



Environment, Health,  
& Safety Manual

# 2022 Annual Safety Report

## The Steward Observatory Annual Safety Report 2022



Image credit: Burns & McDonnell



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

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## Table of Contents

Acknowledgements .....	3
Dale Webb, Safety Manager .....	3
Contreras Fire at Kitt Peak National Observatory (KPNO).....	3
2022 Executive Safety Committee Members (ESC) .....	3
2021 Report Not Completed.....	3
Introduction and Overview.....	4
2022 Objectives and Targets .....	5
Key Performance Indicators (KPIs).....	5
Summary of KPI Data .....	5
OSHA Total Recordable Incident Rate (TRIR) .....	6
Incident Reporting .....	7
Site Safety Inspections, Findings, and Corrective Actions .....	8
Executive Safety Committee & Observatory-Wide Safety Committee Meetings .....	9
Safety Management System (SMS) Changes .....	10
Training .....	12
2023 Objectives and Targets .....	13



# 2022 Annual Safety Report

## Acknowledgements

### Dale Webb, Safety Manager

First and foremost, on behalf of Steward Observatory, the Director and Executive Offices, the Executive Safety Committee, and all those impacted by his wisdom and leadership, we would like to formally acknowledge the years of dedicated service, commitment, contributions, and wisdom of Dale Webb. Dale served as the Safety Manager since 2009, and in that time, he was principal in implementing the Steward Safety Management System (SMS) and Safety Manual, creating a culture of safety, identifying, and resolving hundreds of safety issues, and driving down the total number of OSHA recordable injuries, achieving the status of zero recordable injuries in the year of his retirement. In 2022, the Observatory acknowledged Mr. Webb, and his impact on the organization and lives of individuals. It is with humility and honor that we acknowledge Dale for his years of dedicated service.

### Contreras Fire at Kitt Peak National Observatory (KPNO)

We would also like to acknowledge the valiant efforts of the firefighters, incident command teams, emergency services, Tribal, State, Federal, and Organizational leadership, and all those individuals who worked and fought tirelessly in extremely hazardous conditions to keep our invaluable assets safe on Kitt Peak during the Contreras Fire at Kitt Peak National Observatory (KPNO). While we lost some key assets, damage to astronomical equipment was thankfully minimal. The fire had, and continues to have, an impact on operations at the site as teams work to continue resumption of normal operations and reconstruction.

A more comprehensive report and further links may be found at <https://inciweb.nwccg.gov/incident-information/azppa-contreras-fire>.

### 2022 Executive Safety Committee Members (ESC)

Special acknowledgement shall be given to the members of the Executive Safety Committee, which includes Mark Buglewicz, David Carroll, Karen Kenagy, Paul Smith, Alan Strauss, Eric Buckley, Kelly Baker, Chad Bender, Gabe Coronado, Cory Knop, Sean Keel, Wade Boltinghouse, and Kerry Gonzales. These individuals contribute on behalf of their sections between two to five hours per month to Executive Meetings, reviewing incidents and Department Meetings. This does not include day to half day contributions to take part in the inspection process. Thank you to the committee, to their supervisors and Dr. Buell Jannuzi for their support in 2022!

### 2021 Report Not Completed

An annual report was not completed for 2021 as Mr. Webb transitioned out and Mr. Carroll transitioned in, taking over in January 2022. During this transition and throughout 2022, priority was given to safety inspections, Executive Safety Committee meetings, processing incident and near-miss reports, implementing corrective actions, and creating a data collection system to maintain safety performance data. The results of these efforts are summarized in this report along with relevant safety performance metrics for calendar year 2022. It is important to note that a further difficulty was the Pandemic, spanning from March of 2020 through most of 2022, followed by the post-Pandemic return to work. During most of this time, SO operations in labs and on site were maintained while the balance of employees were working remotely. All efforts were made to accomplish this in as safe a mode as possible. Documentation from this period was developed by several lead sources within SO and submitted institutionally. Combined with the transition and re-organizing of the Steward Safety Program, operations were prioritized over the annual report.



# 2022 Annual Safety Report

## Introduction and Overview

2022 was an active year for safety in Steward Observatory. Highlights of the program included:

- **Incident/near-miss reporting and documentation increased** because of efforts made by the ESC to promote reporting, actively request documented reports, and to follow-up on those reports with supervisors. While previous years reports were not counted or tracked in the annual report, the 25 reports processed in 2022 are recognized as a notable increase over previous years.
- **The Executive Safety Committee reviewed and closed 25 safety incidents and near-miss reports**, implementing training, communications, and programmatic changes in response to data trends.
- **Safety inspections were resumed at all sites post-COVID**, completing 22 out of 28 planned inspections for the year.
- **An online SMS Administration Database was implemented** to collect and document safety data and information in the SMS, linking incidents, inspections, Executive Safety Committee meeting minutes, site point of contacts, annual reports, and corrective actions/task lists for the ESC.
- **David Carroll, LBTO Health, Safety, and Environment (HSE) Manager/Engineer, joined Steward in 2022** in part-time capacity to assist with Dale Webb's duties and provide technical consultation to Steward.
- **Mark Buglewicz, Associate Director of Steward Observatory, continues to successfully lead** the safety function at Steward, serving as the administrative and leadership representative with a direct line to the Director, Dr. Buell Jannuzi.
- **Special thanks to Dr. Chad Bender, member of the ESC, as well as faculty liaison for facilities and safety.** Dr. Bender has been instrumental in supporting the program, especially during the Pandemic, and currently with review and assessment of Steward labs.
- **Karen Kenagy, Program Manager, RFCML**, whose continued leadership and participation in the program, as well as historian and counselor have been invaluable during the transition between Dale's retirement and David's new role.
- **With a return and substantial increase to activities and more facilities, a full-time safety position for Steward Observatory was deemed justified. An Environmental, Health, and Safety Professional position was created** and submitted to the University in calendar Q3/4 2022, with hiring to start in Q1/2 2023.
- **Kelly Baker, MGIO Emergency Response Coordinator and Trainer** joined MGIO and Steward in June 2022, bringing many years of experience in emergency response and paramedicine to the site and to the Executive Safety Committee.
- **Rick Hansen, LBTO HSE Specialist**, transitioned from Associate Manager and Principal Technician at LBTO to his new role in November 2022, bringing years of experience with crane and rigging, machine shop fabrication, material handling, and hands-on knowledge and application of OSHA regulations to the Observatory.
- **Wade Boltinghouse, UAPD Officer**, joined the Executive Safety Committee in late 2022/early 2023. Officer Boltinghouse has been stationed at Mt. Graham since the inception of the site and brings years of experience as an officer and leader in his field.
- **Our partnership with the institutional departments of Risk Management Services (RMS) and Research Laboratory and Safety Services (RLSS) has grown as is evidenced by integration of multiple additional Steward Observatory (SO) locations into the RLSS Dashboard** for Respiratory Protection compliance and laboratory registration. This system has been used historically for radiation and laser safety compliance.





# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

This past year, in partnership with RLSS/RMS, SO has expanded its utilization for additional SO sites to help better ensure respiratory protection, SDS management, and lab safety compliance. The partnership has potential to include integration of the SO site safety inspection checklist into the RLSS dashboard for audit and corrective action tracking.

- **Our first hybrid in-person and remote hybrid Observatory-Wide Safety Committee Meeting** was held with experts presenting on topics derived from and relevant to our safety incident and near-miss report data.

## 2022 Objectives and Targets

In 2022, the main objectives and targets for Steward Observatory Safety were:

1. Transition of the duties and responsibilities of Dale Webb to David Carroll.
2. To resume site safety inspections post-COVID.
3. To implement an SMS administration database to sustain safety data through future years.
4. To develop and communicate safety information and training to the Observatory that is relevant to trends in safety performance metrics (i.e., incident and near-miss data).

## Key Performance Indicators (KPIs)

### Summary of KPI Data

The following is a summary of the data from the sections below:

	Target	Actual
<b>OSHA Recordable Injuries</b>	0	3
<b>OSHA TRIR</b>	<1	0.83
<b>Incident/Near Miss Reports</b>	NA	25
<b>Inspections Performed</b>	28	22
<b>Inspection Findings &amp; Recommendations</b>	NA	446
<b>Inspection Findings, High Priority</b>	0	44
<b>Executive Safety Committee Meetings</b>	12	13
<b>ESC Average Attendance</b>	75%	66%
<b>Obs.-Wide Safety Committee Meetings</b>	2	1
<b>Safety Communications (Notes)</b>	TBD	6
<b>Safety Training</b>	TBD	TBD



# 2022 Annual Safety Report

## OSHA Total Recordable Incident Rate (TRIR)

Steward Observatory will begin using the OSHA Total Recordable Incident Rate (TRIR) to track injuries. The TRIR is a normalized metric that compares OSHA recordable incidents per one hundred full-time workers during a calendar year. This metric is used to compare safety performance across industries. The TRIR is defined as:

$$\text{TRIR} = (\text{Total \# Recordable Cases} \times 200,000) / (\text{\# of Hours Worked by all Employees})$$

SO Total OSHA Recordable Injuries & Illnesses (2022) <sup>1</sup>	SO Hours Worked 2022 Calendar Year <sup>1</sup>	SO TRIR (2022) <sup>1</sup>	UA TRIR (2022)	US Total TRIR (2021) <sup>2</sup>	Average TRIR of Relevant Selected Industries <sup>3</sup>
<b>3</b>	<b>720,598</b>	<b>0.83</b>	<b>0.86</b>	<b>2.9</b>	<b>1.79</b>

<sup>1</sup>An OSHA-recordable injury or illness is any incident in the workplace resulting in any of the following:

- Medical treatment beyond first aid
- Days away from work
- Restricted work activity or job transfer
- Death or loss of consciousness

The total OSHA recordable number, hours worked, and TRIR were calculated using data combined from the following departments, which fall under the reporting jurisdiction of the Steward Observatory Safety Committee:

- Steward Observatory 0404
- Astronomy 0422
- MMT 0438
- LBTO 0463

<sup>2</sup>The US total TRIR is the incidence rate of nonfatal occupational injuries and illnesses from all US industries including private, state and local governments retrieved from the Bureau of Labor Statistics website: <https://www.bls.gov/iif/nonfatal-injuries-and-illnesses-tables/table-1-injury-and-illness-rates-by-industry-2021-national.htm>.

<sup>3</sup>Average TRIR of relevant selected industries is based on a sample set selected to represent the multitude of SO operations. The sample set and data are taken from the US Bureau of Labor Statistics "Injuries, Illnesses, and Fatalities" database for 2021 (<https://www.bls.gov/iif/nonfatal-injuries-and-illnesses-tables/table-1-injury-and-illness-rates-by-industry-2021-national.htm>):

Industry	NAICS code	TRIR
Colleges, Universities, and Professional Schools	6113	1.4
Scientific Research and Development Services	5417	0.7
Office Administrative Services	5611	0.8
Facilities Support Services	5612	3.8
Services to Buildings and Dwellings	5617	2.8
Commercial and Industrial Machinery and Equipment Repair and Maintenance	8113	2.1
Computer and Electronic Product Manufacturing	334	0.9
Optical Instrument and Lens Manufacturing	333314	1.2
Scenic and Sightseeing Transportation	4871	2.4



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

Please note that in past years total OSHA recordable cases reported in the Annual Report were for Steward Observatory and LBTO (combined) only and may not have included data from the MMT or Astronomy departments. As stated above, the TRIR was not calculated prior to this year.

For more information on OSHA recordable and incidence rates, see the OSHA document titled "[Forms for Recording Work-Related Injuries and Illnesses.](#)"

## Incident Reporting

In 2022, the number of reported incidents to the ESC increased significantly to a total of 25. Below is a breakdown of the incident report type with additional information on the incident characterization or mechanism of injury:

2022 Steward Incident Reports		Incident Characterization or Mechanism						
Incident Type	Total	Vehicle	Altitude	Slip/ Trip/ Fall	Sprain/ Strain	Contusion	Cut/ Puncture	Equipment Emergency
Injury	9	1		3	3	1	1	
Medical	6		6					
Incident w/Damage	5	4						1
Near-Miss Incident	5	2		1				2
<b>Total</b>	<b>25</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>

**Three Recordable Injuries:** As noted above in the OSHA rate section, there were 3 OSHA recordable injuries which includes a slip/trip/fall resulting in bruising/abrasion, an ergonomic knee twist resulting in a sprain/strain, and a vehicle crash resulting in a neck injury.

**Trends in Data:** Vehicle, Altitude Health & Safety, and Slips/Trips/Falls were identified as common trends mid-way through 2022. In response, the ESC retained Dr. Chris Williams, MGIO Medical Director, Kelly Baker, MGIO Emergency Response Coordinator, and Art Wood, ADOSH professional, to develop and deliver training on each of these topics at the September 2022 Steward Safety Committee meeting held in-person and via zoom. These presentations were recorded and saved to the Steward Safety web page and their links communicated to all Steward staff via email following the event. Additionally, safety communication emails and potty posters were developed and distributed to all staff and sites.

**Reporting to Risk Management was emphasized in 2022,** and it was ensured that each report submitted to the ESC also had an RMS report submitted, when applicable. This was verified both in the SMS spreadsheet and by requiring the RMS incident number to be included on the SO incident report.

**The incident report template was revised in 2022** to include additional fields and instruction, to protect employee privacy, to link to risk management reports, and to shorten the length of the form.



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

## Site Safety Inspections, Findings, and Corrective Actions

### 2022 Safety Inspections of Steward Observatory Safety Committee Sites

Inspection Location	First Inspection Findings				Second Inspection Findings			
	HP	MP	SP	RA	HP	MP	SP	RA
Bldg. 65 & Campus Telescope		2	21	4			19	
Mirror Lab	2	1	1	5	1	1	13	8
OSC Optics Shop	3	6	17	4	Not completed			
ITL			5				3	6
Sunnyside	1	7	11	10	Not completed			
ETS Tech Park		2	11		Not completed			
Mt. Graham VATT		4	11		1		1	
Mt. Graham SMT	1	1	5		1		2	
Mt. Graham MGIO		2	7			1	3	
Mt. Graham LBTO			12			1	1	
Mt. Lemmon & Bigelow	4	17	45	15				0
Mt. Hopkins MMT	Not completed				15	16	12	18
Kitt Peak 90"	9	10	17	17				0
Kitt Peak 12 Meter ARO	6	7	13	7	Not completed			
<b>TOTAL FINDINGS (=446)</b>	<b>26</b>	<b>59</b>	<b>176</b>	<b>62</b>	<b>18</b>	<b>19</b>	<b>54</b>	<b>32</b>

13/14 Inspections Performed this Period

9/14 Inspections Performed this Period

"High" & "Medium" Priority Findings by EHS Type											
FP	EM	IH	COHE	EL	CS	MH	MG	FS	PPE	G	ST
	2										
1		4									
1	1	4		1			1				1
	1	2	2		1	1					1
	1			1							
1	2		1	1							
			2					1			
	2	1									
	1										
9	3	1	1	2	1	2	1	1			
11	4	4	3	2	2	1	1		2	1	
11	1		2	2		1	1	1			
6	2	1	3		1						
<b>40</b>	<b>20</b>	<b>17</b>	<b>14</b>	<b>9</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>

#### Prioritization Key

Inspection findings have been categorized into four qualitative priority levels:

- 1) *HP = High Priority: Compliance issues with potential for fatalities or serious injury or harm.*
- 2) *MP = Medium Priority: Compliance issues with significant potential for injury or harm.*
- 3) *SP = Standard Priority: Standard compliance issues with lower potential of injury or harm.*
- 4) *RA = Recommended Actions: Recommendations to improve the performance of the safety management system (SMS)*

#### EHS Type Key:

FP	Fall Protection, Walking Working Surfaces, Ladders	MH	Material Handling (Cranes, hoists, lifts, fork trucks, etc.)
EM	Emergency Management & Response	MG	Machine Guarding
IH	Industrial Hygiene	FS	Fire Safety
COHE	Control of Hazardous Energy & Lockout/Tagout	PPE	Personal Protective Equipment (non IH-related)
EL	Electrical Safety	G	General
CS	Confined Space	ST	Structural





# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

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Key takeaways from 2022 Inspections:

1. **446 findings and recommendations** were identified in 2022 during 22 inspections completed of 28 planned.
2. **Fall hazards and fall protection compliance** gaps top the list of high and medium priority findings across all sites, particularly mountain and telescope sites. Numerous unguarded fall hazards were noted at multiple sites with the potential to result in fatalities or severe injury, regardless of likelihood.
3. **Emergency management procedures, plans, and protocols need to be developed** for each site, and training, communication, and posting of information/plans in employee work areas is essential.
4. **Industrial hygiene related to chemical exposure hazards** at multiple sites requires attention. Exposure assessments and controls need to be established, documented, and integrated into site operations, particularly related to inhalation controls such as ventilation systems and respiratory protection compliance.
5. **Control of hazardous energy, particularly related to the control of remotely operated equipment that could pin, strike, or crush personnel (telescope, enclosures, instruments, etc.)** as well as subsystems serving telescopes require lockout/tag out (LOTO) procedures, training, and oversight/enforcement. In some cases, LOTO is not being fully or properly utilized for motion control and must be implemented immediately.
6. **Electrical safety, confined space, material handling, and machine guarding issues** were also noted, particularly related to legacy equipment that requires modification or further evaluation to ensure safe access or operation.
7. **The inspection rate dropped** from 93% when coordinated by the HSE Manager/Engineer to 64% when delegated to the ESC members. Hiring a full-time safety professional will help ensure that inspections are completed as planned twice per year. Further, a shared-model approach and partnership can be further developed by the new safety coordinator to continue the involvement of the ESC or possibly the Building and Site Overseer currently being recruited.
8. **A corrective action tracking system would be beneficial to the program.** The 2022 implementation of an SMS database is a start; however, all corrective actions, inspection, incidents, meetings, and other SMS performance data are being tracked in Excel spreadsheets, which is time consuming and cumbersome for an organization of this complexity and size. Currently, there is no way to assign, update, close, and track completion of correction actions besides manual person-to-person meetings/reviews.

Screenshot from Corrective Action Required (CAR) Tracking Spreadsheet is included in Appendix A.

## Executive Safety Committee & Observatory-Wide Safety Committee Meetings

The Executive Safety Committee (ESC) met 13 times with an average attendance of 67% in 2022. Meetings were held monthly, and at times twice monthly, to process incident reports and related corrective actions. Many corrective actions, communications, manual changes, recommendations, and improvements were made because of the committee's time and efforts, including those highlighted in the next section "Safety Management System (SMS) Changes." The ESC used safety incident and near-miss report data to drive topic and content development in 2022. This resulted in relevant messaging, training, recommendations, and corrective actions that focused on the types of incidents and near-miss incidents that were occurring throughout the year. This included slips, trips,



# 2022 Annual Safety Report

and falls, altitude health and safety, and vehicle travel on mountain and winter roads, which were the primary themes of 2022.

## 2022 Observatory-Wide Safety Committee Meeting

The 2022 Observatory-Wide Safety Committee Meeting was held in October 2022, and was hosted in a flex-hybrid format (in person and on zoom). Presentations on slips, trips, and falls, altitude health and safety, and mountain and winter driving were given by Claud Wood, ADOSH, Dr. Chris Williams, Banner University, and Kelly Baker, MGIO Emergency Coordinator, respectively. The meeting was a success, and all three presentations were recorded, sent observatory-wide, and have been uploaded to the [Steward Safety site](#) for future reference. The videos, as well as PDFs of presentations, can be found here:

- [Altitude, Health & Safety - Dr. Chris Williams](#) | [PDF](#)
- [Mountain and Winter Driving - Kelly Baker](#) | [PDF](#)
- [Preventing Slips, Trips and Falls - Claud Wood](#) | [PDF](#)

The flex in-person/hybrid model will likely be used in the future to promote wider attendance and ensure recording for future viewing is possible.

## Safety Management System (SMS) Changes

The Safety Management System (SMS) is a term used to define the safety requirements, processes, procedures, tools, assets, and records that are utilized by the organization to execute safety management. Some examples include the safety manual, safety staff and committees, audit and inspections, incident reports, training, communications, and equipment.

The following are highlights of improvements made to the safety management system (SMS) in 2022:

1. **Incident and near-miss report template revised ([link](#)):** The template now includes better protections for employee privacy, a box for the Risk Management Services (RMS) Incident Report number to ensure better RMS reporting, clearer designations of incident type (injury, medical, incident with damage, near-miss), instructions to distinguish immediate vs. long-term corrective actions, and a shortened format.
2. **Revised Safety Manual Ch. 526 "Flammable and Combustible Liquids"** to include requirement for self-closing doors on flammable cabinets and to specify the quantity and flash point of materials that are required to be in flammable storage cabinets. This was updated in coordination with RMS and RLSS.
3. **Addition of links to Steward Safety website** for 2022 Safety Notes (email communications) and videos of recent presentations from the 2022 safety committee meeting:

[Safety Note #1: Overhead Hazards and Head Protection](#)  
[Safety Note #2: Digging/Trenching & Underground Service Lines](#)  
[Safety Note #3: It's a Dry Heat - Heat Stress](#)  
[Safety Note #4: Monsoon Safety](#)  
[Safety Note #5: High Altitude Health Safety Information](#)  
[Safety Note #6: What Happened?](#)

4. **Increased the safety footwear reimbursement** amount from \$100 to \$120 per pair and revised Ch. 406 of the Safety Manual to reflect this. This was in response to employee concerns about the increased cost of footwear and was verified with market research.



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

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5. **Created an AED inventory matrix** and verified monthly inspection and reporting of units to RMS. Communicated and documented reporting form and instructions.
6. **Submitted an AED needs risk assessment to Steward Management and RMS** for approval of purchase of new units. Units have been since bought by Steward and in some cases under cost-sharing with RMS, including for Bldg. 65 Level 1, ETS Tech Park, SMT, Vatican, Sunnyside, Bigelow, and Kitt Peak 12 meter.
7. **ESC incident review process** was developed and incorporated into the agenda. This helps to ensure incident reports are reviewed and processed correctly and follow-up corrective actions are completed.
8. **Created a SMS administration file and online database for all Steward ESC assets** including ESC meeting minutes, incident reports, inspection schedules and reports, inspection findings, site contacts, and pending changes to the SMS and Steward Safety Manual. This file is managed by the safety coordinator (currently David Carroll), accessible to all ESC members, and updated as often as needed. Additionally, all inspection reports, incident reports, meeting minutes, and reference files and materials are stored on the shared drive and linked via the SMS admin file, as appropriate. Screenshots of the SMS Admin file are included in Appendix A, and the file can be found at this link: [SMS Admin File](#)
9. **Inspection report format was revised** to distinguish required corrective actions from recommendations. Additionally, a priority scheme was applied, and a corrective action database was created.
10. **Six (6) safety notices were communicated to the Observatory** with postings (potty posters) on the topics of overhead hazards and head protection, digging/trenching and underground service lines, heat stress, monsoon safety, high altitude health and safety, incident reporting, and mountain and winter driving. These can be found on the Steward Safety home page.
11. **Registered 3 sites into the RLSS Dashboard, bringing the total to 4.** This site is used for lab, chemical, and radiation safety and helps ensure compliance with the UA Laboratory Chemical Hygiene Plan, Respiratory Protection Program, and Hazard Communication Program.
12. **The Kitt Peak 90" telescope installed and implemented a fall restraint system for the roof** to reduce the risk of potentially fatal falls from the roof when accessing for maintenance or snow clearing.
13. **Sunnyside coating facility designed and implemented a stand inside the coating chamber for safer access.**
14. **Building 65 Deferred Maintenance Project completed in 2022** including replacement / upgrade of sprinkler system, replacement / upgrade of the fire alarm system, and the addition of fire system message boards.
15. **Development of a 10-year Deferred Maintenance Plan** for the Catalina site with UArizona Facilities Management (FM).
16. **Created Altitude Health Notification** for individuals / visitors / groups, as well as for vendors.
17. **MGIO installation of Fire / Emergency system in the Utility Building** at the summit of Mt. Graham.
18. **MGIO purchased a drive-on snow trax** for use at the Mt. Graham summit by LBTO staff for emergency egress. Pending is the installation of an out-structure to shelter the snow trax and emergency vehicle during winter months.
19. **MGIO implemented the following emergency equipment/training:** installed stop the bleed kits, standardized oxygen masks and brought O2 tanks into compliance, acquired an evacuation stair chair, implemented winter weather vehicle recovery kits, and provided in-person training on all.
20. **LBTO highlights include the following:** Hired, onboarded, and integrated Rick Hansen as HSE Specialist, released the LBTO Health, Safety, and Environment (HSE) online Manual



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

---

<https://wiki.lbto.org/Safety/LBTOSafetyManual>, released M004s00490 Electrical Safety Program compliant to NFPA 70E, revised M004s00306 Minimum Staffing for Emergencies Procedure to prevent opening of telescope if minimum staffing criteria is not met, completed risk assessments for SHARK-NIR, VIS, and iLocator next-generation instrument projects, implemented a hazard/risk registry for the LBTO, drafted a safety design standard for LBTO (in process), implemented a monthly job/task/time tracker for the new HSE Specialist position including prioritized IT list based on risk assessments, increased safety footwear reimbursement from \$150 to \$200 to reflect market changes, change to PPE requirements to require safety footwear in all areas of the Observatory outside of office/dorm areas, completed industrial hygiene noise surveys for utility building and level 4 and chemical assessment for aluminizing, installed drive-on snow trax kits on LBTO vehicles for emergency egress during a winter storm, ensured liquid nitrogen transfer hose hardware had over pressure relief valves and re-oriented to prevent damage in the event of tip over, installed an ANSI/OSHA compliant lockout and emergency stop system for SHARK-NIR instrument rotation on the telescope, and began changes to instrument fills hardware configuration to prevent liquid nitrogen exposure.

## Training

Steward Observatory utilizes the following online training systems:

- Steward Observatory online training site: <https://safety.as.arizona.edu/site/login.php>
- EDGE online training, via University of Arizona: <https://uaccess.arizona.edu/>

Performance numbers and course completions are not easily pulled from the Steward online system and are not included in this report. Further, while most of the basic training videos are still applicable, content is dated at this point. Refreshing the system has been investigated by the ESC. However, with the currently available systems available on the market, and UArizona's EDGE, the practicality and cost of supporting a Steward training catalogue may not make sense. A charge of the new Environmental Health and Safety Professional will be to review and present recommendations on this subject. The UArizona EDGE system offers training in vehicle safety, and chemical hazard communication. Initial communications with the EDGE team have been made as to whether Steward specific training might be hosted. This effort will continue.

LBTO utilizes HSI online training learning management system (LMS) to deliver online training and record and track in-person training (in addition to the few courses offered in EDGE). Below is a summary:

- HSI Online LMS: <https://otis.osmanager4.com/LBTObservatory>
- 406 in-person and online training courses were completed in 2022 by 60 staff and visitors.
- Online Courses include Arc Flash and Electrical Safety, Behavior-Based Safety, Bloodborne Pathogens, First Aid, CPR, Chemical Safety, Cold Stress, Cold, Flu, and Transmissible Disease, Compressed Gas Safety, Distracted Driving, Driver Safety, Dropped and Fallen Objects, Electrical Safety: General, Emergency and Fire Preparedness, Employee Safety Orientation, Eye Safety, Eyewash and Safety Showers, Fatigue and Stress Awareness, Fire Extinguisher Safety, Flammable Liquid Safety, Hand and Power Tool Safety, Hand Safety, Hazard Communication, Hot Work, Incident Investigation, Indoor Air Quality, Industrial Ergonomics, Hexavalent Chromium, Loading Dock Safety, Pallet Jack Safety, Personal Safety Overview, Safe Material Storage, Site Security, Job Safety Analysis, Ladder Safety, Liquid Nitrogen Safety, Lockout Tagout for Authorized User, Machine Guarding, Mobile Elevated Work Platforms, Office Ergonomics,



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

---

Overhead and Gantry Cranes, Pandemics: Slowing the spread, Personal Fall Arrest Systems, Personal Protective Equipment, Powered Industrial Trucks, Radio Communications, Resilience and Stress Management, Scaffold Safety, Slips, Trips & Falls, Winter Weather Driving, Workforce Hazard Recognition, Workplace Signs, Labels, and Tags, and Workspace Cleanliness.

- In-Person Training included: Arc Flash/NFPA 70E, Boom Lift, Fall Protection Authorized User and Competent Person, Forklift, Scissor Lift, Site Safety Orientation with Lockout/Tagout, and Train-the-trainer for aerial lifts and forklifts.

The MGIO Emergency Response Coordinator trained MGIO, LBTO, SMT, and VATT staff on medical oxygen, emergency stair chair, and stop the bleed kits.

## 2023 Objectives and Targets

1. **Safety Coordinator:** Hire, onboard, and integrate a full-time safety coordinator for the Observatory.
2. **High Risk CARs:** For each site, mitigate two (2) or more high-risk (red) corrective action required (CAR) items from the 2022 inspection reports down to medium (yellow) or low-standard (green) risk for each site.
3. **OSHA Rate:** Reduce the OSHA TRIR rate to 0.75.
4. Emergency Preparedness & Response, including collecting site plans and ensuring the UArizona template has been completed by all.
5. Training
6. **Register all sites with current usage of respiratory protection** into the RLSS dashboard and bring them to compliance with the Respiratory Protection Program (RPP).

## Recommendations for Improvements

1. Consider a safety management system software package to track and manage hazards, risks, incidents, audits and inspections, corrective actions, training, and management of change. Currently, the process is manual using a spreadsheet and database.
2. Implement a safety training plan and the resources and materials to support it.



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

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Prepared by:

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Steward Safety

*Karen Sue Kenagy*

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Program Manager

Approvers:

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**Mark Buglewicz**  
Associate Director, Steward Observatory  
Head of Business Services, Astronomy





# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

## Appendix A: Screenshots of the SMS Administration File and CAR Spreadsheets:

### SOESC Meetings

#### Meeting Date      Agenda/Minutes

- 1/31/2022 <https://docs.google.com/document/d/1EC-tmjsj-fwmv8H8z1AXL1JxAAKoXnmR/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true>
- 2/28/2022 <https://docs.google.com/document/d/1XkrQdCxOyjlx82jLW9afIm64s1xUjMSI/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true>
- 3/28/2022 <https://docs.google.com/document/d/1wxr1cMxIkWONh16cTCEoJ56S7ZWFImcx/edit>
- 5/18/2022 <https://docs.google.com/document/d/1rz4PCGiPmnoCUd3LF7NGAVLDSPqjZSCe/edit>
- 6/2/2022 [https://docs.google.com/document/d/1\\_Rm-NOh2lGH4T1JRy9ze0gQDsvYZtC3f/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true](https://docs.google.com/document/d/1_Rm-NOh2lGH4T1JRy9ze0gQDsvYZtC3f/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true)
- 6/16/2022 [https://docs.google.com/document/d/1shwSMlglu3mTnGswtUtX2LDZCeraM\\_c/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true](https://docs.google.com/document/d/1shwSMlglu3mTnGswtUtX2LDZCeraM_c/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true)
- 6/30/2022 <https://docs.google.com/document/d/11WS1vkvSeJTCFCKUtaikFeiFvW1g-HI/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true>
- 7/14/2022 <https://docs.google.com/document/d/1GZvpppFUKtHcmnsslZJ55HzYxben9ReE/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true>
- 8/25/2022 <https://docs.google.com/document/d/1vUL4unmQzyvt05ZV2UC2v3YJT3NjHxjO/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true>
- 9/8/2022 <https://docs.google.com/document/d/1RJI0gS3xPVMKyR1oOgSolQqOqN1DHDDeM/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true>
- 9/22/2022 <https://docs.google.com/document/d/1ue1Oe8jFvZVuyIJ4W3iJRt-M9V6xa3O/edit?usp=sharing&oid=111597041398900635062&rtpof=true&sd=true>
- 10/20/2022 <https://docs.google.com/document/d/1g7KtIsYMj3heJCPbcVaTDdn0P7jhOEOo/edit>
- 12/1/2022 [https://docs.google.com/document/d/1quiZ1-Nnu-YXwVWuXBH9srRWskO6cH5F/edit?usp=share\\_link&oid=111597041398900635062&rtpof=true&sd=true](https://docs.google.com/document/d/1quiZ1-Nnu-YXwVWuXBH9srRWskO6cH5F/edit?usp=share_link&oid=111597041398900635062&rtpof=true&sd=true)
- 2/2/2023 [https://docs.google.com/document/d/1FSELS9ONXZYRE5G48hzAwZ0u0\\_g1l8Ve/edit?usp=share\\_link&oid=111597041398900635062&rtpof=true&sd=true](https://docs.google.com/document/d/1FSELS9ONXZYRE5G48hzAwZ0u0_g1l8Ve/edit?usp=share_link&oid=111597041398900635062&rtpof=true&sd=true)
- 5/11/2023 <https://docs.google.com/document/d/1tUafiliN6K-Q3Hh1wKH8K0IYvU6pxJFa/edit>
- 6/15/2023 [https://docs.google.com/document/d/1-6qZxaPIlgSqsqzUWfItAecSw-TNvM2x/edit?usp=drive\\_link&oid=111597041398900635062&rtpof=true&sd=true](https://docs.google.com/document/d/1-6qZxaPIlgSqsqzUWfItAecSw-TNvM2x/edit?usp=drive_link&oid=111597041398900635062&rtpof=true&sd=true)

### Attendance:

SOESC Members	1/31/22	2/28/22	3/28/22	5/18/22	6/2/22	6/16/22	6/30/22	7/14/22	8/25/22	9/8/22	9/22/22	10/20/22	12/1/22
Kerry Gonzales	x			x	x	x	x	x	x		x	x	
Paul Smith	x	x	x	x	x	x		x	x		x	x	x
Karen Kenagey	x	x		x	x	x	x		x	x	x		x
Mark Buglewicz	x	x	x	x	x	x	x	x	x	x	x	x	x
Eric Buckley	x	x	x	x		x	x	x	x				x
David Carroll	x	x	x	x	x	x	x	x	x	x	x	x	x
Alan Strauss			x	x	x	x	x	x		x		x	x
Chad Bender	x	x	x					x	x		x		x
Gabe Coronado		x	x		x	x	x						x
Cory Knop		x				x		x					x
Sean Keel		x	x				x						
Kelly Baker						x	x	x	x	x	x	x	x
Attendance %	58.33%	75.00%	66.67%	58.33%	58.33%	83.33%	75.00%	75.00%	66.67%	41.67%	58.33%	50.00%	90.91%

### Shared role

Monthly Meeting Administrative MaB / Technical DC --- both inform agenda



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

Incidents													
10/2/2022	Closed	Medical	Altitude	LBTO picnic altitude oxygen use incident	LBTO	Pat Hartley	NA	10/24/2022	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	11/30/2022	12/1/2022	Altitude Health Cont	3/29/2023
7/5/2022	Closed	Medical	Altitude	Medical/Altitude health incident with LBTO Visitor	Mt. Graham	Pat Hartley	None	7/13/2022	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	7/13/2022	7/14/2022	Altitude Health Cont	3/29/2023
4/29/2022	Closed	Medical	Altitude	Medical/Altitude Incident at Mt. Lemmon Sky School	Mt. Lemmon	Alan Strauss	None	6/16/2022	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	6/16/2022	6/16/2022	Altitude Health Cont	3/29/2023
4/26/2022	Closed	Medical	Altitude	Medical/Altitude incident LBTO Contractor	Mt. Graham	James Riedl	None	5/16/2022	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	5/16/2022	5/18/2022	Altitude Health Cont	3/29/2023
4/11/2022	Closed	Medical	Altitude	Medical/Altitude Incident with brief loss of consciousness LBTO Contractor	Mt. Graham	Pat Hartley	INC22-000003071	5/16/2022	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	5/16/2022	5/18/2022	Altitude Health Cont	3/29/2023
4/18/2022	Closed	Medical	Altitude	Medical/Altitude and panic attack incident with UA/FM Vendor	Kitt Peak	Joe Branaum	INC22-000003003	5/16/2022	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	5/16/2022	5/18/2022	Altitude Health Cont	3/29/2023
2/18/2022	Closed	Injury	Contusion	Head bump on bottom corner of receiver frame; 1/2" cut	12m Radio Tower	David Forbes/Alyson Ford	INC22-000002847	2/23/2022	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	2/23/2022	2/28/2022	Lessons learned email	3/29/2023
8/5/2022	Closed	Injury	Cut/puncture	Employee cut to finger	Sunnyside	Gary Rosenbaum	INC22-000003290	9/22/2022	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	9/22/2022	9/8/2022	None	3/29/2023



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

## Inspections

Inspection Location	GDrive	Target Months		2022	2022	2023	2023
		Spring	Fall	Spring	Fall	Spring	Fall
Steward Observatory Building 65	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Mar	Oct	March 23	Pending		
Campus Telescope	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Mar	Oct	March 23	Pending		
Mirror Lab	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Mar	Oct	April 19 and June 8	No Reply		
OSC Optics Shop	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Mar	Oct	Mar. 23&31	No Reply		
ITL (Imaging Technology Laboratory)	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Mar	Oct	March 18	MOVING		
Sunnyside	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Mar	Oct	March 25	No Reply		
ETS Tech Park	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Mar	Oct	March 18	No Reply		
Mt. Graham VATT	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Apr	Sep	April 11	Nov. 15		
Mt. Graham SMT	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Apr	Sep	April 11	Nov. 15		
Mt. Graham MGIO	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Apr	Sep	April 11	Nov. 15		
Mt. Graham LBTO	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Apr	Sep	April 11/12	Nov. 15		
Mt. Lemmon	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Apr	Sep	Apr. 27 & May 19	1/10/2023		
Mt. Bigelow	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Apr	Sep	Apr. 27 & May 19	1/10/2023		
Mt. Hopkins/MMT	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Apr	Sep	Did not Occur	12/16&1/26		
Kitt Peak 90"	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Apr	Sep	April 14&20	1/17/2022		
Kitt Peak 12 Meter ARO	<a href="https://drive.google.com/...">https://drive.google.com/...</a>	Apr	Sep	April 20	FIRE		

### Blank Inspection Checklist

<https://www.as.arizona.edu/sites/default/files/Safety/Safety%20Inspection%20Checklist.pdf>

### Past Inspection Reports

<https://drive.google.com/drive/folders/1bodd37luVvVrji7AAWPh9LQxVEQXBpuM?usp=sharing>



# 2022 Annual Safety Report

Environment, Health,  
& Safety Manual

Status	Closed Date	Inspection Date	Priority	EHS Category	Finding/Recommendation
Open		3/25/2022	3-HP	MH	Standing under a live crane load prohibited. Complete a work stand or administrative
Open		3/25/2022	2-MP	COHE	Need adaptors for electrical panel LOTO
Open		3/25/2022	2-MP	COHE	LOTO Argon (asphyxiant), Oxygen (oxidizer), and electrical before working inside
Open		3/25/2022	2-MP	CS	Document confined space entry procedure for entering the chamber with help of
Open		3/25/2022	2-MP	EM	Test/verify the emergency action plan with 911/UAPD dispatch to ensure dispatch is
Open		3/25/2022	2-MP	G	Install/verify use of OSHA pressure compliant air gun nozzles on compressed air guns to
Open		3/25/2022	2-MP	IH	Employee respirator training and fit tests expired.
Open		3/25/2022	1-SP	EM	AED and cabinet needed for site. Note: Executive Safety Committee is looking to secure
Open		3/25/2022	1-SP	EM	Perform flush and inspection of safety shower/eyewash and ensure inspection tag
Open		3/25/2022	1-SP	FS	Flammable cabinets require self-closing doors.
Open		3/25/2022	1-SP	G	Cap compressed gas cylinders when not in use to prevent damage/release from
Open		3/25/2022	1-SP	G	Head bump hazard on LBTO thin shell lifting fixture. Guard and mark (i.e. foam,
Open		3/25/2022	1-SP	HC	Update safety data sheets (SDSs) for chemicals.
Open		3/25/2022	1-SP	HW	Ensure hazardous waste storage is in accordance with Risk Management requirements
Open		3/25/2022	1-SP	IH	Respirators with chemical cartridge filters were observed not to have start date marked

**Prioritization Key**

Inspection findings have been categorized into four qualitative priority levels:

- 1) *HP = High Priority: Compliance issues with potential for fatalities or serious injury or harm.*
- 2) *MP = Medium Priority: Compliance issues with significant potential for injury or harm.*
- 3) *SP = Standard Priority: Standard compliance issues with lower potential of injury or harm.*
- 4) *RA = Recommended Actions: Recommendations to improve the performance of the safety management system (SMS)*

**EHS Type Key:**

<i>FP</i>	<i>Fall Protection, Walking Working Surfaces, Ladders</i>	<i>MH</i>	<i>Material Handling (Cranes, hoists, lifts, fork trucks, etc.)</i>
<i>EM</i>	<i>Emergency Management &amp; Response</i>	<i>MG</i>	<i>Machine Guarding</i>
<i>IH</i>	<i>Industrial Hygiene</i>	<i>FS</i>	<i>Fire Safety</i>
<i>COHE</i>	<i>Control of Hazardous Energy &amp; Lockout/Tagout</i>	<i>PPE</i>	<i>Personal Protective Equipment (non IH-related)</i>
<i>EL</i>	<i>Electrical Safety</i>	<i>G</i>	<i>General</i>
<i>CS</i>	<i>Confined Space</i>	<i>ST</i>	<i>Structural</i>