Methods to Determine Safety Compliance

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2023 NSF Research Infrastructure Workshop

Ask yourself…

What is safety?

- Regulatory compliance
- Lack of reported incidents/injuries
- Written policies and procedures
- Implementation and accountability
- Staff engagement and participation

Ask yourself…

What is your approach to safety?

- Proactive planning vs reactive response
- Subjective assessments vs objective data
- One and done vs cyclical
- OSHA regs vs rules of your own

*Occupational Safety and Health Administration




Ask yourself…

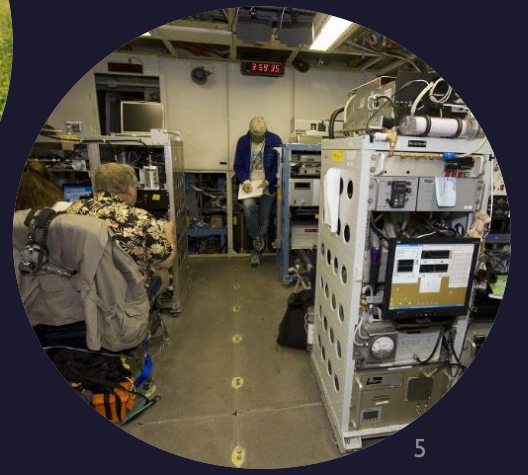
Does anything ever go exactly to the plan?

- Changes in projects scopes
- Changes in staff and location
- Changes in equipment or operations
- Changes in hazards and safety controls

Measuring compliance

How effective are our programs?

- Leading indicators
  - Ways that incidents were prevented
    - Safety participation, training and resources, hazard controls, engineering upgrades
- Lagging indicators
  - Opportunities for safety improvement
    - Incident and injury data
- Regulatory comparison indicators
  - Recordkeeping and written documentation
  - Occupational exposure limits
  - Gap analysis



Measuring compliance

How do we look at our own program?

- ANSI Z.10 standard for safety and health management systems
  - **PLAN,** do, **CHECK**, act model
- Frequent observations and check-ins
  - Safety partnerships
  - Audits and inspections
- Using data to plan strategically
  - Prioritizing efforts and setting goals

*American National Standards Institute

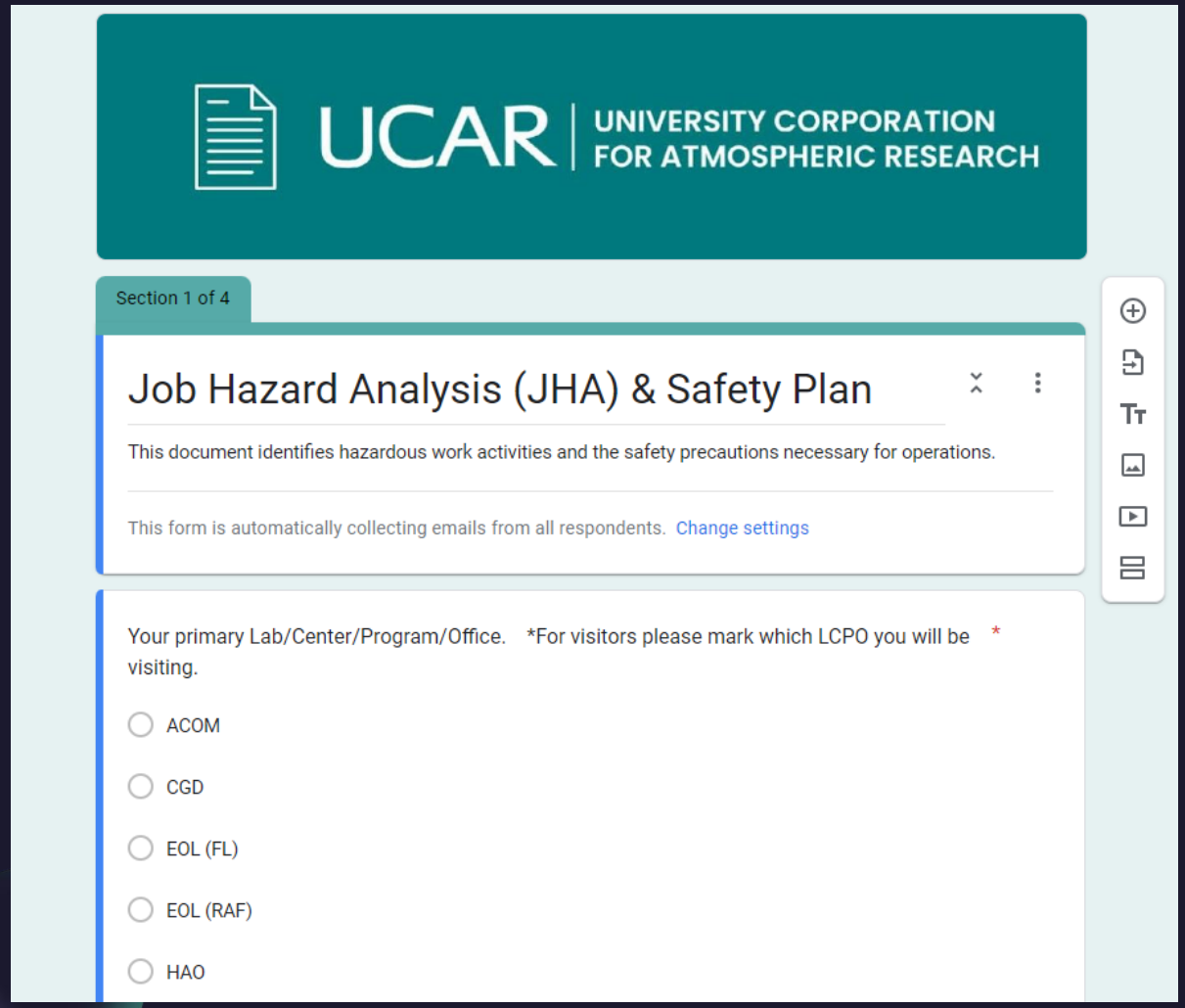



Safety Plan

- Wide range of work activities here at UCAR
  - Lab, Industrial, Field, Office
- 100 compliance programs to manage
- 76 safety training categories
- Staff engagement
  - Job Hazard Analysis, Operating / Maintenance Procedures

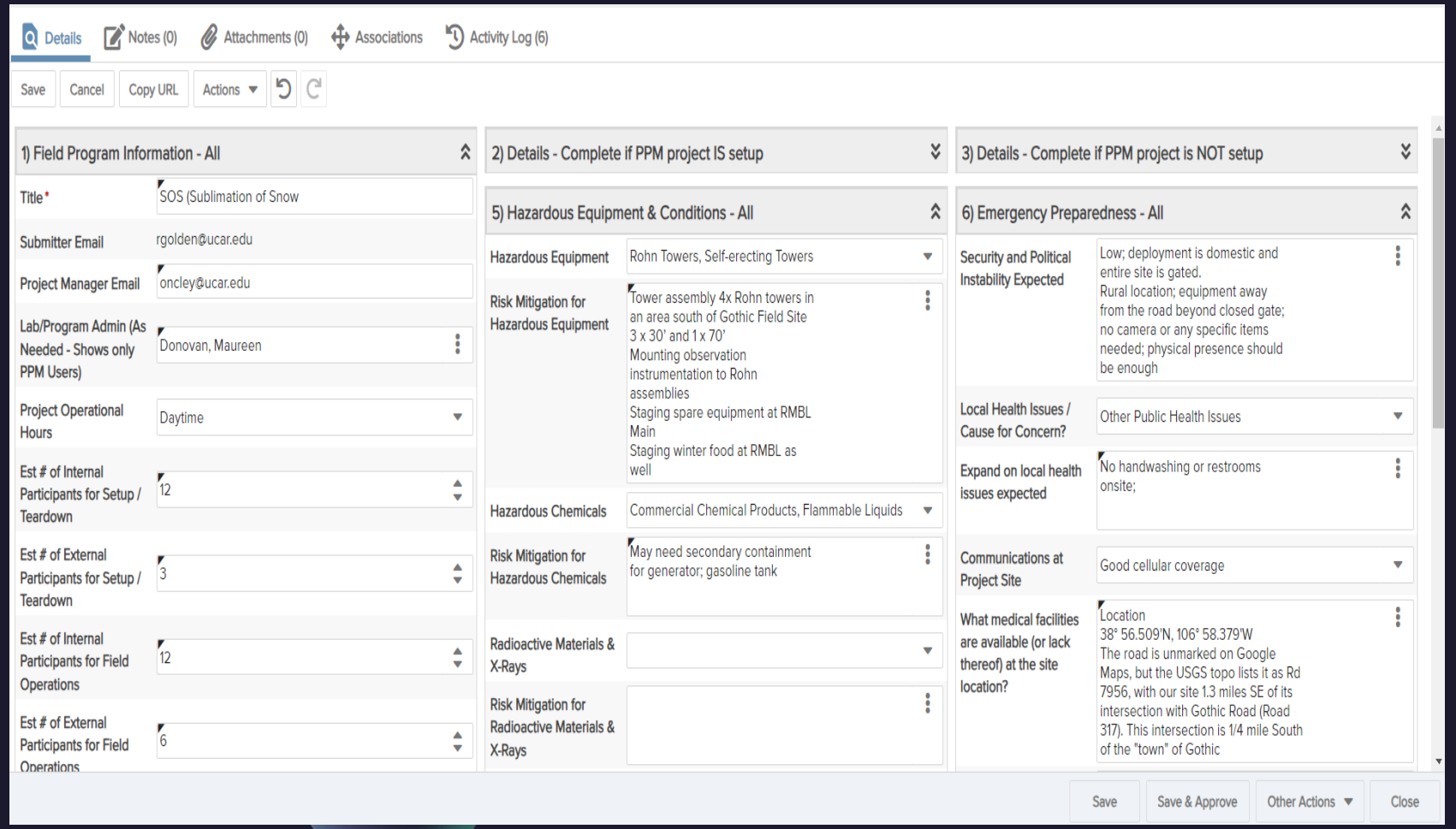
Job Hazard Analysis

- Participants (Internal + External)
- Work summary and timeline
- Hazard identification
  - Chemicals / Compressed Gases / Cryogens
  - Electronics / Hazardous Energy
  - Ionizing radiation and Non-ionizing radiation
  - Specialized Equipment
  - Other hazardous conditions (Elevated work, confined space, forklifts, aerial/scissor lifts)
- Hazard controls
  - Personal Protective Equipment (PPE)
  - Written procedures and manuals
  - Engineering and infrastructure



Project Deployment Risk Assessment

- Participants (Internal + External)
- Work summary and timeline
- Hazard identification
  - Hazardous equipment needs
  - Chemicals or radiation sources
  - Weather/environmental
  - Transportation/terrain
  - Communication
  - Emergency preparedness/response

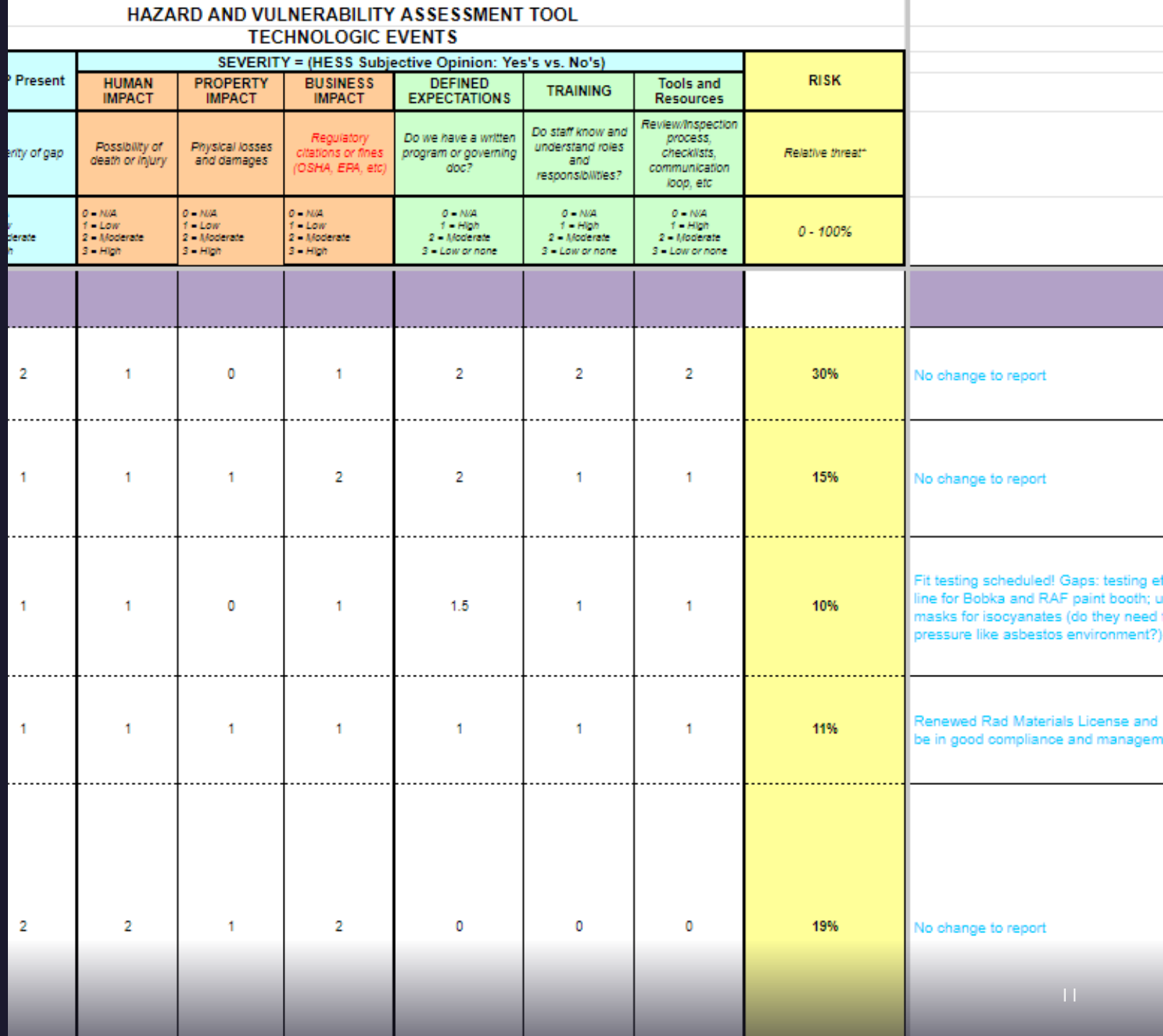


Safety Check

- Audits
- Inspections
- Critiques and feedback
- Assessments for continual improvement

Comprehensive Risk Assessment

- Merged elements
  - ANSI Z.10
  - OSHA Compliance Programs
  - Health care facility vulnerability assessment



HAZARD AND VULNERABILITY ASSESSMENT TOOL
TECHNOLOGIC EVENTS

? Present	SEVERITY = (HESS Subjective Opinion: Yes's vs. No's)						RISK	
	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS IMPACT	DEFINED EXPECTATIONS	TRAINING	Tools and Resources		
nity of gap	*Possibility of death or injury*	*Physical losses and damages*	*Regulatory citations or fines (OSHA, EPA, etc)*	*Do we have a written program or governing doc?*	*Do staff know and understand roles and responsibilities?*	*Review/Inspection process, checklists, communication loop, etc*	*Relative threat**	
derate	*0 = NA 1 = Low 2 = Moderate 3 = High*	*0 = NA 1 = Low 2 = Moderate 3 = High*	*0 = NA 1 = Low 2 = Moderate 3 = High*	*0 = NA 1 = High 2 = Moderate 3 = Low or none*	*0 = NA 1 = High 2 = Moderate 3 = Low or none*	*0 = NA 1 = High 2 = Moderate 3 = Low or none*	*0 - 100%*	
2	1	0	1	2	2	2	30%	No change to report
1	1	1	2	2	1	1	15%	No change to report
1	1	0	1	1.5	1	1	10%	Fit testing scheduled! Gaps: testing ef line for Bobka and RAF paint booth; u masks for isocyanates (do they need pressure like asbestos environment?)
1	1	1	1	1	1	1	11%	Renewed Rad Materials License and be in good compliance and managem
2	2	1	2	0	0	0	19%	No change to report

Comprehensive Risk Assessment

- Analysis elements
  - ANSI Z.10
  - OSHA Compliance Programs
  - Health care facility vulnerability assessment

Program	Risk Rating 2022	Risk Rating 2019	Highest Ranking Risk
S&H Management			
S&HMS Implementation and Operation	51%	57%	Procurement standards (83%); Documented S&H policy (72%)
Participation and Involvement	57%	72%%	Management involvement (89%); Incentive programs (78%); Safety Performance Metrics (72%
Life Safety Components	21%	19&	Emergency Action Plans (41%)
Job Planning	69%	68%	Field Projects (89%); JHA (83%), SOPs, (89%)
Training and onboarding	69%	26%	Documented Safety Responsibilities (94%); Demonstration of Competency (100%)
Recordkeeping	28%	26%	Near Misses (56%); Incident recordkeeping (44%)
Evaluation and Corrective Action	56%	50%	Violations/Nonconformance (83%); Systematic audi shcedule and plan (83%)
SMHS Management Review	20%	28%	Systematic tracking of Rick Reduction (26%)
S&H Compliance			
Workplace and Critical Process Safety	54%	37%	Process Safety Management (78%)
Fatality and Injury Prevention	37%	67%	Fall Protection (52%)
Walking and Working Surfaces	33%	17%	Scaffolding (59%)
Electrical Safety	46%	76%	Specific Procedures LOTO (83%); Equipment modification and design (83%)
Machine Guarding	46%	78%	Handtools Power Tools (48%)
Vehicular	24%	54%	Hoists and Cranes (56%)
Employee Exposure (Physical)	22%	56%	Laser safety (44%); Welding safety (41%)
Employee Exposure (Chemical)	24%	54%	
Asbestos	31%	74%	Training for affected staff (37%)
GHS/Haz Com	25%	57%	SRS Resources (33%); PPE (33%)
Hazwoper	33%	54%	Overall spill response program (41%)
Lab Safety/ Chemical Hygiene Plan	19%	50%	Written chemical hygiene plan (28%); highly hazardous chemicals (30%)
Transport	12%	44%	DOT Training Compliance (13%)
Waste Management	9%	28%	Waste accumulation (13%); Waste recordkeeping and reporting (13%)
Contractor and Visitor Safety	33%	67%	Contractor Work Rules and Management (63%); Visiting Scientist Program (56%)

Training Assessment Matrix

- Analysis elements
  - Current training programs
  - Existing workplace hazards
  - Comprehensive Risk Assessment

	LCPO	ACOM Lab	ACOM Engineering	EOL RSF	EOL ISS	EOL DFS	FMS base (?)	FMS Maint	FMS Logistics	FMS Projects/Construction	FMS Tech Security	HAO IG	HAO MLSO	HESS	MMM	NETS (Infrastructure)
Hazard / Training category		20	5	13	17	10	5	19	5	5	2	9	4	6	4	12
L&I + in person	Hazardous Work (Aerial and Scissor Lifts)	2		7	o	2		12		2	2	2		1		12
L&I + United	Hazardous work (other heavy machinery; excavators / bobcats)				o			10		2				1		
L&I	Hazardous work (heavy drilling, sanding, grinding, cutting)			5	8	5		10		2	2		2	1		10
	Hazardous Work (Welding / Brazing)			3		2		3		2				1		
	Hazardous Work (Soldering)	5	2	5	7	2		2		2	1	4	3	2	3	4
	Hazardous work (in and around L&I areas)	20	5	13	14	10	5	18	5	5	2	7	4	6	4	12
	Hazardous work (audits and inspection / overseeing)	10	2	7	10	5	5	18	5	5	2	7	4	6	4	12
L&I Training	Electrical Work (Equipment and design review)	5	5	5	6	4		7		5	2	8	2	2	2	12
	Electrical Work (Lab / benchtop)	20	5	7	8	4		7				8	2	2	2	12
Basic Electrical	Electrical Work (Facility / Utilities)							7		2	2			2		6
	Electrical Work Arc Flash)							7		2				2		
	LOTO (Electrical)	2	4	7		5		7		5		8	2	2		10
L&I Training	LOTO (Other catergory)	5	4	7	8	5		15		5	2	8	2	2	2	12
L&I Training	Exposure (Noise)		2	7	8	8	1	15	2	5	2	3		4	2	12
	Exposure (Respiratory)	5	2	7	7	3		12			2			1	2	12
	Exposure (Chemicals / Vapors / Fumes)	5	1	4	4	3		5		2				2	2	
	Exposure / Hazardous work (Asbestos)						3	16		5	2			4		12
	Exposure / Hazardous work (intrusive work / generating dust / particulates)			7	8	3	3	12		2	2		2	2		12
	Exposure (Ionizing Radiation)	7	3	7				2	5	2		2		6		
	Exposure (Non-ionizing / Lasers)	7	3	7	6	3		2		2		4	2	3	2	6

Other applications

- Building inspections
- Facility commissioning
- COVID-19 phased reopening

This risk assessment form has been created to assist in decision masking processes as it pertains to reopening and reoccupying the Research Aviation Facility (RAF) as we approach a completion of remodel

The hazards captured in this form have been observed by the HESS team during site visits and walkthroughs and are evaluated with regulatory compliance (OSHA, NFPA, NEC, etc) in mind

Risk Description describes conditions of non-compliance in which 'an event' may occur resulting in 'consequences'

OSHA 29 CFR 1910 Subpart D Walking-Working Surfaces

29 CFR 1910.36 and 37 Means of Egress

Risk Impact assesses how severe the "consequences" or outcome (injury, illness, fatality, regulatory intervention) would be if the hazard captured in RISK DESCRIPTION is not addres

Risk likelyhood assesses how likely the "event" is to occur **(1 low; 5 high)**

RISK TYPE	RISK CATEGORY	Location	RISK DESCRIPTION	RISK IMPACT	RISK LIKELIHOOD	RISK RATING	RISK EXPOSURE	MITIGATION (to reduce risk)
Health and Safety	Improper Storage/Accumulati	Hangar A Stairwell	Improper Storage of materials under stairwell	3	3	9	MEDIUM	Remove items and store in correct designated locations or dispose of
	Life Safety	Hangar A Stairwell	Improperly placed /mounted fire extinguisher	3	3	9	MEDIUM	Move into Hangar A by the emergency exit; with proper mounting and signage
	Life Safety	Hangar A Mezzanine	Gap between wall and flooring; can result in dropped equipment on people and or fire issues	4	3	12	HIGH	Fill with Fire Caulk
	Life Safety	Hangar A Stairwell	No exit sign causing visibility and egress issues	3	3	9	MEDIUM	Install illuminated Exit sign per code
	Life Safety	Hangar A Stairwell	Door to stairwell needs sign that says "not an exit"	3	3	9	MEDIUM	Order and apply proper signage
	Life Safety	Hangar A	Electrical Room: Needs fire caulking at joints	4	3	12	HIGH	Fill with Fire Caulk

This risk assessment form has been created to assist in decision masking processes as it pertains to phased reopening and reoccupying facilities guring the COVID-19 pandemic

The criteria in this form have been selected based on state, local, and federal health and safety guidelines and resources from Johns Hopkins School of Public Health

Risk Impact assesses how severe a gap is regarding the (RISK DESCRIPTION) criteria and conditions applicable to the pandemic **(1 low; 5 high)**

Risk likelyhood assesses how perpared the organization is to mitigate the gap/described risk **(1 low; 5 high)**

RISK TYPE	RISK CATEGORY	RISK DESCRIPTION	RISK IMPACT	RISK LIKELIHOOD	RISK RATING	RISK EXPOSURE	TRIGGER	MITIGATION (to re
Operational	Pandemic Data	Case positivity (Infection) rate is increasing	4	2	8	MEDIUM	State **and** local (Boulder, Jeffco, Weld, Denver) Seven Day Case Positivity (Infection) rates are unstable; fluctuating in higher percentages	State and local (Boulder, Denver) Seven Day Case P (Infection) rates are at 5% moderate) or less for 3 co weeks
	Pandemic Data	Testing method is inaccurate (too many false negatives)	3	2	6	MEDIUM	Sensitivity below 80%; Specificity below 80%	Sensitivity improves to 98 improves to 98%
	Pandemic Data	Access to asymptomatic testing is still low	1	1	1	LOW	State was able to provide 10,500+ tests per day (08/01/20); unable to provide needed 30,000+	State needs to be able to 30,000+ tests per day; Co contracts from local healt becomes an option
	Pandemic Data	Testing result delays	1	1	1	LOW	Test turn-around times are averaging 8-12 days	Testing centers need to d average turn-around time
	Pandemic Data	Inadequate prevention methods (vaccination) for COVID-19	1	1	1	LOW	No FDA approved vaccine available	FDA approved vaccination widely available
	Pandemic Data	Inadequate medical treatment methods for COVID-19	1	1	1	LOW	Lack of standardized medical treatment protocols	FDA and clinically approve drugs or methods
	Pandemic Data	Technologies to help prevent spread of COVID-19 (surface contamination, UV, Ventilation)	1	1	1	LOW	Many options are still in research phases	Research-driven options a approved by CDC and loca departments
	Pandemic Data	Potential for staff performing work onsite to be COVID+ and expose the organization	4	2	8	MEDIUM	Confirmed case of 1 employee onsite; outbreak is considered 2+ onsite staff	Onsite questionnaire and hygiene protocols; staff to HESS to investiagte
			Yellow will not be an option until RISK EXPOSURE	Green will not be an option until RISK EXPOSURE	Blue will not be an option until RISK EXPOSURE score	27		

Questions?