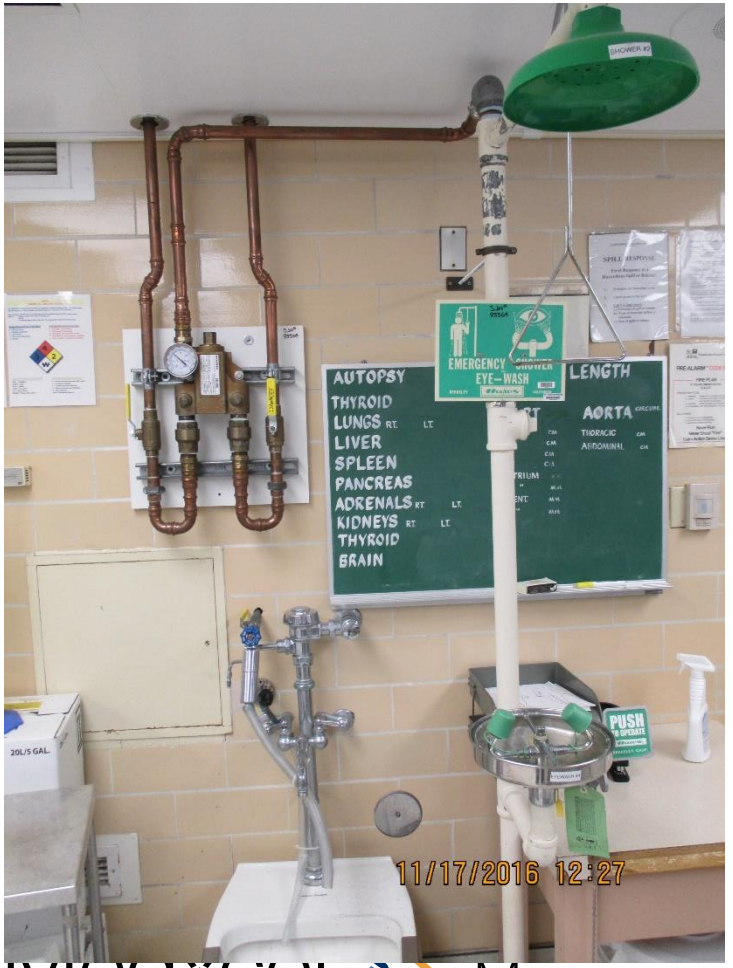
HazMat Release, exposure risk



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Hazard mis-Communication?

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

Classification (GHS-US)

Metal Corrosion 1	H290
Skin Corrosion 1B	H314
Eye Damage 1	H318
Carcinogenicity 1A	H350
Specific Target Organ Toxicity Single Exposure 3	H335
Aquatic Acute 3	H402

Full text of H-phrases: see section 16

Label Elements

GHS-US Labeling

Hazard Pictograms (GHS-US) :

Signal Word (GHS-US) : Warning

Hazard Statements (GHS-US) :
H290 - May be corrosive to metals.
H314 - Causes severe skin burns and eye damage.
H318 - Causes serious eye damage.
H335 - May cause respiratory irritation.
H402 - Harmful to aquatic life.

Precautionary Statements (GHS-US) :
P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P234 - Keep only in original container.

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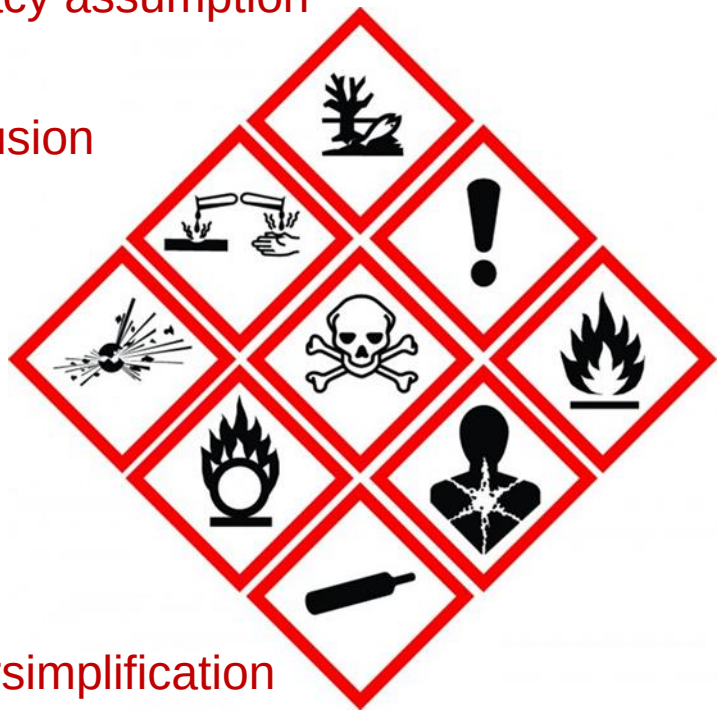
Clear path to success?

Over reliance on education and training

Literacy assumption

Confusion



Oversimplification

Critical thinking

Quick Fixes

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Event Causal Factors (2014, James Tweedy)

Common Causal Factors		pg. 50
Poor Supervision		
	Lack of proper instructions	
	Job and/or safety rules not enforced	
	Inadequate PPE, incorrect tools, and improper equipment	
	Poor planning, improper job procedures, and rushing the worker	
Worker Job Practices		
	Use of shortcuts and/or working too fast	
	Incorrect use or failure touse PPE	
	Horseplay or disregard of established safety rules	
	Physical or mental impairment on the job	
	Using improper body motion or technique	
Unsafe Materials, tools, and equipment		
	Ineffective machine guarding	
	Defective materials and tools	
	Improper or poor equipment design	
	Using wrong tool or using tool improperly	
	Poor preventive maintenance procedures	
Unsafe Conditions		
	Poor lighting or ventilation	
	Crowded or poorly planned work areas	
	Poor storage, piling, and housekeeping practices	
	Lack of exit and egress routes	
	Poor environmental conditions such as slippery floors	

Source: Tweedy, James T. (2014) Introduction to Hazard Control Management. CRC Press. Boca Raton, FL.

Hazard Assessment

What can go wrong?

Flammable liquid storage practices

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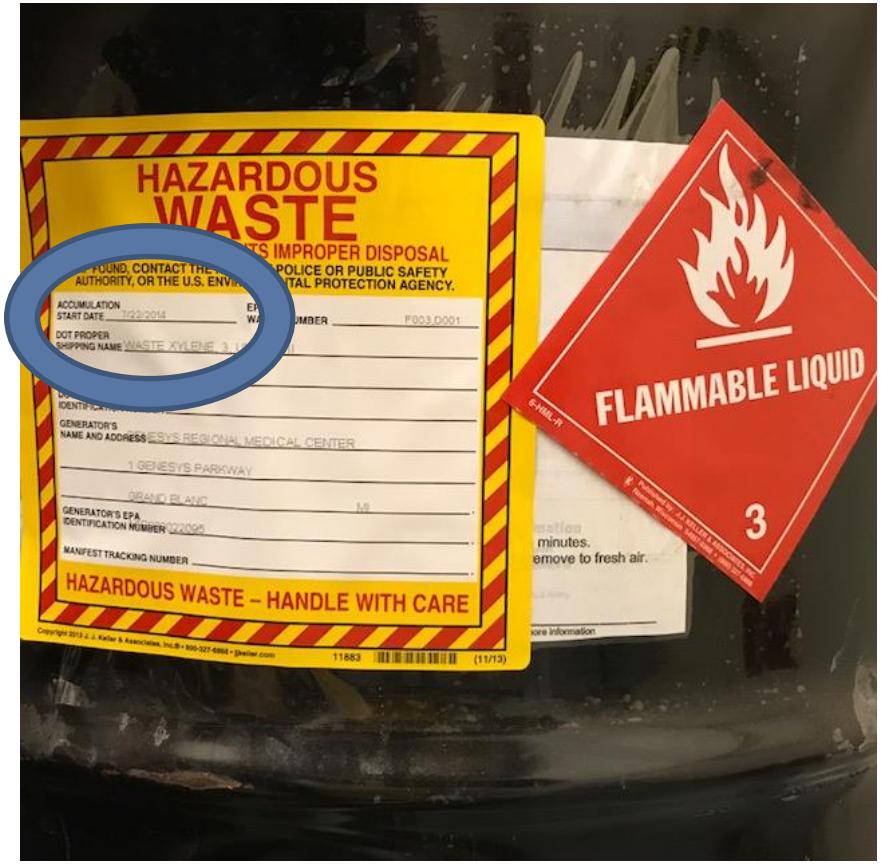
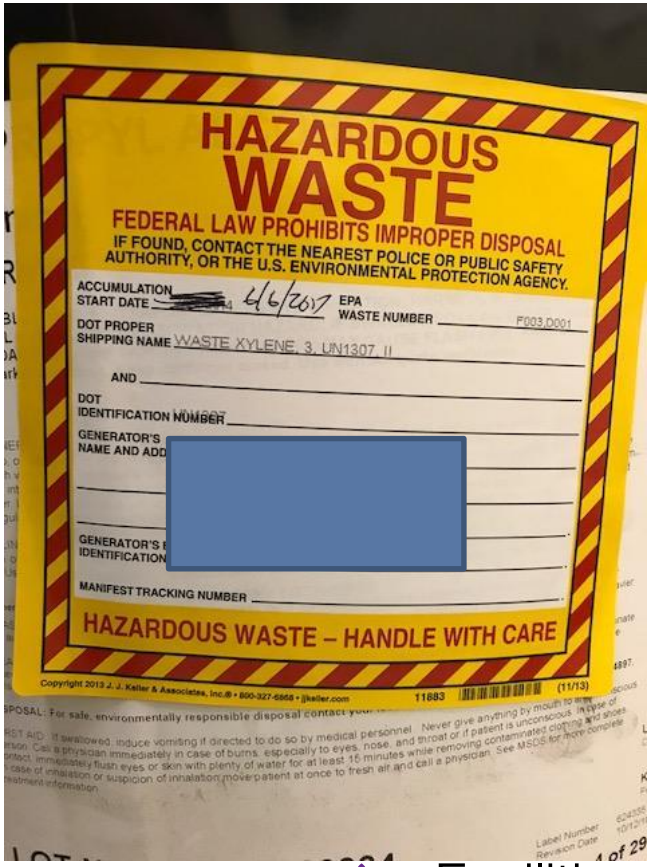
Hazardous waste compliance





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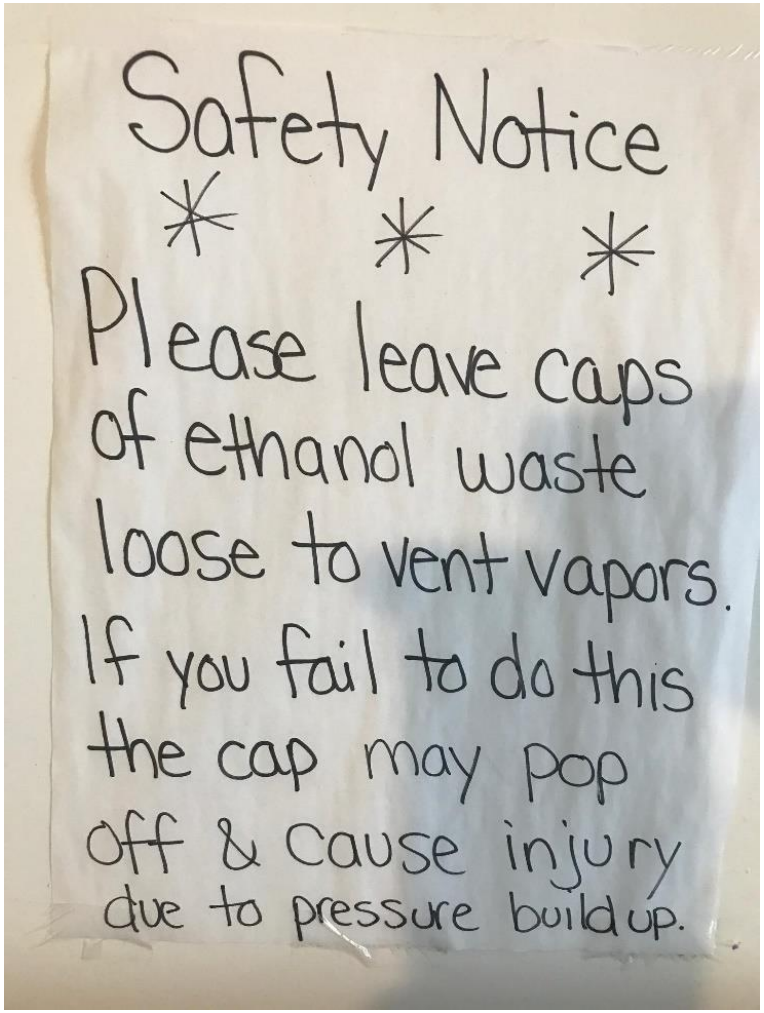
Safety culture



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Respiratory protection, storage

Response supply inventory management

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Hazard Assessment - Behavioral

	Program or system evaluated:	**Hazardous Materials & Waste Storage and Handling**						Date	5-Apr-12			
								Evaluator	Scott Cruzen, REM, OHST			
	Hazard Group	**Potential Areas for Failure**										
		a	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
		Acceleration	Chemical (dissociation, replacement, substitution	Electrical elements and operators	Environment	Leakage	Moisture	Oxidation	Off-gassing of material properties	Pressure high, low, or sudden change	Stress	Structural failure
1	Collision/mechanical damage	1a			1d	1e				1i	1j	1k
2	Loss of habitable atmosphere				2d	2e			2h			2k
3	Corrosion		3b		3d	3e	3f	3g	3h			3k
4	Contamination		3b		4d	4e	4f	4g	4h			4k
5	Electrical shock			5e	5d	5e	5f	5g	5h	5k		5k
6	Fire		6b	6e				6g		6i		6k
7	Biological				7d	7e						7k
8	Psychological/Behavioral	8a	8b	8e	8d	8e	8f	8g	8h	8i	8j	8k
9	Temperature extremes		9b		9d	9e				9i	9j	9k
10	Radiation				10d	10e						10k
11	Explosion	11a	11b	11e	11d	11e		11g	11h	11i	11j	11k

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Hazard Assessment

	Program or system evaluated:	Call Center: Notification of emergency or safety issue						Date	3/17/2015			
								Evaluator Team	Scott Cruzen, CHSP, OHST, REM			
	Hazard Group	Potential Areas for Failure										
		a	b	c	d	e	f	g	h	i	j	k
		Acceleration	Chemical (dissociation, replacement, substitution	Electrical elements and operators	Environment	Leakage	Moisture	Oxidation	Off-gassing of material properties	Pressure high, low, or sudden change	Stress	Structural failure
1	Collision/mechanical damage											
2	Loss of habitable atmosphere											
3	Corrosion											
4	Contamination											
5	Electrical shock											
6	Fire											
7	Biological											
8	Psychological/Behavioral											
9	Temperature extremes											
10	Radiation											
11	Explosion											

8b-k Behavioral factors related to delay in notification of safety officer, initiation of emergency/procedures.

	Hazard Group	Consequence	RAC	Control Measure	Controlled RAC
			higher		lower
8	Psychological/Behavioral	Delay in notification of safety officer		To be determined	
		Delay in initiation of emergency/other procedures			
		Chemical contamination, fire, leakage, energized equipment,			
		sudden release of pressure, stress			
		Structural failure, damage to equipment or facilities.			

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Hazard Assessment

	Program or system evaluated:	**Hazardous Materials & Waste Storage**						Date	4/7/2012
			Engineering Controls	Work Practice Controls	Administrative Controls				
	System Safety Precedence	1. Design for minimum risk	**Eliminate/Barrier**						
		2. Incorporate passive safety devices	**Automatic**						
		3. Incorporate active safety devices	**User initiated**	**PPE**				Evaluator(s):	
		4. Provide warning devices	**Alarm**	**Monitoring**	**Auditing**			Scott Cruzen, REM, OHST	
		5. Develop procedures and training	**Inspection**	**Maintenance**	**Supervision**				
		6. Acceptance of residual risk	Go to work practice controls	Go to Administrative controls	**Surveillance**				
		BEHAVIORAL CLASSIFICATION							
	Hazard Group	**Perceptual**		**Mediational**				**Communication**	**Motor**
		i	**ii**	**iii**	**iv**	**v**	**vi**	**vii**	**viii**
		Decision Making							
		Detect	Identify	Evaluate	Policy or Objective	Alternatives	Outcomes, Consequences	Communication	Actions
8	**Psychological/Behavioral**								
a	Acceleration	x	x	x	overpack, limit stacking	visual cue for stacking height	container breakage	notify	overpack, stack properly
b	Chemical	x	x	x	substitute	eliminate	exposure		pour into container
c	Electrical	x	x	x	ground & bond	maintain contact	fire, explosion	ground & bond	ground & bond
d	Environment							report spills	
e	Leakage							report leaks	wear PPE
f	Moisture								
g	Oxidation								
h	Off-gassing	x	x	x	wear PPE	closed system	exposure	report concentration	wear PPE
i	Pressure	x	x	x	notify	release gradually	release of contents	notify/document	report
j	Stress	x	x	x	notify	delay	errors	notify/document	report
k	Structural failure	x	x	x	notify	overpack	emergency	notify/report	report

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Hazard Assessment

	Hazard Group	Consequence	RAC	Control Measure	Controlled RAC
1	Collision/mechanical damage	Containers broken from being dropped or knocked over	1	Utilize safe container handling procedures, devices	4
1	Collision/mechanical damage	Containers broken from being dropped or knocked over	1	Place small containers into secondary containment	3
1	Collision/mechanical damage	Containers stacked too high will damage them, fall over	1	Limit stacking height, mark limit with visual cue	4
2	Loss of habitable atmosphere	Accumulation of gases and vapors	3	Provide adequate general ventilation	4
3	Corrosion	Corrosion of containers, electrical equipment, structures	3	Select containers that are compatible with chemicals	4
4	Contamination	Chemical reaction of incompatible substances	2	Avoid mixing incompatible chemicals in one container	4
4	Contamination	Exposure to chemical (inhalation, skin, eye, ingestion)	2	Avoid spills, splashing, wear PPE	4
5	Electrical shock	Electrocution from contact with live electrical component	2	Lockout and tagout electrical systems	4
5	Electrical shock	Electrocution from contact with live electrical component	2	Remove all liquids from floor before operating electrical equipment	4
6	Fire	Injury and property damage due to fire and smoke	2	Eliminate all sources of ignition, avoid spills and leaks	4
7	Biological	Infectious disease, infection, tetanus, blood borne pathogens	2	Do not place medical waste in this area. Obtain medical care including vaccination when exposed.	4
8	Psychological/Behavioral	Errors resulting in release of chemical, fire, explosion	2	Provide pol & proc, ed, train, supervision	2
8	Psychological/Behavioral	Errors resulting in release of chemical, fire, explosion	2	Provide adequate lighting, hazard warning, housekeeping	3
9	Temperature extremes	Container failure due to extreme heat or cold	3	Provide heated and air conditioned space 50 - 85 F	4
10	Radiation	Exposure to radiation, environmental contamination	4	Store radioactive materials in separate area with adequate shielding and monitoring	4
11	Explosion	Static discharge when pouring flammable liquids	2	Use grounding and bonding cables when pouring	3

Hazard Assessment

	Control Measures:	Control Type
a	Place small containers into larger container (overpack). Limit container stacking height with visual cue. Wear appropriate PPE.	work practice
b	Use label to identify chemical. Review MSDS. Place in compatible container. Do not mix with other chemicals (unless authorized to do so).	work practice
c	Use grounding and bonding cables to prevent the accumulation and discharge of static electricity, which can be a source of ignition and cause fire or explosion.	engineering
d	Avoid releasing into the environment (air, water, sewer, ground, general waste stream). Dispose of contaminated PPE, spill clean-up supplies properly.	work practice
e	Respond to leakage based upon level of training and available supplies and equipment. Wear appropriate PPE. Report all spills to Security.	work practice
h	Conduct industrial hygiene monitoring to evaluate inhalation exposures. Repeat monitoring periodically.	work practice
i	Pressurized containers may indicate an unstable container. Notify spill response team, or gradually release pressure if authorized to do so. Report to Security	work practice
j	Do not perform HazMat handling tasks if you are under psychological stress. Delay tasks, if possible. Take you time when performing HazMat tasks.	administrative
k	Report structural failure of containers, containment barriers, walls, roofing, floors, etc immediately to Security.	work practice

Hierarchy of controls

1. Design for minimum risk
2. Incorporate passive safety devices
3. Incorporate active safety devices
4. Provide warning devices
5. Develop procedures and training
6. Acceptance or risk

Recommendations

Internal hazmat spills

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Some considerations:

- Emergency Action Plan
- Emergency Response Plan
- Emergency spills/releases/exposures
- Incidental spills
- Awareness training
- HAZWOPER 8 hour Operations Training
- Respiratory Protection Plan

Response Options, internal hazmat

- Incidental spills → Start here
- Emergency spills → Outside assistance
  - Internal Team? → Resource intense
    - Safety
    - Reliability
    - Sustainability

Start here: Incidental spills

- Risk assessment inputs
  - Incident history
  - Preliminary hazard list
  - Health hazard assessment
  - Operations and maintenance assessment
  - Personal protective equipment
  - Respiratory protection plan

Training

D	etect hazardous material(s) presence.
E	stimate likely harm without intervention.
C	hoose response objectives.
I	dentify action options.
D	o best option.
E	valuate progress.

Source: Benner, L., "D.E.C.I.D.E. in Hazardous Materials Emergencies". *Fire Journal* . National Fire Protection Association (1975, July).

Monitor and Report Deficiencies

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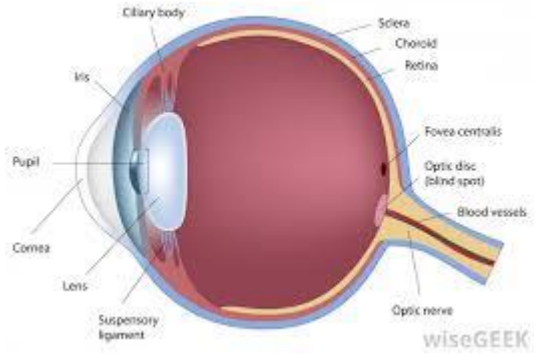
Eye exposure hazard assessment +

Emergency Eyewash station compliance assessment

Let's not lose *focus*

Each day about 2000 U.S. workers sustain a job-related eye injury that requires medical treatment. About one third of the injuries are treated in hospital emergency departments



Source: National Institute for Occupational Safety and Health, retrieved 6/15/2017 from https://www.cdc.gov/niosh/topics/eye/default.html

What can workers do to prevent eye injury?

- Wear personal protective eyewear, such as *goggles*, face shields, safety glasses, or full face respirators.

Source: National Institute for Occupational Safety and Health, retrieved 6/15/2017 from https://www.cdc.gov/niosh/topics/eye/default.html

What can employers do to prevent eye injury?

- Ensure *engineering controls* are used to reduce eye injuries and to protect against ocular infection exposures.
- Conduct a *hazard assessment* to determine the appropriate type of protective eyewear appropriate for a given task.

Source: National Institute for Occupational Safety and Health, retrieved 6/15/2017 from https://www.cdc.gov/niosh/topics/eye/default.html

Hazard assessment project:

1. Occupational exposure (eye) to chemicals
2. Emergency eyewash station compliance
3. PPE Hazard Assessment

- November/2015-December 2016
- 15 cities, villages, townships
- Hospitals and outpatient locations
  - 3 healthcare systems
  - 231 work locations (facility departments)

Changing MI regulatory environment

- 2007 *Minimum Design Standards for Healthcare Facilities*-MDCH
- 2009 *ANSI/ISEA Z358.1 Emergency Eyewash and Shower Equipment*
- 2011 *Emergency Eyewash/Shower and Equipment Rules*-LARA
- 2012 *Hazard Communication Standard*-LARA
- 2015 *Medical Services and First Aid*-LARA

Observations

- (51) No eyewash station
- (43) Personal (squeeze bottle)
- (1) Self-contained units
- (17) Plumbed drench hose
- (9) Plumbed drench/eyewash
- (95) Plumbed eyewash
- (1) Plumbed eye/face wash
- (6) Plumbed eyewash/shower

Challenges

- Chemical exposure/PPE hazard assessment
  - Absent or inadequate
- Chemical product inventories
  - Absent, incomplete, or out-of-date
- High level disinfection process changes
  - Technology change
  - Location change
- Bloodborne Infectious Disease Standard
  - Confusion, risk-perception, historic practice

Be sure to ask the right questions

"I *want* an emergency eyewash station. *Can you install one for me*?"

"We need an emergency eyewash station assessment. *Can you take a look at my eyewash stations*?"

Hazard assessment objectives
Eye exposure + eyewash station

1. Identify chemicals that pose an eye injury hazard (corrosive = pH $\leq$4.0 or $\geq$10.0; or may be considered to be “injurious” to the eye).
2. Identify locations in which corrosive or eye injurious chemicals are used.
3. Evaluate potential for occupational exposure to hazardous chemical products in the workplace which may require installation of an emergency eyewash station.
4. Determine if an emergency eyewash station is required based upon the hazardous properties of the chemical agents used in the workplace.
5. Identify if existing emergency eyewash stations meet the requirements of the consensus standard known as ANSI/ISEA Z358.1-2009 for emergency eyewash stations.
6. Identify locations where existing emergency eyewash stations require upgrading or replacement to meet ANSI/ISEA Z358.1-2009.
7. Identify locations where emergency eyewash station(s) need to be installed which meets the requirements of ANSI/ISEA Z358.1-2009.
8. Identify locations where existing emergency eyewash stations, including personal eyewash (bottle) stations, may be removed.
9. Identify personal protective clothing and equipment requirements for each area evaluated.

Eye hazard assessment methodology

METHODOLOGY:

System Safety hazard assessment techniques were used, including:

1. Preliminary Hazard List
2. Preliminary Hazard Analysis
3. Operating and Support Hazard Analysis
4. Personal Protective Equipment Hazard Assessment
5. Biosafety risk assessment

PPE Hazard Assessment—why not?

CERTIFICATION OF HAZARD ASSESSMENT FORM FOR PPE USE

To be reviewed annually

The OSHA Standard states: The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). 1910.132(d)(1) The employer shall verify that the required workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment; and, which identifies the document as a certification of hazard assessment. 1910.132(d)(2)

This form may be used to certify (document in writing) your hazard assessment. Keep it on permanent file in your department.

PERFORMED BY (Name & Title): Scott Cruzen, CHSP, OHST **DEPARTMENT:** Medxcel Facilities Management

LOCATION (Building & Room): Genesys Regional Medical Center **DATE:** 9/9/2016 - 11/11/2016

☐ NONE – Hazards requiring personal protective equipment are not present or likely to be present.

SOURCE	ASSESSMENT OF HAZARD	PPE REQUIRED	COMMENTS
Use or handling of; ☒ Chemicals ☐ Biological agents, human blood, OPIM ☐ Radioactive materials	*Eye or face injury* ☐ Impact from flying particles ☒ Chemical splash in eyes ☒ Facial skin chemical contact ☐ Nose/mouth contact with blood/OPIM	☐ Safety glasses ☐ With side shields ☐ Safety goggles ☒ Chemical splash goggles ☒ Face shield ☐ Face mask for blood/OPIM only ☐ Other	
	Body/skin/hand contact ☐ Biological agents ☐ Sharps ☐ Radioactive materials ☐ Chemicals ☐ Hot or cold objects	☐ Lab coat / Gown ☐ Latex gloves ☐ Apron ☐ Double latex gloves ☐ Scrubs ☐ Rubber gloves ☐ Tyveks ☐ Chemical resistant gloves ☐ Other.....	
☐ Operations generating airborne fiber, dust, fume, mist, or vapor	☐ Required: inhalation exposure above exposure standards ☐ Voluntary: inhalation exposure below Standard	*Respirator* ☐ Filter or Cartridge EI SCBA or air line ☐ Other	Contact EHS for initial exposure assessment.
☐ High noise levels from equipment or operation	☐ Required: exposure above standards ☐ Voluntary: exposure below standards	☐ Muff ☐ Ear Plugs ☐ Other.....	Contact EHS for initial noise exposure assessment.
Non ionizing radiation sources ☐ Lasers ☐ Welding ☐ Infrared ☐ Ultraviolet	*Radiation burns to:* ☐ Eyes, ☐ Body ☐ Skin	☐ Shaded safety glasses ☐ With side shields ☐ Shaded safety goggles ☐ Welding helmet ☐ Protective clothing (welding leathers, etc.) ☐ Barriers, shields ☐ Other	
☐ *General safety: physical* hazards from equipment, process, or material	☐ *Foot Injury.* equipment or object that can fall or roll onto feet	☐ Safety shoes ☐ Other.....	
	☐ *Impact or penetration* to eye, face, head, body, or soles of foot ☐ Electrical contact	☐ Safety glasses ☐ With side shields ☐ Safety goggles ☐ Face shield ☐ Safety shoes ☐ Hard hats ☐ Cut resistant gloves ☐ Coveralls ☐ Other.....	
	☐ Other: *extreme heat or cold*	☐ Thermal gloves ☐ Face shields ☐ Thermal clothing ☐ Safety glasses ☐ Barriers /shields ☐ Other	
☐ Other			

Form updated: July 2016

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Procedure, task orientation

- Chemical product handling
  - Pouring
  - Mixing
  - Testing
  - Process-related (solution change, dilution)
  - Storage, receiving, disposing, transporting
- Resulting in potential for occupational exposure to eyes/face

GHS Health Hazard Codes vs pH

- H227 Combustible liquid
- H302 Harmful if swallowed
- H312 Harmful in contact with skin
- H314 Causes severe skin burns and eye damage
- H315 Causes skin irritation
- H318 Causes serious eye damage
- H319 Causes serious eye irritation
- H332 Harmful if inhaled
- H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled
- H335 May cause respiratory irritation
- H400 Very toxic to aquatic life
- H402 Harmful to aquatic life
- H410 Very toxic to aquatic life with long lasting effects
- H412 Harmful to aquatic life with long lasting effects

Corrosive, eye injurious

PRELIMINARY HAZARD LIST (Concept Phase)

Program: Hazardous Materials and Waste Management — Date: February 16, 2016

Prepared by: Scott Cruzen, CHSP, OHST — Page:

Item	Hazardous Condition	Hazard Category	Cause	Effects	RAC	Comments
1	chemical exposure	Chemical	Corrosive agent	serious eye damage	1 (IIB)	H314, H318; Cat-1 Eye, Skin
2	chemical exposure	Chemical	eye injurious chemical	serious eye damage	1 (IIB)	H318 eye damage
3	chemical exposure	Chemical	severe eye irritant	eye irritation	2 (IIIB)	Cat-2A serious eye irritation

PHA: Operating Support Hazard Analysis

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PRELIMINARY HAZARD ANALYSIS, OPERATING SUPPORT HAZARD ANALYSIS

Program: Hazardous Materials and Waste Management — Date: November 11, 2016

Prepared by: Scott Cruzen, CHSP, OHST — Page: 1 of 1

Item	Procedure/Task	Hazardous Condition	Cause	Effects	RAC	Risk Assessments	Recommendations-Eyewash	Recommendations-PPE
1	Chemical product handling, pouring, mixing resulting in potential for occupational exposure.	Corrosive (highly corrosive pH ≤2.0, ≥11.5) chemical exposure to eye(s)	Splash, spill, spray, aerosol, vapor, etc.	serious eye damage, irreversible; skin damage	1 (IIB)	Chemical hazard assessment, personal protective equipment hazard assessment (chemical), and emergency eyewash risk assessment; Preliminary Hazard Assessment, Operating Support Hazard Analysis.	Provide emergency eyewash station adjacent to chemical use area (≤ 25 feet per MIOSHA) which meets the ANSI Z 358.1-2009 Standard.	Face shield, chemical splash goggles, impervious gloves (rubber, neoprene, PVC, nitrile: See Safety Data Sheet for details). Impervious apron, sleeves, coveralls, boots, if splash is anticipated.
2	Chemical product handling, pouring, mixing resulting in potential for occupational exposure.	Corrosive (pH >2.0 ≤ 4.0; ≥ 9.0 <11.5)chemical exposure to eye(s)	Splash, spill, spray, aerosol, vapor, etc.	serious eye damage, irreversible, skin damage	1 (IIB)	Chemical hazard assessment, personal protective equipment hazard assessment (chemical), and emergency eyewash risk assessment; Preliminary Hazard Assessment, Operating Support Hazard Analysis.	Provide emergency eyewash station near chemical use area (≤ 100 feet per MIOSHA) which meets the ANSI Z 358.1-2009.	Face shield, chemical splash goggles, impervious gloves (rubber, neoprene, PVC, nitrile: See Safety Data Sheet for details). Impervious apron, sleeves, coveralls, boots, if splash is anticipated.
3	Chemical product handling, pouring, mixing resulting in potential for occupational exposure.	Eye injurious chemical exposure to eye(s)	Splash, spill, spray, aerosol, vapor, etc.	serious eye damage, irreversible, skin damage, irritation	1 (IIB)	Chemical hazard assessment, personal protective equipment hazard assessment (chemical), and emergency eyewash risk assessment; Preliminary Hazard Assessment, Operating Support Hazard Analysis.	Provide emergency eyewash station adjacent to chemical use area (≤ 25 feet per MIOSHA) which meets the ANSI Z 358.1-2009 Standard.	Face shield, chemical splash goggles, impervious gloves (rubber, neoprene, PVC, nitrile: See Safety Data Sheet for details). Impervious apron, sleeves, coveralls, boots, if splash is anticipated.
4	Chemical product handling, pouring, mixing resulting in potential for occupational exposure.	Severe eye irritant chemical exposure to eye(s)	Splash, spill, spray, aerosol, vapor, etc.	serious eye irritation, reversible, skin damage, skin sensitization, irritation	2	Chemical hazard assessment, personal protective equipment hazard assessment (chemical), and emergency eyewash risk assessment; Preliminary Hazard Assessment, Operating Support Hazard Analysis.	None required.	Face shield, chemical splash goggles, impervious gloves (rubber, neoprene, PVC, nitrile: See Safety Data Sheet for details). Impervious apron, sleeves, coveralls, boots, if splash is anticipated.
5	Chemical product handling, pouring, mixing resulting in potential for occupational exposure.	Chemical exposure to eye(s), non-corrosive, not a severe eye irritant	Splash, spill, spray, aerosol, vapor, etc.	irritation, reversable, skin irritation	3 (IVA)	Chemical hazard assessment, personal protective equipment hazard assessment (chemical), and emergency eyewash risk assessment; Preliminary Hazard Assessment, Operating Support Hazard Analysis.	None required.	Chemical splash goggles, or safety glasses; impervious gloves (rubber, neoprene, PVC, nitrile: See Safety Data Sheet for details). Impervious apron, sleeves, coveralls, boots, if splash is anticipated.
6	Laboratory task(s) resulting in potential occupational exposure to blood, body fluids, or other potentially infectious materials.	Blood and body fluid exposure to eye(s), HIV or HBV research laboratory	Splash, spill, spray, aerosol, vapor, etc.	infection	1 (IIB)	Personal protective equipment hazard assessment (chemical), and emergency eyewash risk assessment; Preliminary Hazard Assessment, Operating Support Hazard Analysis.	Provide emergency eyewash station adjacent to chemical use area (≤ 25 feet per MIOSHA) which meets the ANSI Z 358.1-2009 Standard.	Standard (barrier) precautions: Face shield, goggles, gloves. Add impervious (water) gown if splash is anticipated.
7	Laboratory task(s) resulting in potential occupational exposure to blood, body fluids, or other potentially infectious materials.	Blood and body fluid exposure to eye(s), NOT in a HIV or HBV research laboratory	Splash, spill, spray, aerosol, vapor, etc.	infection	4 (IVD)	Personal protective equipment hazard assessment (chemical), and emergency eyewash risk assessment; Preliminary Hazard Assessment, Operating Support Hazard Analysis.	None required.	Standard (barrier) precautions: Face shield, goggles, gloves. Add impervious (water) gown if splash is anticipated.

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Hazard analysis shows:

1. Corrosive (highly corrosive pH <2.0, >11.5) chemical exposure to eye(s)	1. Provide emergency eyewash station adjacent to chemical use area (< 25 feet per MIOSHA)
2. Corrosive (pH >2.0 < 4.0; > 9.0 <11.5)chemical exposure to eye(s)	2. Provide emergency eyewash station near use area (< 100 feet per MIOSHA)
3. Eye injurious chemical exposure to eye(s)	3. Provide emergency eyewash station adjacent to area (< 25 feet per MIOSHA)
4. Severe eye irritant chemical exposure to eye(s)	4. None required.
5. Chemical exposure to eye(s), non-corrosive, not a severe eye irritant	5. None required.
6. Blood and body fluid exposure to eye(s), HIV or HBV research laboratory	6. Provide emergency eyewash station adjacent to area (< 25 feet per MIOSHA)
7. Blood and body fluid exposure to eye(s), NOT in a HIV or HBV research laboratory	7. None required.

Eyewash station assessment: ANSI/ISEA Z358.1-2009

Guardian

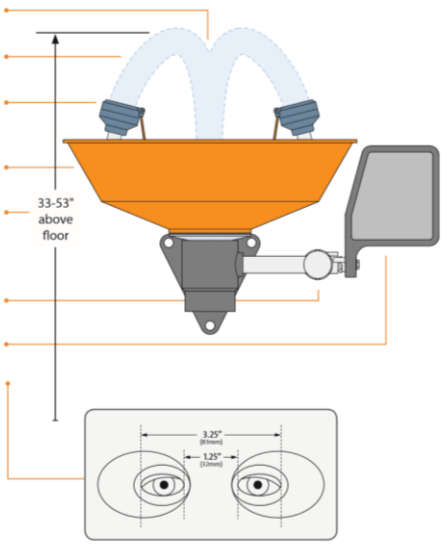
ANSI / ISEA Z358.1 Compliance Checklist

Eyewashes

This checklist is a summary of the provisions of ANSI Z358.1-2014 relating to emergency eyewashes. Please refer to the standard for a complete listing of these provisions.

All Guardian eyewash units are third-party certified to meet or exceed the provisions of ANSI Z358.1-2014.

- ☐ Controlled, low velocity flow rinses both eyes and is not injurious to user. (Section 5.1.1)
- ☐ Water flow is sufficiently high to allow user to hold eyes open while rinsing. (Section 5.1.7)
- ☐ Spray heads are protected from airborne contaminants. Covers are removed by water flow. (Section 5.1.3)
- ☐ Unit delivers at least 0.4 gallons (1.5 liters) of water per minute for 15 minutes. (Section 5.1.6, 5.4.5)
- ☐ Water flow pattern is positioned between 33" (83.8 cm) and 53" (134.6 cm) from the floor and at least 6" (15.3 cm) from the wall or nearest obstruction. (Section 5.4.4)
- ☐ Hands-free stay-open valve activates in one second or less. (Section 5.1.4, 5.2)
- ☐ Valve actuator is easy to locate and readily accessible to user. (Section 5.2)
- ☐ Unit washes both eyes simultaneously. Water flow covers area indicated on Guardian test gauge at no more than 8" above spray heads. (Section 5.1.8)



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ANSI/ISEA Z358.1-2009

- [ ] **Location:** Install eyewash unit within 10 seconds (approximately 55 feet) of hazard, on the same level as hazard and with unobstructed travel path. Where strong acids or caustics are being handled, emergency eyewash unit should be located adjacent to the hazard, and an appropriate professional should be consulted for advice on the proper distance. (Section 5.4.2; B5)
- [ ] **Identification:** Identify eyewash location with highly visible sign. Area around eyewash unit shall be well-lit. (Section 5.4.3)
- [ ] **Water Temperature:** Water delivered by eyewash shall be tepid (60-100°F). (Section 5.4.6; B6)
- [ ] **Training:** Instruct all employees in the location and proper use of eyewash units. (Section 5.5.4)
- [ ] **Maintenance/Inspection:** Activate plumbed eyewash units at least weekly. (Section 5.5.2) Inspect all eyewash units annually for compliance with standard. (Section 5.5.5)

Record #	Attachments: Photos, documents, etc.
43	
☑ Eyewash Require	
☐ ANSI Z358 2009 Compliant	
☐ Tepid Water	
☑ Accessible	
☐ On in 1 Second	
Distance in feet: 8	
Date Assessed: 8/15/2016	
Status: Open	
Date Completed:	

Short Stay Unit
Soiled Utility Room

Type	Hazard
Personal	Chemical injurious

Chemical Name
Control III Disinfectant

Action Plan
Required: Upgrade to ANSI Z358.1-2009 compliant eyewash station

Comments
Install mixing valve to provide tepid (60-100F) water. Remove personal eyewash station.

Safety: Always provide and ensure that associates wear appropriate personal protective equipment and clothing (e.g. chemical splash goggles, face shield, chemical impervious gloves such as nitrile, impervious apron or gown, arm and foot cover as needed, etc.). Provide education and training on PPE use and safe work practices.

Data gathering

- Eye/face exposure?
- Name of product
- pH, H314, H318
- Eye injurious?
- Eyewash required?
- Distance?
- Accessible?
- On in one second?

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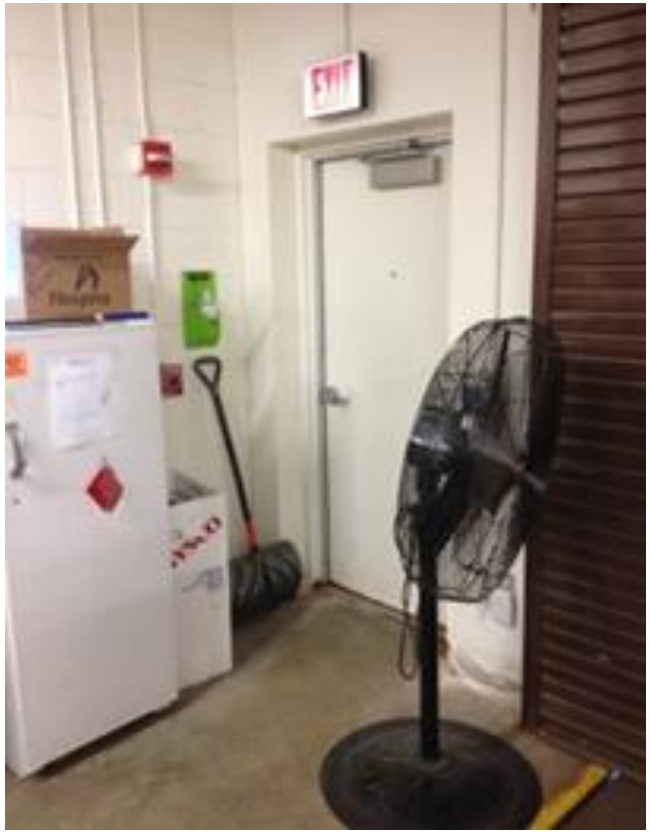
Field assessment: Personal eyewash stations



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Signs of eye exposure hazard

Engineered product delivery systems

First Gen: Diversey-Care Suma Combi

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Second Gen: Sumi Flow SafePack

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SafePack rinsing connector

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Engineered closed, spill-free design

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Third Gen: Suma Revoflow

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Minimizes splashing

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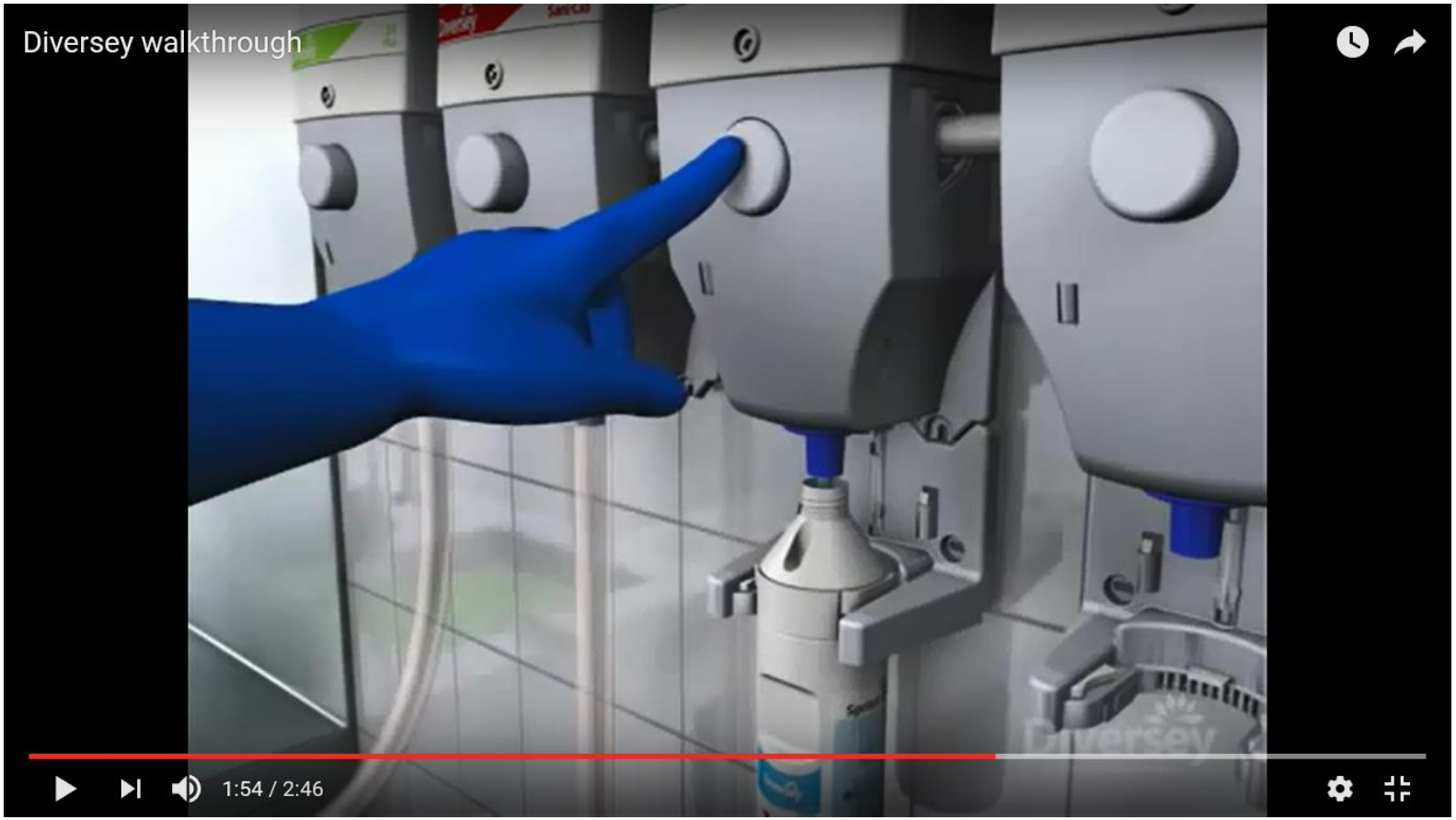
Filling spray bottles minimizes splashes and spills



Medxcel Facilities Management

Task: Chemical handling, Controlled RAC

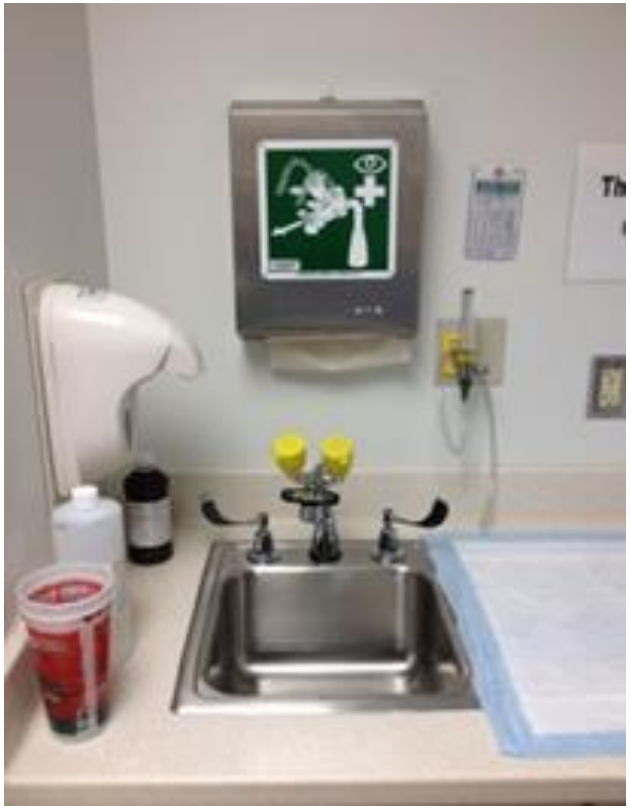
	Analysis Type: SYSTEM/SUBSYSTEM HAZARD ANALYSIS						
	System	**Chemical Handling**	**SJHS-Dietary**		Prepared by: Scott Cruzen, CHSP, OHST		
	Subsystems	**Dishwashing, cleaning**	Date: 8/11/2016			Sheet 1	of 1
Item #	**Category**	**Description**	**Effects**	**RAC**	**Recommended Controls**	**Controlled RAC**	**Standards**
1	Chemical exposure, (highly) corrosive	Splashing and spilling	Eye damage, including blindness	1 (IIA)	chemical splash goggles	1 (IIB)	MIOSHA Part 433 Personal Protective Equipment
2	Chemical exposure, (highly) corrosive	Splashing and spilling	Eye damage, including blindness	1 (IIA)	emergency eyewash station	1 (IIB)	MIOSHA Part 472 Medical Services and First Aid, ANSI Z358.1-2009
3	Chemical exposure, (highly) corrosive	Splashing and spilling	Eye damage, including blindness	1 (IIA)	engineered dispensing system	1 (IIB)	MIOSHA Part 433 Personal Protective Equipment
4	Chemical exposure, (highly) corrosive	Splashing and spilling	Eye damage, including blindness	1 (IIA)	engineered dispensing system + chemical splash goggles	2 (IIC)	MIOSHA Part 433 Personal Protective Equipment
5	Chemical exposure, (highly) corrosive	Splashing and spilling	Eye damage, including blindness	1 (IIA)	engineered dispensing system + emergency eyewash station	2 (IIIB)	MIOSHA Part 472 Medical Services and First Aid, ANSI Z358.1-2009
6	Chemical exposure, (highly) corrosive	Splashing and spilling	Eye damage, including blindness	1 (IIA)	engineered dispensing system + chemical splash goggles + emergency eyewash station	3 (IIIE)	MIOSHA Part 433 Personal Protective Equipment, MIOSHA Part 472 Medical Services and First Aid, ANSI Z358.1-2009

Adapted from: Stephans, Richard (2004). *System Safety for the 21st Century: The updated and revised edtion of System Safety 2000*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Facility Risk Acceptance

RAC 1 - Unacceptable
RAC 2 - Undesirable
RAC 3 - Acceptable with controls
RAC 4 - Acceptable

More observations



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Eyewash and quick drench shower

Eyewash and hidden hazards

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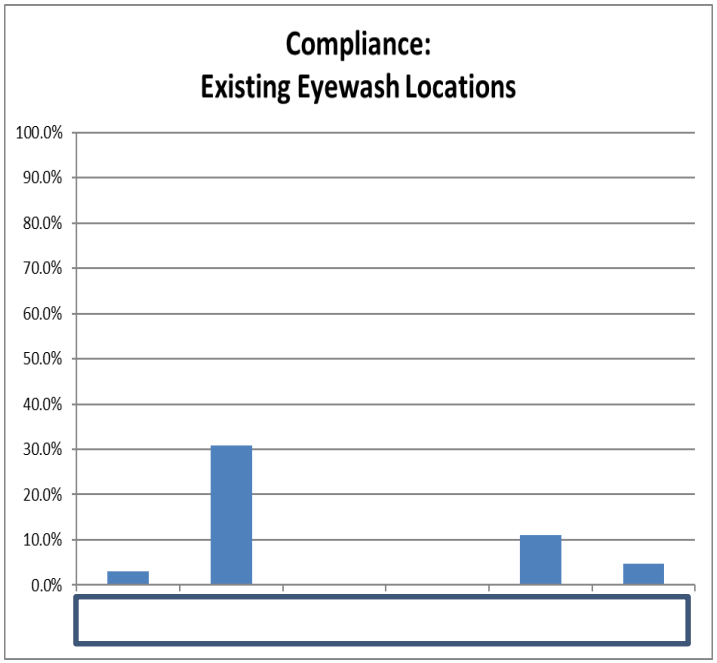
Accessiblity (located in supply room)

Compliance: Existing eyewash stations



Compliance: Existing Eyewash Locations Scores	
Facility A	3.0%
Facility B	30.8%
Facility C	0.0%
Facility D	0.0%
Facility E	11.1%
Overall	4.8%

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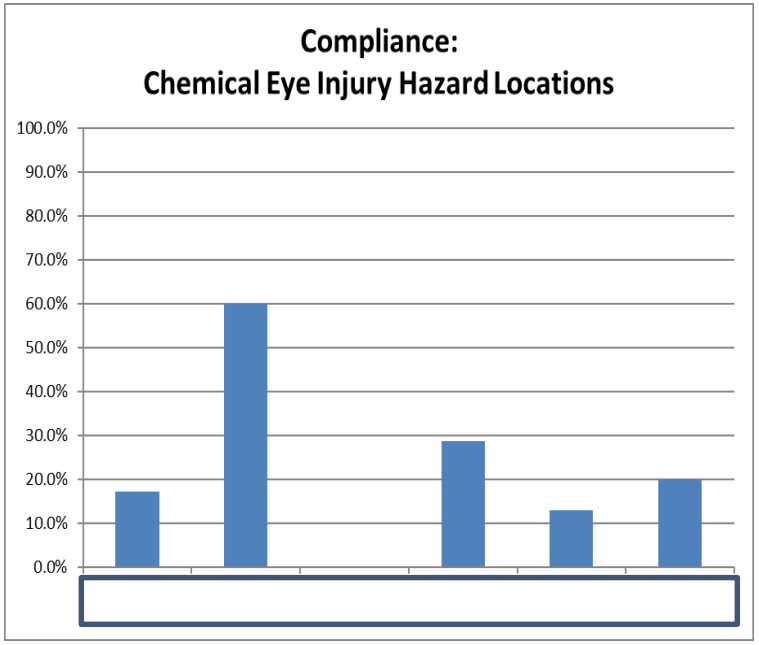
Compliance: Chemical eye injury locations



Compliance: Chemical Eye Injury Hazard Location Compliance Scores	
Facility A	17.3%
Facility B	60.0%
Facility C	0.0%
Facility D	28.8%
Facility E	13.0%
Overall	**20.0%**

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Recommendations: Facility A

Table 1 - Recommendations

Recommended Corrective Actions	Number of Locations Affected	New or Existing installation
1. Install mixing valve to deliver tepid (60-100 degrees F) water to eyewash station.	30	1 existing
2. Install plumbed eyewash station that meets ANSI/ISEA Z 358.1-2009 requirements.	23	13 upgrade existing 10 new
3. Move procedure or task to an alternate location, or substitute chemical product with less hazardous (Emergency Department).	0	
4. Consider removing eyewash stations/face wash/drench hose.	32	Provided for use when exposure to blood or body fluids occurs (not required).

The good, the bad, and the costly

Recommendations	Number of Locations
Eyewash not required. No further action	38
Eyewash not required. Remove eyewash	77
Other (product substitution, relocate process, requires further assessment, or information)	7
Required. Install ANSI-compliant eyewash	29
Required. Install mixing valve	92
Required. No further action	5
Required. Upgrade to ANSI-complaint eyewash	38
Total	231

Estimated cost $246,000 for highlighted items

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Lessons Learned, Best management practices

1. Regulatory compliance is low, agency interest is high
2. Dynamic environment, incomplete information
3. Hazard assessment:
   - Comprehensive approach is necessary
   - Labor intensive process
4. Anticipate significant cost to implement improvements
5. Risk communication with stakeholders
6. Opportunity for:
   - Substantial risk mitigation, compliance improvement
   - Substitution, consolidation, standardization
7. Need a dynamic process to manage information and measure improvements

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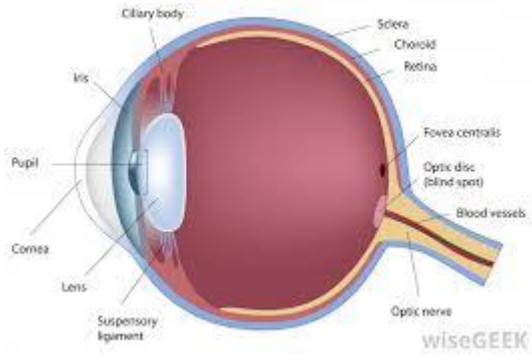
Questions?


Ciliary body
Sclera
Choroid
Retina
Iris
Fovea centralis
Pupil
Optic disc
(blind spot)
Blood vessels
Cornea
Lens
Suspensory
ligament
Optic nerve
wiseGEEK