

THE STEWARD OBSERVATORY ANNUAL SAFETY REPORT

2014



The Executive Safety Committee members knew 2014 would be a good year for Safety at Steward Observatory. At our December 2013 meeting, Jeff Kingsley asked each of the members to submit a "Christmas List for Safety". A few of the actions taken as a result of those listed items were:

- A full time building monitor was hired for the Steward Observatory building
- "Safety" was added to the agenda for most Director meetings
- Electrical and Mechanical Engineers were appointed to the Safety Committee to handle safety concerns or problems as a priority
- A major survey of all Steward employee's was completed to identify their safety concerns

Our first Trimester meeting was held on March 25, 2014, which turned out to be an interesting and well attended meeting. The meeting was designed to be of major interest to all personnel who work at an Observatory site. In addition to regular Steward employees, we invited employees from other observatories as well. Our guest speakers were:

- **Dr. Philip Krider** from Atmospheric Sciences, talked on the subject of Lightning, Thunderstorms and Astronomical Observatories.
- **Brenda Granillo**, talked on the subject of Emergency Preparedness.
- **John Roads**, former Mount Lemmon Fire Chief, talked on the subject of Why America is Burning.

2014 was a very good year in the area of Safety Improvements. Some of those improvements were:

1. Due to a multi-year effort by Jeff Kingsley, Buell Jannuzi, U of A Vice President, Carol Garcia and the Safety Committee, we now have a fire warning system in the historic Raymond E. White, Jr. 21" telescope here on campus.
2. New handrails and step markings were installed at the entrance to the Steward building, as well as new steps and handrails on the loading dock and south entrance.
3. At the College of Optical Sciences Large Optics shop, Dan Caywood, Kurt Kenagy, and Dale Webb found nine needed safety improvements in the test tower. Most of the safety improvements have been completed or are in the final process of being implemented.
4. A new shield system has been installed at the LBT to contain spillage of oil from the telescope bearings.



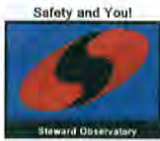
5. A new floor operated lens cover has been installed at the Ray White Telescope, to eliminate the need of climbing a ladder to open or close the lense on the finder telescope.
6. During the last quarter of this year, the Mirror Lab identified the most serious safety concerns that needed to be addressed. The risks mitigated included serious falls from height, pinch points from rotating equipment and controlling respirable exposures. Pinch points and falls have been mitigated through engineering measures. Control of respirable exposures is on-going.
7. Mirror Lab casting employees incorporated new ventilation methods to eliminate respirable exposures while machining refractory cores on the new CNC Machine.
8. Major efforts and time were spent by Jeff Kingsley, Buell Jannuzi, Risk Management, and Facilities Management, to resolve the problem of sewer odors on the first floor of the Steward Building.
9. The Executive Committee created the Safety Star Award to recognize an employee whose effort, impact, initiative and innovation have had an impact on safety within their work groups. This is to be an annual recognition event recognized by the Steward Observatory Safety Committee and at the College of Science, Steward Observatory employee recognition event held each spring.
10. During this year, Dale Webb, Safety Manager, and Linda Warren, Mirror Lab Program Coordinator, revised and updated the online Safety Manual to make it more user-friendly and to include numerous website changes. Linda also revised the online Safety website to include updated Safety Manual links, Annual Safety Reports, and Potty Posters.

Other major projects, each completed without injury and deserving of major recognition were:

1. The Arizona Radio Observatory upgraded the 12-Meter Telescope in the existing 12-Meter dome. This job entailed the dismantling and removal of the old 12-Meter telescope and then dismantling and moving the 75 ton pedestal and 12-Meter dish from the Plains of St. Augustine in New Mexico to Kitt Peak. The pedestal was installed in the dome using two cranes and placed on the mounting piers, moving only an eighth of an inch every few minutes during the final installation. The new 12-Meter dish was installed on the pedestal as it moved through the dome slit with only ½ inch clearance on either side. All of this effort with no injuries!



2. At the Large Binocular Telescope (LBT) on Mount Graham, four new large instruments were installed. The first new instrument known as **ARGOS**, is a Laser Guide Star System. It consists of equipment distributed throughout the telescope. The next major instrument known as **PEPSI**, consisted of six containers of equipment that had to be moved into and installed in the LBT pedestal. A three ton camera instrument known as **LUCI II**, and a six and a half ton **MODS** camera were also installed. Again, all instruments were installed without an injury.
3. On Mount Lemmon, the 24 inch telescope formerly housed in the Roll Off dome, was moved into the dome previously known as the Jamison Dome, and a new 24 inch telescope was moved into the Roll Off Dome. Each of these telescopes weigh about 3,000 pounds and have to be moved with great care, both for the safety of the instrument and the people moving it. The move was completed without injury to employees or telescopes.
4. The MMTO staff has been spending many days working at the Sunnyside facility to develop new mirror illumination techniques. During this process they have been working with high voltage and high amperage equipment. All work was again accomplished without injury.
5. The Mirror Lab incorporated innovative ideas for fall protection and ergonomics in three major projects.
 - The Mirror Lab rebuilt the Large Optics Generator (LOG), which included new platforms, heavy component installation, crane work, new electrical power distribution panels and control software upgrades. Other new technology for this station includes tools and equipment for ergonomic handling of generating tools, variable work height of operators, and safe access to critical work areas. There were no injuries during this project.
 - Loadspreader bonding. A lightweight, yet strong and re-useable fall protection ring was designed and built to provide employees' protection from falls while working on the mirror backplate during the loadspreader bonding procedure. This novel system can be easily assembled around 6.5m and 8.4m mirror cell perimeters. The lightweight material enabled employees to lift and install the system around the GMT 2 mirror perimeter. A special mat padding was utilized to protect the mirror back plate during loadspreader bonding. This added feature significantly reduced employee ergonomic risks associated with working on hard contact surfaces such as glass.



- The TAO 6.5m Test Optics Bridge has been designed and built. This equipment is scheduled to be installed in early 2015 at a height of 56 feet in the Test Tower. Design criteria included installing the bridge without exposing personnel to fall hazards, safe containment of any personnel installing and adjusting test equipment.

During 2014, there were a total of twenty four (24) safety inspections conducted at thirteen (13) different facilities. These inspections resulted in the discovery of fifty three (53) safety infractions. Also during this period, thirty two (32) of the previously noted forty four (44) infractions had been repaired or otherwise settled. In the eight years since we started our formal Safety Management System, we have fixed over nine hundred fifty (950) safety infractions at the various sites.

This year offered a lot of employee training. Nevertheless, we still need some work to assure adequate Safety training record keeping is implemented for each Steward Department.

The following training programs were offered to all Steward employees:

Lockout/Tagout, CPR and First Aid, Fall Arrest Authorized User, Hearing Protection, and recertification for Scissor Lift and Articulating Boom

In addition, 3 employees from Mount Lemmon attended Lightning, Wildlife Safety and Emergency Preparedness, Hearing Protection, and Fuel Tank Program Management.

The second Trimester Safety Committee Meeting was held in October and attended by an enthusiastic crowd of Safety Committee members. Chuck Gessner, Safety Manager at the LSST, gave a presentation on the Hazard Analysis Process he designed and implemented at the Large Scale Synoptic Telescope. The second speaker was Cory Knop, who spoke on the subject of Changing the Safety Culture and the importance of Safety both at work and at home. Jeff Kingsley, Associate Director and Paul Gabor, Director of the Vatican Telescope presented the 2014 Safety Star Award to Gary Gray for his exemplary safety work with the Vatican Telescope.

Near Misses:

There were two known and reported near miss reports filed this year.

The first near miss was the result of two employees working in a manlift that was not positioned correctly under the telescope. The corrective action taken, was to mark the floor area to ensure proper positioning of the manlift and to implement more caution in future manlift operations.

The second near miss involved the moving of a nitrogen dewar. This resulted in modifying the Steward Observatory Safety Manual to address safely moving dewars in elevators and requiring two people to move the dewars. Other corrective action taken is to require training of personnel, tracking the age of dewars, and regular inspection of dewars.

Injury Report - Statistics According to Official U of A Data:

OSHA Recordable Accidents = O

Injuries = I

Illnesses = IL

Lost Time Accidents = L

Total Lost Work Days = T

	2014	2013	2012	2011	2010	2009	2008	2007	2006
O	04	06	07	08	08	04	08	13	14
I	06	05	14	13	12	11	23	25	06
IL	02	01	00	01	03	01	01	02	04
L	00	00	01	01	01	00	00	01	03
T	00	00	10	33	06	00	00	07	164

Again this year, we had an improvement in our accident rate, down from six OSHA recordable injuries to four OSHA recordable injuries. Since we began our Safety Management System we have shown a major reduction in Lost Work Days as well as OSHA Recordable Accidents. It should also be noted, statistics reported for 2006 to 2012 include all of Steward Observatory, Mirror Lab, LBT, and Vatican Observatory, but not MMTO. For the second year now, the MMTO is included in the above statistics, which results in an even larger improvement in our Safety Record.



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Themes and Goals for 2015:

1. Increase Management Participation in “Safety” Decisions
2. Assure adequate Safety training record keeping for each Steward Department
3. Assure the implementation of Global Harmonization System



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Steward Observatory Site Inspections

Site	Inspected	Found	Inspected	Rem.	+	New	Inspected	Rem	+	New	Inspected	Rem.	+	New	Inspected	Rem.	+	New
Mt Lemmon	3/30/06	24	8/9/06	6	+	2	3/15/07	3	+	4	7/5/07	3		8	12/5/07	2		9
KP & Sunny	4/25/06	24	8/17/06	7	+	0	1/25/07	2	+	0	7/6/07	1		7	11/28/07	0		0
MGIO	5/3/06	2	8/22/06	0	+	0	4/4/07	0	+	0	8/29/07	0		0	1/16/08	0		1
VATT	5/3/06	28	8/14/06	24	+	1	4/4/07	13	+	7	8/29/07	14		2	1/16/08	2		1
LBT	5/4/06	9	8/22/06	0	+	3	4/4/07	0	+	0	8/29/07	0		8	1/16/08	2		1
SO & Tele	5/25/06	72	11/28/06	38	+	10	5/3/07	27	+	21	9/5/07	22		5	2/4/08	13		15
Imaging Tech	5/31/06	9	11/29/06	0	+	1	4/16/07	0	+	0	9/11/07	0		3	2/4/08	1		0
SMP	6/2/06	5	11/29/06	4	+	6	5/24/07	3	+	2	9/20/07	1		2	2/6/08	0		3
Tumamoc Hill	-	-	8/23/06	3	+	-	2/20/07	0	+	0	mothballed							
12-Meter	4/25/06	9	8/7/06	0	+	6	1/25/07	4	+	5	8/7/07	5		2	11/28/07	1		2
SMT	5/3/06	15	8/22/06	9	+	12	4/4/07	3	+	4	8/29/07	4		3	1/16/08	2		1
SO Mirror Lab	5/23/06	23	2/7/06	10	+	10	5/24/07	6	+	17	9/20/07	14		12	2/6/08	10		5
Totals		220		101	+	51		61		60		64		52		33		38
Total items fixed				119				210				267				350		
Total infractions		220				271				331				383				421



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Site	Inspected	Rem.	+	New	Inspected	Rem.	+	New	Inspected	Rem.	+	New	Inspected	Rem.	+	New
MT Lem & C-Tele	3/31/08	4	+	13	9/4/08	8	+	5	1/21/09	3		3	7/7/09	1	+	3
KP & Sunny	5/8/08	0	+	4	8/7/08	1	+	1	12/16/08	2		0	6/4/09	2		7
MGIO	6/16/08	0	+	0	10/1/08	0	+	0	3/11/09	0		0	7/13/09	0		0
VATT	6/16/08	0	+	0	10/1/08	0	+	0	3/11/09	0		0	7/13/09	0		0
LBT	6/16/08	0	+	4	10/1/08	0	+	1	3/11/09	0		1	7/13/09	0		0
SO Office & labs	6/19/08	17	+	11	11/5/08	10	+	10	4/2/09	8		30	7/28/09	10		6
Imaging Tech		0	+	0	11/6/08	0	+	2	5/18/09	0		1	8/25/09	0		0
LBTI Lab & So Te	6/17/08	0	+	2	11/20/08	0	+	11	4/ /06	1		4	8/19/09	0		2
Tumamoc Hill	mothballed		+		mothballed		+		mothballed				7/7/09	0		0
12-Meter	5/8/08	2	+	2	8/7/08	0	+	0	12/16/09	0		3	6/4/09	0		3
SMT	6/16/08	1	+	4	10/1/08	1	+	2	3/11/09	1		2	7/13/09	3		2
SO Mirror lab	6/17/08	8	+	7	11/20/08	3	+	2	4/15/09	0		29	7/28/09	6		2
Totals		32	+	47		23		34		15		73		22		25
Total items fixed		389				445				487				553		
Total infractions				468				502				575				600

Continued from previous:

Site	Inspected	Rem.	+	New	Inspected	Rem.	+	New	Inspected	Rem.	+	New	Inspected	Rem.	+	New
MT Lem & C Tele	11/9/09	1	+	0	4/29/10	0	+	2	12/8/10	1		0	4/28/11	1		1
KP & Sunny	11/18/09	0	+	1	4/14/10	0	+	4	11/30/10	0		2	3/8/11	0		0
MGIO	11/10/09	0	+	0	5/12/10	0	+	1	9/21/10	0		0	5/26/11	0		0
VATT	11/10/09	0	+	0	5/12/10	0	+	0	9/21/10	0		1	5/26/11	0		0
LBT	11/10/09	0	+	0	5/12/10	0	+	0	9/21/10	0		3	5/26/11	1		2
SO & Annex	2/4/09	7	+	12	6/22/10	5	+	6	1/6/10	6		14	7/19/11	5		18
Imaging Tech	3/2/09	0	+	0	7/21/10	0	+	2	1/6/10	0		0	7/12/11	0		0
LBTI & Solar Tech	2/8/09	1	+	1	6/23/10	0	+	5	12/14/10	0		2	7/12/11	0		2
Tumamoc Hill	mothballed		+		mothballed		+		mothballed				mothballed			
12-Meter	11/18/09	0	+	1	4/14/10	1	+	3	11/30/10	1		2	3/8/11	0		1
SMT	11/10/09	2	+	1	5/12/10	0	+	4	9/21/10	2		0	5/26/11	2		2
SO Mirror Lab	3/5/09	1	+	28	7/15/10	3	+	4	11/22/10	0		7	8/2/11	0		4
Totals		12	+	44		9		31		10		31		9		30
Total items fixed		588				635				665				697		
Total infractions				644				675				706				736



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Site	Inspected	Rem.	+	New	Inspected	Rem.	+	New	Inspected	Rem.	+	New	Inspected	Rem.	+	New
MT Lem & C Tele	11/17/11	0	+	2	5/16/12	0	+	7	11/19/12	5		2	5/28/13	3		2
KP & Sunny	11/22/11	0	+	2	5/29/12	0	+	0	11/15/12	0		0	5/21/13	0		6
MGIO	9/19/11	0	+	1	5/9/12	0	+	1	11/8/12	0		0	5/2/13	0		0
VATT	9/19/11	0	+	0	5/9/12	0	+	0	11/8/12	0		0	5/2/13	0		0
LBT	9/19/11	0	+	4	5/9/12	1	+	0	11/8/12	0		1	5/2/13	0		3
SO & Annex	2/27/11	8	+	18	9/17/12	8	+	6	4/9/12	9		11	11/20/13	12		14
Imaging Tech	5/1/12	0	+	1	1/14/12	0	+	0	6/10/12	0		2	11/4/13	0		0
Solar Tracker	3/20/12	0	+	1	8/14/12	1	+	1	3/26/12	0		2	11/25/13	0		0
Optics Shop			+				+		12/18/12	0		18	5/23/13	2		4
12- Meter	11/22/11	0	+	0	5/29/12	0	+	1	11/15/12	0		0	5/21/13	0		0
SMT	9/19/11	1	+	0	5/9/12	0	+	0	11/15/12	0		0	5/2/13	0		3
SO Mirror Lab	2/29/12	0	+	11	10/4/12	0	+	5	4/9/12	0		11	11/27/13	0		8
Totals		9	+	40		10		21		14		47		17		40
Total items fixed		727				766				783				827		
Total infractions				776				797				844				884

Continued from previous:

Site	Inspected	Rem.	+	New	Inspected	Rem.	+	New	Inspected	Rem.	+	New	Inspected	Rem.	+	New
MT Lem & C Tele	11/5/13	3	+	3	4/8/14	4	+	2	10/01/14	2		2		0		
KP & Sunny	11/12/13	1	+	3	4/1/14	2	+	2	11/12/14	2		1		0		
MGIO	9/25/13	0	+	4	5/13/14	0	+	1	09/18/14	0		0		0		
VATT	9/25/13	0	+	0	5/13/14	0	+	1	09/18/14	0		1		0		
LBT	9/25/13	0	+	0	5/13/14	0	+	0	09/18/14	0		0		0		
MMTO	10/24/13	0	+	32	6/11/14	0	+	0								
SO & Annex		0	+		5/21/14	14	+	6	11/24/14	6		15				
Imaging Tech		0	+		5/20/14	0	+	0	12/02/14	0		3				
Solar Tracker		0	+		5/19/14	0	+	0	11/20/14	0		4				
Optics Shop	11/26/13	0	+	12	6/3/14	2	+	6	11/19/14	2		0		0		
12-Meter	11/22/13	0	+	0	4/1/14	0	+	0	11/12/14	0		7		0		
SMT	9/25/13	2	+	3	5/13/14	3	+	0	09/18/14	0		1		0		
SO Mirror Lab		0	+		5/22/14	0	+	1		0						
Totals		6	+	57		25		19		12		34		0		0
Total Items Fixed		878				916				948				0		
Total Infractions				941				994				0				0



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