

## CSO Safety Briefing for Visiting Observers Checklist

CSO staff member conducting the safety briefing: \_\_\_\_\_ Date: \_\_\_\_\_

Name of Observer(s): \_\_\_\_\_

CSO safety issues:

1. \_\_\_\_\_ **CSO forms signed? Waiver of Liability, Driving and Safety Policy, Information**
2. \_\_\_\_\_ **A minimum of TWO PEOPLE are required at the CSO telescope at all times**
3. \_\_\_\_\_ **CSO safety book**
4. \_\_\_\_\_ **CSO safety website: [cso.caltech.edu/safety](http://cso.caltech.edu/safety)**
5. \_\_\_\_\_ **Health concerns**
6. \_\_\_\_\_ **Driving CSO vehicles safely**
7. \_\_\_\_\_ **CSO vehicle items**
8. \_\_\_\_\_ **Vehicle issues**
9. \_\_\_\_\_ **Emergencies**
10. \_\_\_\_\_ **Accident or injury**
11. \_\_\_\_\_ **Telescope and equipment safety**
12. \_\_\_\_\_ **Housekeeping**
13. \_\_\_\_\_ **HP Office**
14. \_\_\_\_\_ **Shipping**

I have reviewed and understand the CSO safety information in this briefing.

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(signature of observer and date)

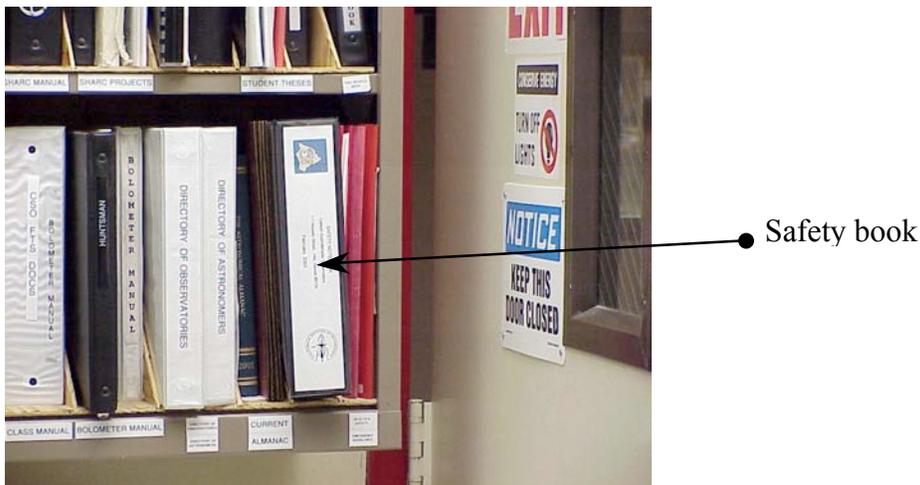
*Please complete this checklist and return to Diana Bisel.*

*Normally the CSO staff provides an in person safety briefing for each visiting observer at least once a year. On occasion, however, visiting observers may be asked to review the safety briefing on their own. In that case, please enter "self" instead of the staff member's name.*

## CSO Safety Briefing for Visiting Observers

**To All CSO Observers:** Attention to safety is important to avoid personal injury or damage to instrumentation and other equipment. Please review the following information carefully.

1. **Forms.** Please sign the Waiver of Liability and the CSO Driving and Safety Policy forms and fax to CSO *before* your arrival. If you have not done so, please complete them now. Please also present your driver license for copying.
2. **At least TWO PEOPLE must be present** when working or observing at the CSO. In addition, there must be a vehicle at the telescope whenever someone is working there.
3. **The CSO Safety Book** contains emergency information and procedures, including the emergency response plan and the procedure for starting the generator in case of a power failure.



At the telescope, the safety book is located on the control room bookshelf. There are also copies in the HP and Hilo offices.

Emergency phone numbers are posted on the bulletin board in the control room.

4. **CSO Safety webpage.** [cso.caltech.edu/safety](http://cso.caltech.edu/safety)

The safety briefing, emergency response plan, and other information are on line.

A wallet sized safety information card with useful information is available.

## 5. Health concerns.

At the altitude of the CSO, 4070 m (13350 ft), the air pressure is only 60% of the sea level pressure. Consequently less oxygen is available for respiration. *Everyone* will experience some degree of hypoxemic hypoxia and may experience symptoms of altitude sickness. Individual responses can vary greatly. Symptoms include, but are not limited to, impaired judgment, light-headedness, tunnel vision, breathlessness, dizziness, weakness, fatigue, headache, nausea, and vomiting. In rare cases, symptoms may progress to pulmonary edema or cerebral edema, both very serious conditions.

Before visiting the telescope, please consult your doctor about any medical concerns. Contraindications include, but are not limited to, cardiac or respiratory problems, pregnancy, or scuba diving within the past 24 hours. Individuals in these categories should not work at the telescope. Children younger than 16 years old are not allowed at the telescope.

*Never* go to the telescope alone. You may not always recognize the symptoms of altitude sickness in yourself. If you experience any unusual feelings or symptoms of altitude sickness, *tell someone immediately*. If you notice someone else appears to be suffering symptoms, ask how he or she feels. If symptoms persist, descend to HP as soon as possible. If the symptoms are severe, descend immediately and seek medical attention in Hilo. Call 911 in serious cases. Let Simon Radford or Diana Bisel know.

Acclimatizing at Hale Pohaku (2800 m; 9200 ft) before ascending may ameliorate the symptoms.

Supplemental oxygen will alleviate some symptoms. There are oxygen cylinders available in the lounge and portable oxygen dispensers are available on request. If you use the oxygen, please tell the staff so it can be replenished. There is a pulse oximeter in the control room for self monitoring.

In addition, it can be very dry at the telescope and typical nighttime temperatures are near or below freezing. Dress warmly, drink plenty of fluids, do not smoke, avoid alcohol or other drugs, and pace yourself.

The following memo on high altitude was prepared by Djon I. Lim, M.D., FACP, for all the Mauna Kea Telescope Facilities.

## TO OUR VISITORS TO THE ASTRONOMY FACILITIES AT THE SUMMIT OF MAUNA KEA

Prepared by: Djon I. Lim, M.D., FACP, for all the Mauna Kea Telescope Facilities (2009-04-17)

Individuals planning to visit any one of the telescope facilities at the summit of Mauna Kea [4,208 m / 13,796 ft] should be aware of the health hazards due to high altitude. High altitude poses a potential threat to life because of the reduced atmospheric oxygen resulting in lowered oxygen tension of the inspired air. At sea level, the inspired partial pressure of oxygen is around 150 mm Hg (mercury); at the summit of Mauna Kea the partial pressure is 90 mm Hg. As a consequence of the reduced ambient partial pressure of oxygen, the partial pressure of oxygen in arterial blood is reduced from 100 mm Hg to 60 mm Hg resulting in hypoxemia. The clinical manifestations of hypoxemia include tachycardia (rapid pulse rate), tachypnea (rapid respiratory rate), dyspnea (shortness of breath), fatigue, lightheadedness, reduced mental alertness and anxiety. As opposed to the astronomy personnel working at the summit of Mauna Kea, casual visitors, because of limited time for high altitude adaptation, are more prone to experience high altitude mountain sickness (AMS), with symptoms including headaches, nausea, fatigue, shortness of breath, dizziness, lassitude and insomnia. HAPE (high altitude pulmonary edema) and HACE (high altitude cerebral edema) are major high altitude medical emergencies occurring more frequently with prolonged stays at higher altitude (16,000 ft or higher), luckily less of a problem on top of Mauna Kea. People who have known coronary artery disease with exertional chest pains (angina) may experience angina with activity sooner than at sea level. People with chronic obstructive lung disease (emphysema) should not be exposed to high altitude without oxygen supplementation or be there at all for fear of serious respiratory difficulty.

Major symptoms requiring oxygen supplementation and immediate descent to lower altitude include severe unrelenting anterior chest pains with sweating (may indicate a heart attack), severe shortness of breath with pink frothy sputum (may indicate pulmonary edema); severe and persistent headache with nausea / vomiting, progressive lassitude, unresponsiveness, collapse or coma (may indicate cerebral edema).

Precautionary advice:

- Have a good night's rest and sleep before ascent to the summit; avoid alcoholic hang-overs
- Have a light meal at least 2 – 3 hours before ascent
- Avoid ascent to the summit with a bad cold or other medical ailments
- Rest at Hale Pohaku for at least 1 hour before continuing ascent to the summit
- Avoid smoking cigarettes at high altitude (it's an unhealthy health habit to start with)
- Wear warm clothing, keep warm inside and avoid needless open cold air exposure
- Pace yourself, walk slowly; avoid strenuous physical activity; rest if you need to
- Take all your prescribed medications faithfully

Don't forget to bring along your sublingual nitroglycerin tablets if you have exertional angina or chest pains.

Lastly, for visitors with known medical issues, please make sure that you obtain medical clearance for ascent to high altitude from your family doctor and let the telescope facility hosting you know of special precautions you may need.

Beyond that, welcome to the summit of Mauna Kea. Have a pleasant, enjoyable and safe visit.

## 6. Driving CSO vehicles safely.

Driving CSO vehicles is a privilege, not a right. You are expected to observe speed limits, drive conservatively, and use CSO vehicles only to support CSO operations and observations. This expectation applies to everyone, both staff and visitors. Per Caltech policy, drivers of CSO vehicles must possess a valid US driver license. You will be responsible for any traffic or parking citations.

Any accident that involves another vehicle or an injured person **must be reported to the police without delay**. Call 911. All driving mishaps of any type must also be reported verbally to Simon Radford or Diana Bisel and in writing. There is an accident report form in the binder in the glove box of each vehicle.

The speed limit above HP is 25 mph *maximum* on all surfaces. Often, you must drive slower because of adverse weather, ice or snow, bad conditions on the cinder road, traffic, etc. The Mauna Kea Rangers conduct speed surveys on this road. If we receive reports of speeding or unsafe driving, we may suspend your driving privilege.

Past experience shows the most hazardous activity associated with working at the CSO is driving to and from the telescope. Many bad wrecks occur on Saddle Road and a few have been associated with CSO observers. Most accidents occur when traveling to Hilo or Kona during heavy rain. Use extreme caution and observe the speed limits. Bad accidents lead to expensive property damage, lost time at work, serious injury, death, and may ultimately jeopardize CSO operations. Please do not take the risk. Be responsible drivers and please do not forget that your actions affect others.

Special hazards on Mauna Kea include:

- a. **Cinder road.** Always stay on the right hand side of the road and slow down on the bad sections. Ascending from HP, use high range 4WD on the cinder road. Read the laminated instructions for the 4WD shift located on the visor. Downshift to first or second gear on steep sections.
- b. **Steep grades.** When descending, please avoid continuous braking as it will wear out the brakes very rapidly. Instead downshift to a low gear so continuous braking is unnecessary. Obey the speed limits at all times.
- c. **Sun Glare.** When the sun is low in the sky, sun glare on your windshield can impair your view of the road ahead and may lead to an accident. Sunlight scattered by dirt on the windows is blinding. If you cannot see ahead, *STOP* and clean the windshield both inside and outside. Then proceed with caution under such conditions. CSO vehicles are equipped with window cleaning wipes. If you find the windows are dirty, please take the time to clean the windows before driving.
- d. **Rocks.** *Do NOT run over rocks!* Many thousands of dollars of damage has been done to CSO vehicles by hitting rocks. If you must cross the rocky berm left by the road grader on the cinder road, *SLOW DOWN* and avoid big rocks.
- e. **Tourists.** Watch out for them. They may stop or park in the middle of the road without warning and they may not be paying attention to other traffic.
- f. **Fog.** *SLOW DOWN!*
- g. **Ice on the road.** You can lose control and slide off the road. If it is *below freezing* and there is fog or rain at the summit, these are perfect conditions for ice formation on the roads. Either

evacuate the summit before it starts or *use chains* if you find the road is icy. Put on the chains early.

- h. **Ice on buildings.** After a storm, ice may form on the CSO dome or other buildings. Do not park near buildings and watch out for falling ice. Ice is most likely to fall when it melts during the day or when the shutter is moving.
- i. **Headlights.** Near the summit there is a sign that requests vehicle headlights be turned off at night as a courtesy to the optical observatories. Nevertheless, do not drive without at least the parking lights on. If in doubt, turn on the low beam headlights. Do not risk running off the road or colliding with some unseen object by driving without lights.
- j. **Dozing off.** *Do NOT drive* if you are falling asleep. Let someone else drive. If you are driving alone and cannot stay awake, *STOP!* Pull over well off the road in a safe spot, lock the doors, and take a nap. Do not risk falling asleep at the wheel.
- k. **Saddle road.** Visiting observers are not authorized to drive CSO vehicles below HP. Accidents on the Saddle Road are almost always due to excessive speed for the conditions. The road surface is often wet and slippery, the bends are sometimes banked the wrong way, and oncoming cars may cross into your lane. Going downhill builds excessive speed surprisingly quickly. Be aware and *SLOW DOWN!*
- l. **Cows and other animals.** Do not hit animals. *SLOW DOWN!* The area below HP is ranchland. If you hit a cow or other identifiable domestic animal, then there is property damage that must be reported.
- m. **Cell phones.** It is illegal (and dangerous) to use a cell phone while driving. Do not do it. If you are driving and must make a phone call, pull over in a safe spot well off the road. This also applies to texting or other distractions.
- n. **Questionable driving.** If you are a passenger and feel uncomfortable because of excessive speed or some other reason, speak up and tell the driver your concerns. Safety is paramount.

Before accepting a CSO vehicle to drive, take a few minutes to check: (i) chains, glass cleaning wipes, and other safety gear are in back; (ii) the spare tire is serviceable and you can find the jack; (iii) there is a flashlight in the vehicle; (iv) you can find the instruction note book and credit card wallet in the glove box; and (v) there is a serviceable cell phone for emergency (911) calls. If any of these items are missing or deficient, please contact the CSO staff. After hours call the pager (899-7194) and leave your return number. (The pager does not accept voice messages.)

If you are unsure how to operate features of a CSO vehicle, for example, the 4wd, control buttons, parking brake, emergency brakes, light switch, windshield wipers, etc., please ask a CSO staff member to demonstrate. The owner's manual located in the glove box if no one is available to assist you.

This memo is intended to call attention to some typical driving hazards encountered on Mauna Kea and to suggest some possible solutions. This memo is not exhaustive. Every driver must show proper care and judgment in all situations.

Caltech Vehicle Use Policy

<http://cit.hr.caltech.edu/policies/PM/pm8.pdf>

**Driving Hazards Gallery**  
**Don't let this happen to you!**



**Traffic:** This vehicle was destroyed when it turned in front of oncoming traffic



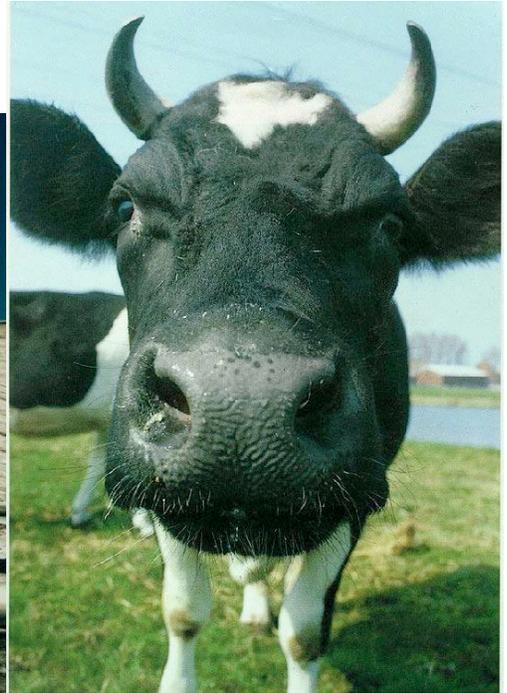
**Sun glare.** *Left:* The driver was blinded by sun glare and ran off the road. *Right:* There is another vehicle following but it is completely invisible because of sun glare scattered by dirt on the rear window and the airborne dust.



**Fog.** Fog is very common on the Mauna Kea access road. *SLOW DOWN!* Cows or other obstructions may be on the road!



**Tourists.** Watch out for them! This tourist has parked in the road while sightseeing. He is stopped in the middle of a turn with limited visibility. Tourists often show poor judgment on the cinder road and at the summit.



**Ice.** The summit after a night of freezing precipitation. This situation is a very common occurrence, especially in the winter.

**Cows.** Watch out for them on the road. Don't hit them. Also watch for turkeys and other animals near HP.



**Saddle road.** This rental vehicle ran off the Saddle road, flipped, and hit a tree. Ouch. *Slow down!*



**Saddle road.** This vehicle lost traction on the Saddle road, slid out, and hit a tree.

**DON'T LET THIS HAPPEN TO YOU!**



## 7. CSO vehicle items.

The glove compartment of each CSO vehicle contains a blue pouch with the current vehicle registration and insurance forms and gas cards and the CSO vehicle book (black binder). Take a few minutes to familiarize yourself with the contents of the vehicle book: important phone numbers, what to do in case of an accident, maps, and driving tips. There is a cell phone for emergency (911) calls only.



Window cleaning wipes and flashlights are located behind the front seat.

In the cargo area, a brown emergency bag contains:

- First aid kit
- Fire extinguisher
- Ice scraper
- Tire chains
- Safety beacons



## 8. Vehicle issues.

### *Accident*

Any accident that involves another vehicle or an injured person **must be reported to the police without delay**. Call 911. All driving mishaps of any type must also be reported verbally to Simon Radford or Diana Bisel and in writing. There is an accident report form in the binder in the glove box of each vehicle. The vehicle registration and insurance papers are located in the blue pouch in the glove box.

*Flat tire*

Always replace a tire on a flat, level surface out of the traffic lane.

The CSO vehicles have a theft deterrent lug nut on each wheel. The key for this nut is located in the compartment over the wheel well in the cargo area. Please replace the key after use. Other equipment (jack, wrench, etc.) is located in recesses in the cargo area. Refer to the vehicle manual for details.

There are spare tires in the welding shed. Always carry a good spare tire. If you replace a flat tire, leave it in the shed and take a good spare tire. Check that the spare fits the vehicle. Please notify the day crew so they can have the flat tire fixed.

*Studded tires and chains*

During the winter, one CSO vehicle equipped with studded snow tires is usually stationed at HP. Vehicles with studded tires *may not* be driven below HP.

If the weather forecast calls for ice or snow, confirm there is a set of tire chains in the cargo area. Please install chains carefully according to the instructions included with each set. Please install chains before they are needed, not after.

### *Malfunctions*

If the vehicle shuts down, i. e., the engine stops while driving:

- *STOP* as soon as possible.
- The brakes will not have a power assist so a lot of force will be required to stop the vehicle.

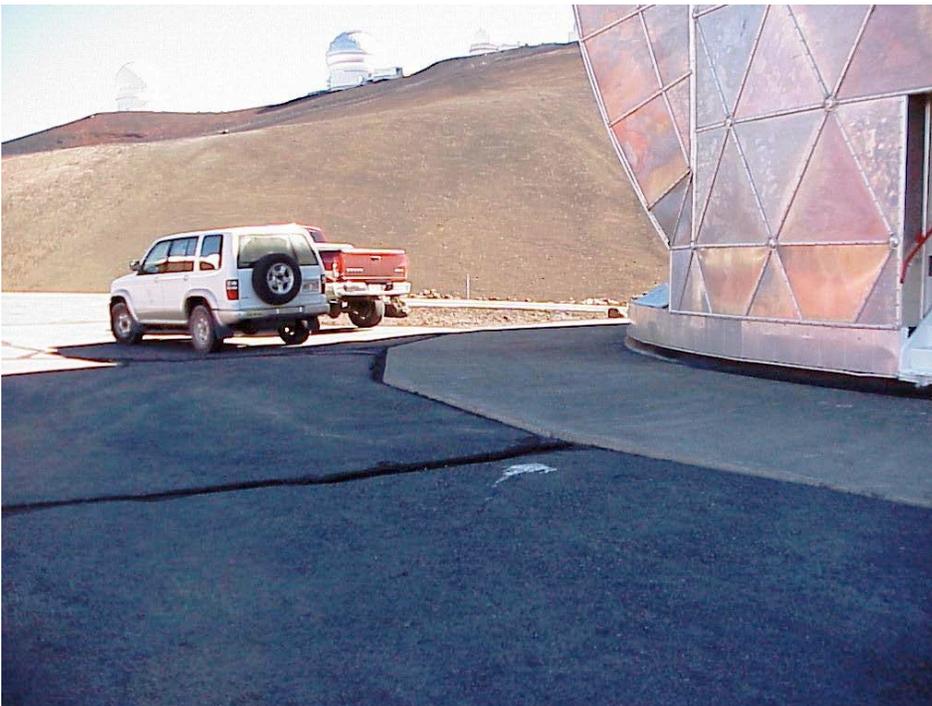
If the vehicle makes strange sounds or operates erratically:

- *STOP* as soon as possible and park the vehicle in a safe place.

Check the parking brake was released. If that is not the problem, contact the CSO staff right away. Do *not* drive a malfunctioning or unsafe vehicle.

### *Parking*

Do not park on the concrete pad surrounding the dome. During high winds, park the vehicle into the wind to avoid damage to the doors.



### **Rules for driving the CSO Dodge truck**

- a. Visiting observers are not authorized to drive the CSO truck.
- b. At HP, the truck will be parked only in the lower lot or the dirt lot. The CSO truck should never be driven into the upper lot even just for pick up or drop off.
- c. Ascending from HP, use high range 4WD on the cinder road. Read the laminated instructions for the 4WD shift located on the visor.
- d. Always stay on the right hand side of the road and slow down on the bad sections of the cinder road.
- e. Downshift to first or second gear on steep sections.
- f. Before descending allow the engine to warm up for a couple of minutes.
- g. When descending, avoid continuous braking as it will wear out the brakes very rapidly. Instead downshift to a low gear so continuous braking is unnecessary. Obey the speed limits at all times.

Please drive carefully at all times! The Mauna Kea Rangers conduct speed surveys on this access road. If we receive reports of speeding or unsafe driving, we may suspend your driving privilege.

## 9. Emergencies.

**Fire:** Evacuate and call 911. There are fire extinguishers on each floor of the telescope and smoke detectors in all rooms.



**Power outage:** Refer to the *CSO safety book* for instructions on switching over to generator power. The circuit breaker panels and UPSes are located in the room directly below the control room.



**Bad weather:** If the wind gusts greater than 50 mph, *cease observing* and close the shutter. For wind speed, look at the JACH weather page. In case of threatening weather, monitor by looking outside occasionally and by JACH weather page:

<http://www.jach.hawaii.edu/weather/>

If you are at the telescope when the weather looks threatening, keep in phone contact with other observatories to be sure you are not the only group on the summit.

**Tourist:** If a tourist is suffering from altitude sickness, advise them to descend and notify the Mauna Kea Rangers. Rangers have oxygen and defibrillators. In a serious or life threatening situation, call 911. For tourist vehicle problems, notify the Mauna Kea Rangers, who have jumper cables, etc., and can also arrange for towing.

**Earthquake:** Do not go outdoors. Get under a desk to protect yourself from falling objects.

**Intruder:** Politely ask intruder to leave. If person is unwilling to leave, call 911 and the Mauna Kea rangers.

**10. Accident or Injury.**

*In case of serious or life threatening injury or illness, call 911 immediately.*

There are a first aid kit and an AED in the CSO galley.



In case an injury requires more than first aid, seek professional treatment in Hilo or Kona. Addresses and maps are on the safety webpage: [cso.caltech.edu/safety](http://cso.caltech.edu/safety)

For *work related* injuries:

1. Proceed to the Hilo or Kona hospital (urgent care clinics may treat work related injuries; call first to confirm).
2. Contact your immediate institutional supervisor to report the injury and to obtain further instructions.
3. Inform Simon Radford or Diana Bisel exactly what happened.

In addition, Caltech or JPL employees should:

4. Contact Diana Bisel for further instructions. She will confirm information from the workers compensation administrator that you need to provide to the hospital when you seek treatment. She will also follow up with your supervisor to be sure the incident is reported properly.
5. Obtain a medical work status form from the doctor authorizing your return to work. This form must be submitted to your supervisor and to the workers compensation office. Without this form, you may not return to work.

For *non work related* injury or illness, you may choose one of the urgent care facilities in Hilo or Kona. Bring your health insurance card. If it is not accepted, be prepared to pay and file a claim later.

**11. Telescope and equipment safety.**

*Restricted equipment. Please do not:*

- a. Use any of the cranes or chain hoists.
- b. Use the machine shop equipment without authorization. This includes the drill press, the lathe, and the milling machines.
- c. Climb on the telescope feedlegs.
- d. Use the vertical lift without authorization.

If you need to use any of this equipment, contact one of the day crew or the CSO Manager.

*Cryogenics*

On weekends and holidays when the day crew is unavailable, observers may be required to fill instruments with cryogenics, i. e., LN<sub>2</sub> or LHe. To protect both personnel and instrumentation from injury or damage, observers are required to take a brief cryogen training from one of the day crew technicians.

When handling cryogenics, please use gloves and a face shield. These are stored on a shelf in the backend lab.



Procedures for cryogen handling and transfer are posted on the safety webpage: [cso.caltech.edu/safety](http://cso.caltech.edu/safety)

*Telescope check.* Every night before observing:

Look at the alidade (cassegrain focus) area. Be sure the area is free of any obstructions, such as ladders, cryogen dewars, test equipment, etc. Stow equipment as close to the control room window as possible but do not lean anything against the control room wall. Remember the dome and the telescope move independently.



Close the drawers on the brown toolbox. If they are open, the drive screw cover plate will smash into them.



On the first floor, ensure nothing protrudes above the top of the railings.



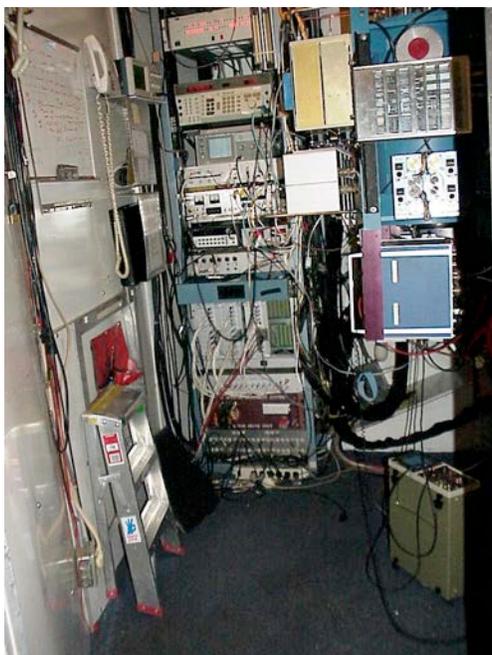
Ensure the electric lift is stowed in the space by the right tower and galley door. There is an interlock with the telescope drive.



Ensure the cranes and chain hoists are stowed. These are interlocked with the telescope drive. A red light on the shutter control panel indicates something must be stowed before you can safely move the telescope.



In the side cab, ensure the ladder in the side cab is stowed against the wall and nothing is in the way of the receivers



*Departure*

Before leaving, close the shutter. Ensure the toaster oven and the range in the galley are both turned *off*. Turn off any heaters.

If it is windy, position the dome at right angles (90°) to the wind direction.

Push the red stop button on the shutter control panel. Ensure two red LEDs are lit: “emergency stop at control room or teepee enabled” and “shutter control status.”

Lock both CSO entry doors.



At the end of your observations, please file an Observing Report at:  
[cso.caltech.edu/docs/ObservingReport\\_CS0.html](http://cso.caltech.edu/docs/ObservingReport_CS0.html)

## 12. Housekeeping.



Please be considerate of the staff and other observers.

*Do not leave a mess for others to see, smell, or clean up!*

- Pick up after yourself before you leave the telescope or the HP office.
- Keep work areas clean and free of rubbish.
- Return tools, flashlights, etc., to their places so others can easily find them.
- Maintain good hygiene, especially when sick. Wash hands often.
- Do not leave any personal items or perishable food lying around. Take them with you or dispose of them in the trash.
- Alcohol consumption and storage is not allowed at the CSO telescope.

**Toilets:** Because the dome rotates, the toilets and sinks empty into a holding tank. The day crew drain this tank every few days.

*Do not* flush anything down the toilets other than toilet tissue.

Putting paper towels or other debris in the toilets can clog the system or cause leaks. This results in unnecessary, unpleasant work for the day crew.

**13. HP Office.**

Please lock CSO vehicles and leave the keys in the CSO HP office before going to your room.

There have been reports of vandalism at both HP and the summit. Be aware of your surroundings or any strangers lurking in the area. Report anything suspicious to the Mauna Kea Rangers immediately.

Emergency phone numbers are posted on the bulletin board at CSO HP office.

Please be considerate of the staff and other observers. Keep the office clean and pick up after yourself.

**14. Shipping.**

All CSO visitors are responsible for shipping their own equipment to or from the CSO. This includes packing, labeling, and completing all necessary shipping documents, i. e., airbills, before departure. If you need further assistance or have any questions about shipping, please contact Diana Bisel.

If you plan to ship any hazardous materials, such as compressed gas or chemicals, you *must* comply with all applicable regulations. Consult with your safety office or shipping department as far in advance as possible. Explain what you want to ship (name, quantity, how it is packed) so they can provide you with the necessary shipping guidelines and assist you to comply with regulations. Depending on the material, you or someone in your group coming to the CSO may need to be trained and certified in shipping hazardous materials. Contact your safety office for details. If this is the case, you will have to plan many weeks or even months in advance. Once certified, you will be authorized to complete the necessary documents for shipping hazardous materials.