...CSO Emergency Response Plan...
Modification Date: 9-April-2009 , RAChamberlin
File Name: Ulu.submm.caltech.edu /home/cham/web/safety/em7.tex

The following document is the CSO safety plan. The emphasis is on the summit site. This safety plan is in two parts. The first part is a brief outline/summary including telephone numbers to call for help. The second part is a detailed plan for emergency response for the various situations which might arise. This second part is adapted from Keck Emergency Response Plan originally written by Larry Olsen.

> These Emergency Response Plans (ERP) are a guidline to be read BEFORE an emergency occurs. The plans are designed to be dynamic in that they will change over time with experience. The recommendations contained within the ERP are not hard and fast rules; it is possible that those in charge during an emergency may choose to deviate from these recommendations if, in their judgement, deviation is warranted. Nothing within these ERP guidlines should be construed as a contract.[1]

Part I, the summary, is intended for quick reference. Part II, the details of each specific emergency response should be studied BEFORE emergency strikes.

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Part I:

A. Summit Site

1. Lines of responsibility
  a. CSO Staff
     First response to an emergency will be handled by the most
     senior/qualified person available on site.  On the CSO staff,
     the ranking order of such people is:

      1. Richard Chamberlin, Technical Manager, Safety Officer
      2. Ed Bufil, Day Crew Leader,  ("First Responder" certified)
      3. Allen Guyer, Electro-Mechanical Specialist ("First Responder" certified)
      4. Steve Baca, Technician ("First Responder" certified)
      5. Brian Force, Electrical Engineer
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[1] Quoted from the Keck ERP.

6. Pat Nelson, Electronics Technician
7. Hiroshige Yoshida, Senior Scientist
8. Ruishing Peng, Senior Scientist
9. Hiroko Shinnaga, Staff Scientist

Example, if Richard Chamberlin and Ed Bufil are not present at the summit, then Allen Guyer has the lead responsibility for directing an emergency response, etc.

b. Visiting observers
In the event that no CSO staff are present, then the most senior observer will lead the response effort.

2. First response. The following is an outline. Consult Part II, Full Emergency Response Plan for details.

a. Fire
i. Call 911, phone numbers: fire department, JCMT, and Keck.
ii. Remove any injured or disabled people from building.
Administer first aid as required. (see b)
iii. If fire is in the incipient stage (very small), attempt to extinguish with hand extinguishers.
iv. If fire is not abated by hand extinguishing, or it is beyond incipient stage, abandon building.
v. Assemble on road near to CSO driveway.
vi. Be sure that all personnel are accounted for.
vii. Call Keck for assistance if Fire Rescue is needed.

b. Injury
i. Evaluate.
If no CSO first aid experience, contact neighboring facilities for assistance.
ii. Administer first aid. (First aid kit in Galley. O2 bottle in lounge.)
iii. Use MKSS emergency van to evacuate injured party. (Van in parking lot. Keys in galley key box on wall opposite sink. Evacuate to saddle road and meet ambulance.)

c. Power outage
Personnel on site will follow CSO "What to do in case of power outage plan." See section in this binder.

d. Injury to non-observatory staff.
Contact 911, MKSS, KECK, etc,

e. Altitude sickness (See Part II of plan for details.)
(i) Administer O2 in lounge, or pressure breath.
(i.a) If person is suffering from edema, immediately begin evacuation to sea level. Arrange to meet ambulance on saddle road.

f. Earthquake, etc. See detailed plan.

3. Coordination with Hilo office
   i. First response leader will contact Hilo office at first opportunity to advise of the situation (935-1909).
   ii. In the event Hilo office closed, then contact Manager (640-1865), and person carrying CSO pager (899-7194).
   iii. Hilo office will advise mainland (the CSO Director and Caltech Safety Office) at first opportunity.

4. Location of emergency items:

Emergency vehicle keys are located in Galley. Emergency food is in stairwell outside Galley. First aid kit is in Galley. Emergency Oxygen cylinder is in Lounge

5. Emergency numbers:

Always call 911 first.

911	County of Hawaii Emergency Services
961-8336	County of Hawaii Fire Department Dispatcher
969-2433	PTA Medical Clinic
969-2441	PTA Fire Department
969-2401	PTA Post Headquarters
	(PTA = Pohakuloa USArmy training area)

Observatories:

Keck	935-8643
JCMT	935-0852
MKSS	935-7606
Gemini	974-2650
Subaru	935-5861
CFHT	961-2630
IRTF	974-4208
UH88	974-4200
UKIRT	961-6091
SMA	933-6990

Other numbers:

Richard Chamberlin, CSO Technical Man.	640-1865 (cell phone)
Ed Bufil, Day Crew Leader	964-3575
Diana Bisel, Administrative Assistant	981-0231
Allen Guyer	985-7118
Tom Phillips, CSO Director	626-395-4278

Caz Scislowicz, Caltech Safety Office	626-395-6727
Art Seiden, Caltech Safety Office	626-395-6727
Office of Mauna Kea Management Rangers	960-2820
	960-3077
HP Office	969-9613

Caltech Safety, after hours
call Campus Security 626-395-5000
and ask for Safety Officer to be paged.

6. Hazardous Materials Release:
(E.g. propane, large hydraulic oil spill, etc.)

1. Call 911.
2. Call CSO Manager, Ed Bufil, Diana Bisel, Caltech Safety Office
3. Call Unitek Solvent Disposal Service.
   PH: 960-0950, 935-8180.
4. Call Phillips Services Hawaii
   91-416 Kamahua Street
   Kapolei, HI 96707
   PH: 808-682-3033

B. Hilo Base Facility, 111 Nowelo Street

1. Lines of responsibility
a.
Diana Bisel, who keeps the most regular hours in the Hilo office, will normally be the person handling the first response to an emergency.
b.
In the event that Diana is not present, or disabled. First response to an emergency will be handled by one of the following:

1. Richard Chamberlin, Technical Manager
2. Ed Bufil, Technician ("First Responder" certified)
3. Allen Guyer, Technician, (CSO Safety Officer "First Responder" certified)
4. Steve Baca, Technician
5. Brian Force, Electrical Engineer
6. Pat Nelson, Technician
7. Hiroshige Yoshida, Staff Scientist
8. Ruishing Peng, Staff Astronomer
9. Hiroko Shinnaga, Staff Astronomer

2. First response. The following is an outline. Consult Part II,

Full Emergency Response Plan for details.

a. Fire
   i. Call 911 and activate fire alarm system.
   ii. Remove any injured or disabled people from building.
   Administer first aid as required. (see b)
   iii. If fire is in the incipient stage (very small), attempt to
   extinguish with hand extinguishers.
   iv. If fire is not abated by hand extinguishing, or it is beyond
   incipient stage, abandon building.
   v. Assemble in parking lot safely away from building.
   vi. Be sure that all personnel are accounted for.
   vii. Give any information to Fire Department personnel which is requested.
b. Serious Injury
   Call 911
c. details about response to other situations can be found in PART II.

PART II: .....Detailed Plan...

Section 2. “First Response”, adapted from KECK plan.

Revision date: 7-Feb-2003

The purpose of an Emergency Response Plan (ERP) is to prepare employees for emergency situations which may arise. Employees should learn how to take necessary precautions; know who is in charge of the emergency planning; and know how to respond before, during and after any emergency. Emergencies can arise at anytime; therefore, advanced planning is the only way to minimize personal injury and property damage. Additionally, awareness and planning before an emergency may make the difference between a minor inconvenience and a major disaster.

1 Introduction

For an ERP to be effective, identification of the potential emergencies is essential. It is necessary to be prepared for both natural and man-made emergencies. Response to emergencies will be different at headquarters than at the summit; hence, it is imperative that clear definition of procedures exist. Employees should familiarize themselves with response plans and review them frequently.

All summit personnel should be familiar with emergency procedures, equipment, and equipment location. The summit is very isolated, and the ERP will be the first line of defense during an emergency. All members of the team should be physically capable, and trained in specific emergency procedures. This training should include

- First aid / CPR
- Emergency evacuation procedures
- Shutdown procedures
- Fire fighting (very small fires only!)

An emergency is defined as an unplanned event that can cause death or significant injuries to employees, disrupt operations, or cause physical damage to equipment or the environment. The following emergency situations have been identified and are addressed in these plans:

- Hurricane and Severe Storms
- Earthquake
- Headquarters Fire
- Summit Fire
- Fire Rescue
- Cryogenics
- Power Outage
- General Spills
- Automobile Accident
- Acute Mountain Sickness
- First Aid
- Violence
- Bomb Threat

The effectiveness of response during an emergency depends on the planning and training performed beforehand. The time to know what action is necessary is before an emergency, not during one. Additionally, these plans are intended to be dynamic, that is, modifications will more than likely be necessary as events occur. Everyone should feel free to bring attention to any part of the plans which may need review or revision.

Remember that in spite of all efforts, planning and training, Murphy's Law will likely come into play at some time. Be prepared and do not take chances.

EMERGENCY PHONE NUMBERS

Always call 911 first.

911	County of Hawaii Emergency Services
961-8336	County of Hawaii Fire Department Dispatcher
969-2431	PTA Medical Clinic
969-2441	PTA Fire Department
969-2401	PTA Post Headquarters

Observatories

CFHT 961-2630, 961-2639	MKSS 935-7606
CSO 935-9853	UH88 974-4200
IRTF 974-4209	UKIRT 961-6091
JCMT 935-0852	VLBA 935-6719
SMA 933-6990	Gemini 933-7150
	Subaru 935-5861

Office of Mauna Kea Management Rangers	938-3020
	938-1180
	969-9613
OMKM (Bill Stormont after hours)	959-4417

SAFETY EQUIPMENT LOCATIONS

First Aid Kit Locations
- Headquarters: Conference Room
- Summit: Galley
- Headquarters: On file in computer lab

Oxygen
- Summit: Lounge

Eyewash Stations and Emergency Shower
- Headquarters: Shower near restrooms. Eyewash stations in Receiver Lab and Electronics Lab.
- Summit: Eyewash station in 2nd floor restroom. Emergency Shower outside Galley.

Fire Fighting Equipment
- Headquarters: Fire extinguishers at various locations.
- Summit: Fire extinguishers throughout facility.

Material Safety Data Sheets
- Summit: Galley

Emergency Evacuation Plans
- Summit: Plans posted throughout facility; specific Emergency Evacuation Manuals in binders in Control Room.

2 Hurricanes and Severe Storms

SUMMIT

Hurricanes:

Hurricanes are tropical cyclones with sustained winds in excess of 74 miles per hour. In the northern hemisphere winds cycle in the counterclockwise direction around a well- defined, low-pressure eye. The "eye" is generally 20-30 miles wide, but the storm may extend 400 miles or more. Three major factors make hurricanes particularly destructive:

- Storm surges
- Torrential rains
- High sustained winds

The strength and size of the storm generally determines the size of the surge, which can be thought of as a huge dome of water around the eye. Slow moving storms or storms that "stall" often generate unusually high surges. Combined with high tides, these surges can be tremendously devastating in low lying areas. Hurricanes do not have to hit a particular area for the effects of the surge to be felt. Although Iniki never came closer than 240 miles to the Big Island, the surge stripped every beach on the west side.

Flooding is a serious threat from the torrential rains associated with hurricanes. It is warm moist air which feeds a hurricane and the resulting rain typically falls with a vengeance. Even weakening storms can inundate huge areas. Several inches of rain an hour are not uncommon, causing severe flooding and landslides. Flooding often causes the most damage and deaths associated with a hurricane.

High winds, especially during prolonged storms, are extremely dangerous, producing hazardous missiles. Tree branches, signs, lawn furniture, etc., become lethal projectiles damaging homes and vehicles, and breaking windows. Trees may uproot from the saturated ground. Winds may gust over 200 mph near the center of the storm.

At wind speeds of greater then 45 MPH close the dome. At winds speeds of greater than 65 MPH, evacuate the summit. Notify other observatories.

A hurricane WATCH is issued when there is a threat of a hurricane within 36 hours. It does not mean a hurricane is imminent, but preliminary precautions

should be taken and weather forecasts monitored closely.

A hurricane WARNING is issued when expected hurricane conditions are 24 hours or less away. Again, this does not mean the hurricane will hit, but storm effects are likely to be felt in the area. Preparations should be made during this time: secure patio furniture, tape windows, listen to weather broadcasts. Leave the area if there is a likelihood of flooding from swollen creeks.

If a hurricane is imminent, all areas of headquarters should be secured. Water damage will most likely be the major problem; windows may break from flying debris, allowing rain to enter offices. Move sensitive equipment away from windows and off floors. Ensure that all doors and windows are securely shut. Check neighboring offices; others may be on vacation or travel.

Severe Storms:

High wind storms are not uncommon in Hawaii. Although rains may or may not be associated with these storms, serious property damage can occur from flying debris. Listen for Civil Defense warnings regarding high wind conditions.

The summit is particularly prone to high winds; always beware of flying ice and snow. High winds there may also blow a person down or a vehicle on ice. Use discretion at the summit during high wind conditions and avoid working outside. The lead person on duty monitors wind conditions and makes the decision to evacuate based on sustained wind speed, severity of wind gusts, and other factors.

Kona storms present a different kind of problem. Normally rain is from the prevailing northeast trades. Kona storms are from the west and often west facing walls are dry and the wood shrunken. Before the wood can swell, these walls often leak. Precautions should be made to minimize water damage during such storms by following hurricane procedures.

Flash floods occasionally occur, particularly on Saddle Road and the Summit Access Road. Watch for extreme weather conditions. Do not take chances driving through washout areas if unsure of depth and velocity of running water. The dirt road will be slippery and very rutted; proceed with extreme caution.

Thunderstorms and Lightning are also common year- round in Hawaii. Although usually not problematic, they can develop quite rapidly, particularly at the summit. Technical crews should be attentive to weather changes while working outside; the summit and environs are very exposed.

Localized high winds and hail are frequently associated with thunderstorms at

the summit. During such conditions, move all personnel and equipment inside. The dome is well grounded against lightning strikes, and they do occur.

If someone has been struck by lightning, administer first aid immediately. A person struck by lightning does not carry an electrical charge. Look for burns where lightning entered and exited the victim. CPR may need to be administered: remember, conventional CPR is ineffective at the summit; use the bag resuscitator.

Blizzards are frequent winter events at the summit. Transportation accidents are the leading cause of winter deaths. Be extremely cautious when driving the summit during winter conditions.

Blinding snow and white-out conditions can lead to severe vertigo and disorientation. Be sure all vehicle emergency supplies, shovels, chains, etc., are in place. It is easier to install chains at the facility than half way down the road. BE PREPARED.

Marginal weather is most common. "Black Ice" conditions occur during periods of low wind, high humidity, and cold temperatures. Ice accumulates quickly on vertical surfaces and covers the roadways and vehicles. Refrain from scraping your vehicle windshield and driving without adequate vision. Start the vehicle early and allow the defroster to do its job, along with the windshield resevoir de-icer solution. If ice on the roadway is substantial, it may be most prudent to wait at the summit until it melts. This could be a long wait. Therefore, if icing conditions start, it would be wise to leave the summit earlier, rather that waiting until it is too late to proceed safely. Again, keep alert to changing conditions.

Bring cold weather clothing at all times during winter summit commutes. Some food may also come in handy in the event a vehicle does get stranded. Cold stress exacerbates the effects of hypoxia; the symptoms are very similar. Impairments from cold exposure include diminished muscle capacity, mental deterioration, edema, and increased cardiac load. Do not leave the vehicle if stranded; it is easier to find the vehicle than individuals wandering about.

Winter winds at the summit often exceed gale force, 39 mph. Subsequent high wind chill can lead to hypothermia and frostbite. Large pieces of ice frequently fall from the dome and building; these can become lethal projectiles in high winds. Several people have received serious injury from falling ice, and often vehicles are damaged by flying ice blocks.

Snow may drift and accumulate at alarming rates, DO NOT DELAY DEPARTURE during bad winter conditions. The lead person on the mountain has the

authority and responsibility to evacuate promptly when weather deteriorates.

If summit observing crew or staff evacuates, please inform other observatories.

——————-Headquarters storm checklist:——————-

Pre-storm

- Move computers away from the windows, if there is a chance of window damage.
- Close windows and blinds.
- Unplug nonessential equipment.
- Secure loose items by the shop garage.
- Move recycle bins inside receiving room.
- Secure trash dumpster.
- Close all doors.
- Lock all outside doors.
- Ensure vehicle safety equipment is intact.

During-storm

- Minimize driving.
- Do not attempt to drive through large puddles or swiftly moving water.
- Watch for downed power lines.
- Be aware of wind-driven debris and falling tree limbs.
- Stay away from windows.
- Minimize use of telephones.

Post-storm

Do not attempt to move or fix anything until a full damage assessment has been completed. Check shops and labs for water. Check offices for broken windows

and water damage. Be particularly careful of precipitously hanging objects. Inspect utilities. Videotape all damaged areas for insurance purposes.

——————— Summit Storm Checklist ———————

Pre-storm

- Move computers away from the windows, if there is a chance of window damage.
- Close windows and blinds.
- Unplug nonessential equipment.
- Secure loose items outside.
- Close all fire doors.
- Lock all outside doors.
- Ensure vehicle safety equipment is intact.
- Evacuate summit in timely manner. Do not delay for any reason.

During storm

- Minimize driving.
- Do not attempt to drive through large puddles or swiftly moving water.
- Watch for downed power lines.
- Be aware of wind-driven debris and falling tree limbs.
- Stay away from windows.
- Minimize use of telephones.

Post-storm

- Do not attempt to move or fix anything until a full damage assessment has been completed.
- Check shops and labs for water.

- Check for broken windows and water damage.
- Be particularly careful of precipitously hanging objects.
- Inspect utilities.
- Videotape all damaged areas for insurance purposes.
- Clear doorways of snow and ice.
- Remove overhead ice near doors and walkways.
- Be especially alert to ice falling from dome and roof overhangs.
- Spread cinder on slippery walkways.
- Do not park vehicles near dome or ladders.
- Beware of falling ice.

3 Earthquake

Earthquakes on the Big Island are generally not severe; however, the potential exists for magnitude 6-7 earthquakes. Locally these can be very destructive. Earthquakes strike without warning; to minimize injury follow these rules:

- Do not place heavy objects on high shelves.
- Leave cabinet doors closed.
- Secure wall-mounted items.
- Identify safe places in rooms away from windows, bookshelfs, lockers, etc.

During an earthquake:

- Remain calm. Move away from loose objects, bookshelfs, and windows.

After an earthquake:

- Check others for injury; assist any injured personnel; emergency
- help may not be readily available.
- Assess damage.
- Inspect utilities.
- Beware of precipitously hanging objects.
- Unplug nonessential equipment until electric circuits have been inspected.
- Inspect shelves, wall shelves, cabinets, etc., for sustained damage which may make such items unsafe.
- Be careful opening cabinets; contents may have shifted.

4 Headquarters Fire

Fire can occur at any time without warning. It could be the most rapid developing and life threatening event in a person's life. All alarms should be taken seriously and proper procedure followed to minimize personal injury. Fire fighting should be limited to the incipient level, that is, during early stages before it gets out of hand.

All flammable materials such as paints, thinners, and solvents should be stored in the flammable liquid cabinets when not in use. Do not clutter these cabinets with paint brushes, rags, etc. Never store incompatible materials such as acids, bases, chlorine, etc., in the flammable liquid cabinets; these could react violently. Acids should be stored in the cabinet under the fumehood.

Small fires may be doused with a fire extinguisher, but a large fire should be handled by the fire department. Fire extinguishers are located throughout the facilities and employees should familiarize themselves with the locations. If unfamiliar with fire extinguishers, do not attempt to put out a fire; get assistance. Always pull the alarm before attempting to extinguish a fire. Also, call the Fire Department (911). Fire extinguisher training will be provided annually, and fire drills conducted periodically.

Use extreme caution when fighting a fire. Some rooms may fill quickly with toxic smoke. If a fire gets too far along, do not continue fighting it; rather try to isolate the room by closing the doors; this may extinguish the flames. Do not reenter the rooms in question until the area has been inspected by the Fire Department.

Never leave any cooking unattended, this includes stovetop, toaster, oven, and microwave cooking. In the event of a cooking fire, cover the material or use the fire extinguisher. Never throw flour on a fire; flour will explode!!

Alarm: When a fire alarm sounds, turn off lights, close doors, check all offices, restrooms, labs, and conference rooms, evacuate through the nearest clear exit, and go to the main parking lot. Account for all personnel and notify the Manager.

Seventy-five percent of all fire-related deaths are from smoke inhalation, not burns. Carbon monoxide poisoning is the most common fire-related death. It combines with blood 220 times faster than oxygen; a 5% carbon monoxide level will cause a 50% CO blood level in 30 seconds. Symptoms of carbon monoxide poisoning include shortness of breath, dizziness, headache, confusion, flush, and mottled skin. Other combustion toxins include hydrogen chloride, hydrogen

cyanide, carbon dioxide, phosgene, nitrogen oxide, formaldehyde, hydrogen sulfide, sulfur dioxide, and benzene. All combustion byproducts can cause severe respiratory ailment, respiratory failure, and death.

——— Headquarters Fire Checklist ———

- Sound alarm and call 911.
- Inform Manager.
- Turn off room lights.
- Shut office door.
- Check other offices while evacuating.
- Check labs, restrooms, conference rooms.
- Muster all personnel in the parking lot.

After Fire:

- Wait until fire department determines that fire is completely out.
- Assess damage.
- Electricians inspect electrical damage and assure safe to return power.
- Ventilate spaces.
- Send used extinguishers to Safety Officer.

5 Summit Fire

Fire presents a particularly serious problem at the summit, since no fire services are available. Be extremely alert to flammable liquids, solvents and combustibles. Flammability tests conducted at the summit demonstrate that solvents and fuels burn far more readily under hypobaric conditions. This is due to a faster rate of evaporation and loss of the nitrogen heatsink. Inspect areas before performing any Hot Work.

Examples of Hot Work are any of the following operations: grinding, torch cutting, welding, and brazing. Follow these guidelines before beginning any Hot Work:

- Consider all options to Hot Work: i.e., is there another way to accomplish the task?
- If Hot Work is deemed necessary clear it with the Safety Officer or Manager.
- Remove all combustibles from a hot work area. If combustibles are not removable, cover them with a fire resistant welding tarpaulin.
- While Hot Work proceeds maintain a fire watch.
- After Hot Work monitor area to check for smoldering fires.

Fire extinguisher training will be provided annually, and fire drills conducted periodically. When a fire alarm sounds, close doors, evacuate through the nearest clear exit, and meet outside the Receiving Room. Account for all personnel and notify the Lead Technician, who will assign response teams, direct fire suppression, and rescue efforts.

Fire suppression should be limited to incipient level extinguishment and be manned only by qualified, trained personnel. During normal work days, the lead person is ultimately in charge; others will be assigned tasks as conditions develop. Use CO_2 extinguishers as first resort, but go to chemical extinguishers if necessary. Open appropriate electrical circuits; when in doubt shut down the main panel in the welding shed: emergency lights should provide sufficient lighting. Do not re-initialize circuits until inspected by the electrician.

Caution: Fire extinguishers are pressurized for sea- level atmosphere of 14.7 psi, but at the summit the air column pressure is only 8.8 psi. Dry chemical extinguishers will shoot a stream up to 20 feet at the summit; the likelihood of spreading a fire is great. Be extremely aware of this. Rather than shoot the base

of the flame, start high and work down. Be careful of flashback with solvents, vapors spread very quickly and will easily re-ignite.

The hypoxic conditions at the summit present enough complications; fire will consume a fairly substantial amount of oxygen, exacerbating matters. It may be difficult to determine whether smoke is toxic or not, therefore always assume that it is. Even if there is little or no apparent smoke, remember carbon monoxide is odorless, colorless, and extremely lethal!! Do not enter a fire area and do not attempt to fight a fire alone.

Seventy-five percent of all fire-related deaths are from smoke inhalation, not burns. Carbon monoxide poisoning is the most common fire-related death. It combines with blood 220 times faster than oxygen; a 5% carbon monoxide level will cause a 50% CO blood level in 30 seconds. Symptoms of carbon monoxide poisoning include shortness of breath, dizziness, headache, confusion, flushed face, and mottled skin. Other combustion toxins include hydrogen chloride, hydrogen cyanide, carbon dioxide, phosgene, nitrogen oxides, formaldehyde, hydrogen sulfide, sulfur dioxide, and benzene. All combustion byproducts can cause severe respiratory ailment, respiratory failure, and death.

All flammable materials such as paints, thinners, and solvents should be stored in the flammable liquid cabinets located in shipping/ receiving cryogen room. Do not clutter these cabinets with paint brushes, rags, etc. Never store incompatible materials such as acids, bases, chlorine, etc., in the flammable liquid cabinets; these could react violently.

Oily rags and solvent rags must be put into appropriate cans. Do not throw rags or solvent soaked items in the trash; they will heat and ignite spontaneously. Wipe up all spills immediately. It cannot be overemphasized that all petroleum based products will burn at the summit including glycol.

Never leave any cooking unattended, this includes stovetop, toaster, oven, and microwave cooking. In the event of a cooking fire, cover the material or use the fire extinguisher. Never throw flour on a fire; flour will explode!!

——— Summit Fire Checklist ———

During Fire:

- Inform Lead.
- Call 911
- Muster all personnel in parking lot.

- Shut down power supplies.
- If very small fire, attempt to fight with hand extingushers.
- Abandon building if fire is beyond incipient stage.
- Notify Hilo office and the Manager.

After Fire:

- Assess damage.
- Ensure that the fire is completely out.
- Electricians inspect electrical damage and assure safe to return power.
- Ventilate spaces.
- Send used extinguishers to Safety Officer.

6 Fire Rescue (Summit)

Fire Rescue should be performed only by trained personnel with proper apparatus. No person at the CSO has current fire rescue training and the CSO does not maintain specialized equipment such as Self Contained Breathing Apparatus (SCBA). Therefore, if fire rescue is needed, call Keck for assistance: 935-8643, 935-1853.

However, for informational purposes, the following fire rescue instructions for Keck personnel are included here:

FIRE RESCUE INSTRUCTIONS FOR KECK PERSONNEL.
(Included here for reference only.)

Seventy-five percent of fire-related injuries and deaths are associated with smoke inhalation not burns. Never attempt a rescue without proper equipment, particularly Self-Contained Breathing Apparatus - SCBA. Do not, for any reason, remove the face mask or air connection to an SCBA. Always work in pairs during fire fighting or rescue. This is essential in the event an SCBA unit may malfunction; these units can be connected to a single tank. Moreover, it is easier to move victims by working as a team.

The most important factor in a fire-related rescue is to remove the victim from the area of the fire or smoke source. This is one of the few times not to be overly concerned with spinal injury. Time and safety are of the essence, and it is paramount to remove the victim before administering first aid, for your safety as well as theirs. Remember, there does not have to be visible smoke for an area to be dangerous; carbon monoxide is colorless, odorless, and extremely lethal. Move the victim to a known safe area.

When rescuing a victim, bring along a functioning oxygen bottle or Emergency Escape Breathing (EEBA) pack to facilitate the victim's breathing. Be aware that a victim may have serious judgement impairment and may even become belligerent. Talk to them soothingly and calmly, logic will eventually prevail.

WARNING: Conventional CPR is not effective at high altitude. The provider simply does not exhale sufficient oxygen to be of use to the victim, especially under exertion. There are resuscitator masks available for administering CPR. These units require a tight seal, therefore it may be necessary for two people to effectively employ these units. The resuscitator masks can be hooked to an oxygen line, but it is not essential, there is enough air delivered by the bag itself.

————-Fire Rescue Checklist————

During Fire Rescue:

- Don SCBA.
- Bring EEBA or oxygen for victims.
- Work in teams of two, do not risk doing it alone.
- Remove victim to a safe area before attempting resuscitation or first aid administration.
- Let outside teams administer first aid.
- Pay attention to SCBA alarms; move to a safe area immediately after tank volume alarm sounds: there is less than 5 minutes of air left at this point.

First Aid Teams:

- Resuscitation is crucial. Conventional CPR is not effective at the summit. Use resuscitator units.
- Administer first aid as needed after victim is breathing on their own.
- Assist in evacuation from summit, coordinate with outside medical units.

7 Cryogens

SUMMIT

Cryogens at the CSO are limited to helium and nitrogen for instrument cooling and calibration. Cryogenic liquids exist well below ambient temperatures, and environmental heat input leading to gas evolution is unavoidable. One liter of cyrogen will evolve into about 750 liters of gas at standard atmospheric temperature and pressure. Excess pressure for a nitrogen dewar must be bled through a relief valve, typically set at 35 psi. It is essential that the relief valve remain open at all times to avoid excessive pressure build up. The same principles apply to liquid helium dewars - they must be properly vented at all times. Excessive pressure build up in storage dewars also leads to inefficient cryogen transfer operations. In general, liquid helium storage dewars should be kept at about 3 psi for this reason. Also note that maintaining a slighty positive pressure in the dewar aids in keeping room air and moisture from icing up inside cold dewar vent and fill tubes. Eventually such icing up can obstruct fill and vent tubes leading to an "ice plug". In extreme cases, ice plugs can lead to to gas pressure buildup and dewar failure. If you think an ice plug is present, consult experienced personnel such as Richard Chamberlin, Ed Bufil, or Allen Guyer.

Safe handling of cryogens is imperative. Properties of common materials are drastically altered upon contact with cryogens. Ductile materials become brittle and can fracture with exposure. Skin can rapidly freeze upon contact; personal protective equipment is mandatory and **includes gloves and face shield**.

Liquid helium is only 3.7 ° C above absolute zero; once released, helium can freeze surrounding air. As the air thaws, nitrogen boils away first at ≈ -200 ° C followed by oxygen at ≈ -190 ° C: this difference in boiling point can leave a dangerous, possibly explosive, oxygen-enriched region locally. Hot work should be avoided near a helium transfer; greasy rags and oil should also be removed from the area.

The expansion ratio from liquid to gas ranges from 700 -750 volumes; often the air (including oxygen) is displaced since the cold gas generally sinks. This may make an area dangerously oxygen deficient, particularly a closed room. Beware of bleed-off in the closed spaces. A 100% nitrogen atmosphere will immediately shut down a person's cardiovascular system.

During a fill, the instrument dewar must come down to cryogenic temperature. Do not remove fill pipe too rapidly or liquid may boil out violently. Continue with other disconnections while letting the instrument adjust.

Emergency Response: Beware of oxygen deficiency in the vicinity of a major cryogenic accident. EVACUATE AREA! Cold gas will displace ambient air including oxygen. Do not enter the vicinity of a cryogenics accident without Self-Contained Breathing Apparatus (SCBA) (Call Keck for assistance from SCBA trained personnel.) SCBA Equipped personnel should check oxygen level at the site of a major spill, minimum allowable oxygen level is 16.5%. Keck has an oxygen monitor.

Remove victims to a known safe zone before administering first aid. Severe cryogenic "burns" are similar to burns from fire. Do not rub skin or thaw frozen flesh with heat, this causes more damage. Slowly thaw skin with a warm water bath of between 99-105 ° F; do not overheat or burns may occur. Cover wound with loose gauze to prevent infection.

————————-Cryogen Accident Checklist ————————-

During Cryo Accident:

- Dewar ruptured, evacuate area.

After Cryo Accident:

- Don SCBA. (CSO personnel are not trained in the use of SCBA's. Ask Keck for assistance.)
- Measure oxygen levels in vicinity of cryogenics release, if less than 16.5%, do not enter area without SCBA.
- Close open valves if possible.
- Clear area until flow stops.
- Check oxygen level before entering area without SCBA; ask Keck for assistance in determining area safety.
- Remove injured personnel: Do not use heat on frozen skin; warm very slowly with warm water; resuscitate if necessary; get immediate medical help.

8 Power Outage

SUMMIT

Power failure is usually no more than a temporary inconvenience; however, a prolonged outage may disrupt certain equipment performance. Computers and systems should be shut down before reinitialization after a long outage. The UPS system is battery powered only. In the case of a prolonged outage (more than 20 minutes), start to power down computers and electronics.

For starting the backup generator and transferring Dome power to it, see the special instructions in the next section in this binder. Also see the online version at http://puuoo.submm.caltech.edu/docs/pf/pf.html

During power outage:

- Initiate plan to transfer power to backup generator. See plan in next section of this binder or http://puuoo.submm.caltech.edu/docs/pf/pf.html.
- When backup generator is running, close dome.
- AFTER dome is closed, restart CTI compressors.
- If power outage is more than 20 minutes begin to shutdown and power off computers.
- Start to remove power from other electronic modules. Don't forget to fully attenuate all receiver Local Oscillator chains.
- Ascertain likely cause of power outage: HELCO, accident, fire, local, widespread?

After power outage:

- Initiate transfer of power back to HELCO mains. See the special instructions in the next section of this binder for HELCO power restoration instruction or at http://puuoo.submm.caltech.edu/docs/pf/pf.html.
- Re-boot computers.
- Check equipment operation.
- Report problems to the Manager.

9 Chemical Spills

SUMMIT

There is a potential for large spills of hydraulic fluid at the summit. EPA and HIOSH regulations require extreme care in clean up of spills to protect personnel and the environment. Precautions must be strictly adhered to during cleanup, particularly the use of personal protective equipment. Read the appropriate MSDS on the material being handled; MSDS's are located in the galley. Contact Safety Officer and the Manager as soon as possible.

Personal protective equipment (PPE) should include gloves, glasses or goggles, respirator, boots and coveralls; PPE is located in the cabinet outside the machine shop on the Apron Area. Spill cleanup materials are located in the safety locker. "Quicksorb" is very effective for cleaning oil and solvent spills. We have several 50 pound bags located on the ground floor under the tepee structure.

Prevent oils, glycol, etc., from getting into drain systems. Ventilate area as soon as possible, but do not circulate fumes in the return air system. Assume the air is contaminated, evacuate all non-essential personnel to a known safe area. Beware of ignition sources whenever solvents or flammable liquids are involved. Additionally, they may spontaneously combust if cleanup material is not placed in a grounded metal container.

Glycol has been shown to be very flammable when dispersed on any foam insulation surface. It is imperative that any glycol spill be thoroughly cleaned from all surfaces. Do not just dilute glycol, the water will eventually evaporate leaving a highly flammable thin film which could ignite. The flash point of glycol is only about 100°C and in thin films sufficient vapors are produced to support combustion.

Transportation of drums is strictly regulated by EPA and Department of Transportation (DOT). Call the Safety Officer or Manager with any questions.

Dispose of cleanup materials in appropriate metal containers. Do not throw rags or towels in the dumpster.

General Spills Checklist

General cleanup procedure:

- Isolate the source of the spill; shut down feed lines.

- Ensure no ignition sources are in the vicinity.
- Ventilate spill area, but do not circulate through return air system.
- Notify the Safety Officer or Manager for instructions.
- Check MSDS for proper cleanup procedures.
- Personal Protective Equipment must be worn: rubber gloves, boots, goggles, coveralls, and possibly respirators.
- Spill kits: peat, peat dams, and absorbent pads. Use "quicksorb" or other absorbant materials.
- Dispose of cleanup material in proper metal containers.

10 Mercury Spills

The CSO does not use mercury in its operations. However, other observatories, such as Keck, do. Since large quantities of mercury are present at other summit sites, be advised of the following:

Mercury is a poison Mercury can enter the body in three ways: absorption (skin and eyes); ingestion; and inhalation. A single, serious acute mercury exposure can lead to permanent health problems including death.

11 Automobile Accident

The daily commute to the summit probably represents the most dangerous aspect of work at the CSO. In the event of an accident, notify headquarters as soon as possible by using the cellular phone. Call 911 and give instruction as to location, injuries, etc. If Pohakuloa Training Area (PTA) is closer, have 911 direct the call - PTA is available 24 hours a day, 365 days a year.

The summit access road is winding, steep and dangerous; there are grades up to 17%. Brakes do not cool effectively in the rarefied air and can easily overheat; avoid excessive braking. ALWAYS USE LOW GEAR! Speed limits are for passenger and vehicle safety and must be obeyed. Review the driving placard on the driver's visor before operating any vehicle. The speed limit on the cinder road to the summit is 25 MPH. However, be advised that actual safe speed may be reduced depending the varying road conditions and the vehicle characteristics.

Weather can deteriorate rapidly and ice, snow, wind, or fog are factors that require special attention. Never drive faster than the weather conditions warrant; slow is best. Beware that the lower access road is OPEN RANGE; be prepared to stop for cows.

Black ice is a common problem at the higher elevations, and a number of vehicles have overturned. If black ice conditions are suspected, keep vehicle in four-wheel drive and drive slowly. Chains may be necessary.

In case of trouble or accident, each vehicle has a notebook in the glovebox giving emergency phone numbers and instructions what to do in case of an accident. Reporting all accidents to the CSO management is required and there is a reporting form. Also, it is mandatory to call the police and have them fill out an accident report for any accidents involving a second vehicle, or any accidents involving an injury.

Each vehicle has a first aid kit and an emergency kit which contains: emergency strobe, space blankets, body heaters, special first aid supplies. A shovel and chains are also provided. In the case of an accident or vehicle malfunction whereby you may be stranded:

- Call from the cellular phone.
- It is easier to find the vehicle than someone wandering about; stay with the vehicle until assistance or rescue arrives; use emergency kit supplies.
- Blinding snow or white-out conditions can lead to severe vertigo.

- Extreme cold and windchill can lead to serious hypothermia and frostbite.
- Judgment impairment at high altitude cannot be over- emphasized! Do not take chances.

In the event of an accident, take precautions against Bloodborne Pathogens. The emergency kits are equipped with latex gloves and masks, which should be donned before helping a victim. Assume all blood is infectious, take precautions seriously.

Emergency Kit Contents:

- Resuscitator mask
- Latex gloves
- Surgical masks
- Emergency strobe
- Batteries
- Space blankets
- Ace bandages
- Stretch gauze
- Trauma compresses
- Telfa gauze pads
- Shears
- Tape
- Alchol Pads
- Flashlight
- Flares
- Fire extingusher
- Tow strap
- Ice scraper
- Elastic bandages
- Vehicle block

- Triangle bandages
- Misc gauze
- Pain reliever

After an Accident:

- Call 911: give location, injuries.
- Is Pohakuloa Training Area closer?
- Are victims in immediate danger?
- Don masks and gloves before assisting.
- Calm victims, reassure them that everything will be all right.
- Call Headquarters.
- Fill out Police Accident Report.
- Fill out CSO Personal Injury Report and submit to the Manager.

12 Acute Mountain Sickness

SUMMIT

The summit is very isolated; there are no medical facilities or public services. Familiarize yourself with the Emergency Evacuation Plans located in this binder. It will explain physiological adjustments, medical evacuation, ambulance use, oxygen administration, etc.

Work at the summit is quite unique and various physiologic changes occur for the body to adjust. Mild discomfort at high altitude is common among first time visitors, but symptoms are usually confined to slight Headache, dimmed vision and/or mild disorientation. Occasionally symptoms progress to Acute Mountain Sickness (AMS), which is usually transitory; however, AMS can become serious. There are "tricks" to help alleviate certain AMS symptoms: drink plenty of fluid (Gatorade helps immensely), pressure breathe, slow down, and avoid excess exertion. Remember, judgment may deteriorate rapidly with worsening AMS: report any changes in symptoms; and, watch for physical or behavioral changes in others.

Serious forms of AMS can include symptoms such as chest pain, delirium, excessive coughing, or migraine headache. If any symptoms worsen, evacuation will likely be necessary. Do not wait; it is easier to remove a conscious victim than an unconscious one. Victims may not respond at Hale Pohaku (HP); be prepared to meet an ambulance at the hunter station at Saddle Road. There have been cases of severe AMS at HP.

> Edema is one of the more serious symptoms of AMS. Edemas result from the body's blood supply dumping fluid (in order for the blood to carry more oxygen), with most of the fluid concentrating in the lungs and cranial cavity. This fluid build-up is often re-absorbed with ill effect.
>
> Occasionally, fluid accumulates more rapidly than the body can absorb it. The result is **pulmonary or cerebral edema**: two very serious conditions. Pulmonary or cerebral edema can be fatal. Clinical studies have shown that at an altitude of 14,000 feet, 0.5% of adults and 8% of children under 16 will suffer from pulmonary edema. Males and females are equally effected.
>
> In High Altitude Pulmonary Edema (HAPE), the lungs become waterlogged, thus increasing hypoxic symptoms to potentially critical levels, leading to respiratory failure. A very rapid rest heartbeat (tachycardia), very rapid breathing (tachypnea), chest pains (dyspnea), and cyanosis (blue skin) are early indications of HAPE.

> High altitude cerebral edema (HACE) is the result of fluid release in the cranial space. Characteristics include intense headache, loss of coordination (ataxia), and loss of sensory ability (obtundation) which can lead to coma. HACE may progress very rapidly and is far more severe than HAPE. Early symptoms are weakness, disorientation, irrational behavior and hallucinations[2]

About 5-10% of first time visitors may faint. Sometimes there is little warning, but usually it is preceded by dizziness and disorientation. Recovery is usually fairly swift and oxygen administration followed by pressure breathing helps. Keep the victim calm, it is likely they will not remember the incident and often are embarrassed. If they panic, this will severely impede recuperation.

Hypoxia will slightly impair memory and judgment at the summit. Therefore, it is important to keep others informed of the following: your location; physical discomfort; changes in condition of others; and, oxygen usage.

Emergency supplemental oxygen is available in the first aid room should the need arise. The supply is very limited; please inform the lead technician whenever oxygen has been consumed. There is nothing worse than having an emergency only to find an empty oxygen cylinder! Read the information on oxygen administration provided in the emergency evacuation section of this binder. Low flow rate is usually sufficient, 3-4 liters per minute. Keep masks clean! Remember, pressure breathing is far more useful than supplemental oxygen and can be employed anytime.

Also available in the summit lounge is an Airsep unit which can supply unlimited oxygen at 5 liters/minute. However, it must be hooked up to a 120VAC supply so it is not useful for evacuating a sick person.

AMS emergency

- Victim's symptoms: mild, serious?
- Headache, shivering, nausea, no coordination, chest pains?
- Check fingernails and lips: cyanotic?
- Administer oxygen 3-4 liters/min until recovered.
- Lethargic expression, unresponsive, irrational? Administer oxygen at 3-4 liters/min.
- Worsening condition - evacuate.

[2] L. Olsen and A. Perala, "Adjustments to Altitude", CARA memorandum (1994)

Pressure Breathing

- Take deep breath.
- Expel about 1/2 breath through pursed lips under slight pressure. Do Not Hold
- Breath!!
- Expel remaining air.
- Repeat 5-7 times per minute for several minutes or until symptoms abate.

13 First Aid

General

First aid kits are located in the summit galley, all summit vehicles, and in the headquarters conference room. These are well supplied and routinely checked. When tending injury victims, take necessary precautions against bloodborne pathogens and infectious transmissions; there are gloves, face masks and resuscitator masks in the emergency kits. Assume every victim is infectious, do not administer first aid without surgical gloves.

Many CSO employees have had first aid/CPR training at one time. Do not be afraid to administer first aid to a victim, any response is usually better than no response. Training is effective, and correct procedure is quickly recalled in emergency situations. Always call for assistance before beginning treatment on a victim. At headquarters, call 911 in serious cases.

The first procedure in first aid administration is to stabilize the victim. Always assume there may be spinal injury, therefore it is imperative to minimize movement until a full survey of injury is complete. Keep the injured victim calm, shock is exacerbated at altitude and an adrenaline rush will seriously affect their judgement.

SUMMIT

Conventional CPR is not effective at the summit; special resuscitator masks are available and located by the oxygen unit. These masks work by tightly fitting the mask over the victim's mouth and nose, and squeezing the blue bag. The resuscitator masks may be connected to the oxygen units; flow rate is regulated by the mask. Sufficient air is passed without attaching the oxygen line, however, therefore resuscitation may begin before connection.

Bruises, particularly at the joints, tend to swell more at high altitude due to the fluid dumping associated with edema. Ice packs should be administered as soon as possible to minimize swelling. Often there is a slight drop in blood pressure after a bruise is sustained, and it is not uncommon for the victim to faint from a blow.

A consequence of hyperventilation associated with hypoxia is the expulsion of large quantities of carbon dioxide. This can result in a rise in blood pH known as blood alkalosis. A high blood alkalinity can disturb blood electrolytes and extend clotting time slightly.

Emergency Evacuation:

Due to the isolation of the summit, it is likely that evacuation of seriously injured personnel will be done by staff. It may also be necessary to employ the Emergency Evacuation Vehicle (EEV) located at CSO parking lot. This vehicle is well supplied with first aid equipment, removable stretcher and oxygen. CSO keys are located in the key box over Allen's desk in the galley.

Call 911 for county medical services and inform them of the severity of the situation. There are medivac helicopters available, but it will take time for the helicopter or ambulance to mobilize. Therefore, begin evacuation immediately and rendezvous at a pre- determined location. The emergency evacuation map lists five possible sites for linking with the medivac unit. In order of preference:

- Saddle Road hunter station: elevation 6,000'
- Hale Pohaku: 9,300'
- Lower parking lot on paved road: 11,400'
- 2nd Parking lot: 12,800'
- Accident Site: above 13,000'

The EEV is equipped with a cellular phone: 936-0281. Use this phone to maintain communication regarding victim's condition, location, weather hazards, etc. Two persons are necessary for evacuation: a driver and a first aid responder.

In the event of a major catastrophe, contact other observatories for assistance. Describe the situation and inform them of any additional equipment that may be necessary.

Emergency Response

- Call 911.
- Give location.
- Describe situation.
- Determine whether county or PTA can respond more quickly.
- Describe weather conditions.
- Confirm rendezvous point.

- Describe vehicle being used.

First Aid Administration

- Don latex gloves if blood or bodily fluids present.
- Calm victim; reassure them that they will be all right.
- Inform Lead.
- Be careful moving victim, assume spinal injury and take necessary precautions.
- Watch for signs of shock.
- Do not leave victim unattended.
- Keep victim warm; there are body warmers in the vehicle emergency kits and blankets in the first aid room.

After First Aid:

- Fill out Injury/Incident report and send to Office Manager.
- Clean all blood and body fluids with 10% bleach solution.
- Dispose of bandages, rags, towels, etc., in a sealed bag and label as medical waste.

14 Violence

Report ALL threatened or actual violent acts immediately to the Manager.

Violence in the workplace is the second cause of all occupational deaths among males, and the leading cause of workplace deaths for women. On the average, 15 people a week are murdered at work. It can happen at any location and at any time. All violence is disruptive and the underlying stress associated with violent acts or threats is detrimental to productivity and morale. Employees should be familiar with signs that may indicate a co-worker is having problems which could potentially trigger a violent episode.

Underlying causes of violent behavior are varied and complex. Be attentive for drops in performance, constant complaining, personality changes, emotional outbursts, and signs of excessive stress. Whatever problems may be present, sometimes just talking about them will help alleviate pressure. Concerns should be directed to the lead or other supervisor for remediation. Usually problems can be resolved before there is unwanted confrontation.

No one has the right to threaten another; all threats should be taken very seriously and should be reported. Avoid confrontation if a co-worker or stranger makes threatening statements; it may only provoke them further. Notify the Manager immediately.

Off-street violence is also a possibility. It is everyone's responsibility to ask any unrecognized person if they require assistance. If a stranger is acting peculiarly, notify the Manager. Do not provoke anyone, let the police handle any difficult situations.

Before Confrontation

- Attempt to defuse a situation before tempers flare.
- Report any threats or harassing statements to the Manager.
- Do not goad or encourage any disgruntling discussions.
- Be alert to posturing or other antisocial behavior.
- Do not take sides in any confrontational situation.
- Do not hesitate to notify the Police if there is a question regarding violence.

During Confrontation

- Duck.
- Contact the Manager immediately.

15 Bomb Threat

SUMMIT

The likelihood of a bomb threat is fairly remote, however not an impossibility. Most bomb threats are a hoax, but the potential for serious injury and damage is real and could result in disastrous consequences.

In the event of a bomb threat, keep the person on the phone and try to get someone's attention. Inform the Office Manager or Lead immediately. The Office Manager or Lead should contact the police, then proceed to evacuate the building. The emergency response team should inspect all areas for objects that do not belong. Note any suspicious packages, but do not move suspected bombs. Make inspections quickly.

Remain calm and try to get as much information as possible from the caller. It may seem silly, but many callers will confess a fair amount of information. Ask:

- Who is calling? What is your name?
- Why have you placed a bomb?
- Where is the bomb?
- What does it look like?
- When will the bomb explode?
- How many bombs are there?
- How will the bomb be detonated?
- Make note of what the caller is saying. What is their tone of voice: calm, disguised, nasal, broken, angry, stutter, slow, accented, loud, emotional, slurred? Is the voice familiar?

WARNING: Do not use portable radios, they could detonate a bombing devise.

——————— Bomb Threat Checklist ———————

During Bomb Threat

- Remain calm.

- Have someone call police.
- Obtain as much information from caller as possible:
  - Who is calling? What is your name?
  - Why have you placed a bomb?
  - Where is the bomb?
  - What does it look like?
  - When will the bomb explode?
  - How many bombs are there?
  - How will the bomb be detonated?
- Note time of call.
- Note caller's tone of voice.
- Note any background noise.
- Write down caller's exact words.
- Evacuate building.
- Inform the Manager immediately.

After Bomb Threat

- Enter building only when cleared by the police or fire department.
- Report any suspicious packages.

16 Glossary

AMS	Acute Mountain Sickness
Apron Area	Area near front of telescope on first level
Cyantonic	A blueness of lividness of the skin caused by by a deficiency of oxygen.
EEV	Emergency Evacuation Vehicle
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
Headquarters	Hilo Base Facility, 111 Nowelo Street
HAPE	High Altitude Pulmonary Edema
HACE	High Altitude Cerebral Edema
HELCO	Hawaii Electric Company
HIOSH	
Hot Work	Grinding, welding, brazing, or torch cutting operations
HP	Hale Pohaku
Incipient stage fire	E.g. trash can fire or small chemical fire. Anything more significant probably can not be extinguished with hand extinguisher. Evacuate.
Lead Responder	See definition, Part I, Section A
MSDS	Material Safety Data Sheet
PPE	Personal Protective Equipment
PTA	Pohakoula Training Area
SCBA	Self Contained Breathing Apparatus

17 Appendix A

...Duties of the Safety Officer...

1. Monthly Inspections
   a. All fire extinguishers at the summit and in Hilo will be visually inspected.
   b. All smoke detectors at the summit will be checked.
   c. All first aid kits at the summit and in Hilo will be checked.
   d. All rigging gear and cranes for lifting loads will be inspected.
   e. All stores of safety equipment will be checked and restocked as necessary.

f. All flashlights will be inspected and fixed and restocked as necesssary.
g. All chemical supplies will be checked and for proper labeling and storage.
h. the operation of the emergency generator will be checked.
i. Adequate supply of propane fuel for the generator will be verified.
j. MSDS sheets will be maintained on all the chemical inventory.
k. All hydraulic systems and flex lines will be checked for leaks and proper function.
l. All wire-ropes in the dome running gear will be check for fraying and/or abnormal wear.
m. (Ed Bufil and Diana Bisel) will perform regular inspection of the vehicles to verify safety, equipment, fluid levels, etc.
n. All inspections will be complete by the first Friday of each month.

2. Record keeping
   a. checks of all items in 1. above will be logged on monthly sheets.
   b. Copies of log sheets will be maintained at the summit and Hilo.

3. Annual inspections
   a. Will remind management when annual inspections on cranes are due.
   b. Will make sure that inspection tags on fire extinguishers at summit and in Hilo are up to date.