



**NOAO-S Operations  
May-2010**

**WINTER OPERATIONS - PLAN  
FOR EMERGENCY WEATHER SITUATIONS  
AT AURA INC.**

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**INTRODUCTION**

This document is a guideline of integrated procedures to permit an effective management of emergencies caused by intense weather conditions which could be the source of inundations and or snow accumulation at the Observatory's operational centers of Cerro Tololo and Cerro Pachón.



## **I. OBJECTIVES**

- These principles have been set up to establish the protocol when dealing with hazards that may affect Observatory installations in wintertime, especially to ensure the safety and health of AURA, Inc. staff, visitors, contractors, and in general to take care of everyone who is at an Observatory mountain installation during an emergency weather condition event.

## **II. SCOPE**

- Permit operations to continue in adverse weather conditions such as: snowfall, rain, storms or any abnormal circumstances that is a hazard for AURA, Inc. employees who work on Cerro Tololo or Cerro Pachón.
- Achieve a methodical and constant integration procedure for all AURA Programs, aiming towards an ongoing operation before, during and after emergency weather situations.
- Operate an adequate procedural approach for adverse or emergency weather conditions.
- Establish specific responsibilities in different work areas.
- Minimize the effect that atypical conditions may have on personnel, equipment or observatory installations.
- Maintain the road open only if conditions are safe and apt for vehicle traffic.

Complying with these procedures is compulsory for all personnel who work permanently or transitorily at AURA Observatory installations on Cerro Tololo and Cerro Pachón, including scientists, visitors and contractors.

## **III. GENERAL PROCEDURES**

### **Winter Time**

AURA, Inc. will consider the period between 15 April and 15 September of each year as Winter time.

During exceptional or emergency weather situations, the NOAO-S Operations Manager, in coordination with the AURA-O Program Site Managers, will assume management of the emergency situation. All operative Units of the observatory shall be under his supervision from the time the emergency was declared and until the emergency is over.

Should the NOAO-S Operations Manager not be readily available, the Cerro Tololo Site Manager will take on the responsibility of conducting operations during the emergency. If



neither of them were on hand, the NOAO-S Director will designate the person who will be in charge of operations during the emergency.

During Alert Level III emergencies, and at the request of any of its members, an Emergency Committee will be set up. The Committee will be comprised by the AURA-O Director, the Administration and Facilities Manager, the Program Safety Experts and representatives of the Programs based in La Serena. The mission of this committee will be to assist the NOAO-S Operations Manager, contact local authorities and public services, coordinate the allocation of special resources and organize the creation of rescue teams or additional support while there is an emergency.

If a critical situation develops due to inclement weather conditions after winter time operations are over, the NOAO-S Operations Manager will be empowered to exceptionally put in place the regulations stated in this handbook.

### **Unexpected Bad Weather Events**

Telescope operators are an important line of first alert for bad weather conditions that develop during the nighttime hours.

1. On Tololo, the Blanco 4-m telescope operator should alert the Mountain Operations leader (in the absence of the NOAO-S Operations Manager) on duty AND the guard station at the Gate of any "threatening conditions" (snow, thunderstorm, strong rain, or other conditions that may cause safety concerns) as soon as such conditions are noted, especially when a bad weather forecast alert has not been issued in anticipation.

2. On Pachón, both the Gemini and SOAR telescope operators should notify the Mountain Operations leader on duty (in the absence of the NOAO-S Operations Manager) of any threatening conditions as soon as they begin, and should maintain the Mountain Operations leader informed of the conditions as they develop. These Pachón-based staff should also coordinate any movements (e.g., from dome to dorm or, more significantly, from dome down the mountain) with the Mountain Operations leader to ensure their safety under such conditions.

3. During threatening adverse weather conditions on the mountain, the Gate Guard in La Serena will instruct the bus driver to stand by at the Recinto and wait for clearance by the NOAO-S Operations Manager or his designee to resume or abort the trip to the Mountain.

The Guard on duty at the Observatory Gate will keep the barrier closed until the NOAO-S Operations Manager instructs him to open it to traffic or otherwise keep it shut until an evaluation of the road provides solid assurance that it is safe for vehicle traffic.



**The NOAO-S Operations Manager or his/her representative will have the following attributes:**

- Coordinate mountain activities with the Emergency Committee.
- Coordinate emergency activities with Site Managers according to the information supplied by each Program before the emergency, or according to counsel provided by the Emergency Committee.
- Call all Tololo and Pachón area leaders to a meeting.
- Restrict transit of persons and vehicle traffic.
- Issue special instructions regarding the nonstandard or emergency situation.
- Bring all activities to a standstill.
- Decide the anticipated evacuation of personnel to La Serena in coordination with each Program Site Manager.

**IV. PRINCIPAL ACTIVITIES**

The NOAO-S Operations Manager will activate the following proceedings as deemed necessary.

- 1) Advise the AURA-O Director and the Administration and Facilities Manager of his decision to establish a predetermined emergency Alert Level.
- 2) Synchronize the necessary emergency condition and alert levels with Site Managers according each situation.
- 3) Assign responsibilities and teams to face the emergency.
- 4) Instruct the Heavy Equipment Operator to remain on Cerro Tololo.
- 5) Together with an assistant, will inspect and evaluate the road conditions from Tololo to the Entrance gate. Assistance from the nurses or additional personnel may be required if necessary.
- 6) Coordinate the centralization of all information at the R.O.B. with Gemini, SOAR and CTIO delegates.
- 7) The R.O.B. on Cerro Tololo will be the communications center for all mountain emergencies and will set in operation continuous radio, telephone or any type of communications available with the La Serena Reception and with the Entrance gate to the Observatory to:



- Be the communications courier within mountain Operations.
- Periodically report the existing weather conditions on Tololo and Pachón.
- Inform traffic restrictions from and to Tololo/Pachón.
- Respond to general inquiries on the mountain.
- Place “do not use” signs on cars for astronomers.

***Everyone is obligated to ask ROB (tel. 440 – or via Radio VHF) BEFORE executing any type of job, personnel transfer, vehicle movement or evacuation process from any of the operation areas on the mountains.***

8) Road traffic

- Authorize traffic of vehicles and instruct drivers regarding the current road conditions and restrictions for vehicles and people.
- Suspend traffic of light vehicles (continuous rain for over 8 hours, torrential rain for more than 4 hours; over 20 cms. of accumulated snow, blizzards, ice, and slippery road); vehicle usage will be restricted to emergency vehicles.
- Suspend use of astronomer’s vehicles should there be any snow and/or ice.
- Evacuate personnel from Gemini and SOAR facilities in advance, if the current conditions allow effective control over risks. Conversely, personnel must take refuge in the 20 Units, Hotel or telescope installations until safe and expedite evacuation channels are arranged.
- Provide a transport system for astronomers between rooms and telescopes while the conditions still allow for safe transport, when they deteriorate the telescope area will be evacuated in coordination with the Site Managers and personnel in charge of those areas.
- Suspend the personnel transport (buses) and heavy cargo transport to ensure that personnel suffer no risks and avoid the deterioration of the road surface.
- Monitor and place warning signs at hazardous locations like: road damage, gulches, avalanches and or landslides, cave-ins, major chasms.

9) Clearing the Road

Heavy equipment and earth moving machinery will be based on Tololo. The NOAO-S Operations Manager will coordinate the road clearing work with Garage according to the following priorities:

- Start to clear **one track of the road** from the Cerro Tololo Garage to the telescope parking area, ROB Casino.
- Tololo El Quisco.
- El Quisco Hotel Cerro Pachón.
- Hotel – Gemini/SOAR Telescope area.
- Return to El Quisco and continue towards the Entrance Gate should the principal road be in need of repair.
- Return to Tololo to clear the other track of the road.



Subject to wet weather conditions the clearing of the following roads will be considered:

- Drinking water and electrical distribution systems service road.

The clearing of areas adjacent to each telescope and parking zones will be the responsibility of each Site Manager.

**General road clearing and restoration norms:**

- The clearing, cleaning and restoration work on roads will be carried out only during daylight, except upon special instructions by the NOAO-S Operations Manager.
- The heavy equipment operator will always be accompanied by an assistant, who will be equipped with a VHF radio and carry all the regular personal protection items indicated for this type of procedure.

**10) Meeting with Area Leaders**

The NOAO-S Operations Manager may call a meeting with all Area Leaders to cover the following concerns:

- Permanent coordination with Site Managers, ROB, Entrance Gate and Emergency Committee in La Serena.
- Continuous information and analysis of the condition of the emergency situation.
- Inform and take preventive and corrective measures in the most critical workplace locations.
- Relocation of personnel who are working out-doors or in risk areas.
- Set up clearing crews and designate them to well-defined areas by priority.
- Instruct the Warehouse Manager on the equipment and material that must be delivered to the crews, operators and other people according to guidelines.
- Instruct the Lead Kitchen person and Nurse regarding the preparation of emergency packages, which will be delivered to operators, drivers and other personnel working outdoors.
- Promulgate AM and PM reports to La Serena Direction regarding local weather conditions, road conditions, decisions taken, special circumstances, situation of the resident and visiting personnel, difficulties, pending tasks, support needed, or any other circumstance that should be notified (supported by photographic material).



## **V. RESPONSIBILITY BY AREA**

### 1) Operations

Make emergency roads and detours available for the safe evacuation of personnel; clean culverts and gullies.

### 2) Tololo Garage

#### a) Heavy Machinery

The highest priority will be given to equipment; checking of mechanical conditions and emergency gear to the subsequent machines in the following order:

Motorgrader:

Revise:

- Fuel
- Leveling
- Lights
- Windshield wiper
- Slings
- Snow chains and tensors
- Spades
- Emergency Package (thermal clothing, personal protection equipment and food)
- VHF radio

#### b) Bulldozer (when intense snowfall occurs)

#### c) Payloader (when intense snowfall occurs)

#### d) 4x4 vehicles

The Head of Garage and the Cerro Pachón Site Managers are responsible for assuring that the emergency vehicles are in perfect mechanic conditions and fully equipped to face an emergency during the entire Winter Operations, along following guidelines:

- Full fuel tank
- Lights, windshield wiper and heating working
- Slings, snow chains, tensors and spades
- Emergency Package
- VHF Radio
- Thermal clothing
- 4 battery portable flashlight
- Pliers
- Jute sack



- 2 pairs of snow chains and tensors
- Screwdriver
- Fire extinguisher in good condition
- Vehicle radiator with antifreeze liquid
- Tires with tread area in good condition

These vehicles will be on hand to be made use of upon instructions by the NOAO-S Operations Manager, or the person he designates.

- c) Ambulance inspection  
This vehicle must be checked by Garage personnel and by the nurse on shift.
- d) Emergency Generators inspection  
Make sure the generators are working correctly (start up), in La Serena, Tololo and Pachón.
- e) Use of snow chains  
The NOAO-S Operations Manager will determine when Garage personnel need to install snow chains and on which vehicles.

### 3) Responsibility of Other Departments

Personnel who are not part of the emergency crews, or have not been assigned specific duties, will remain at their worksite and wait for instructions from their supervisor. They should channel inquiries regarding the situation on hand through their area supervisor so as not to cause congestion at the ROB or extension 440.

### 4) Program Responsibilities

- Each Program Site Manager will act as a coordinator, collaborating directly with the NOAO-S Operations Manager before, during and immediately after each weather emergency phase.
- Each Program Site Manager must deliver to the NOAO-S Operations Manager, via the most expedite approach, the roster of personnel on duty at each Unit and the roster of personnel on shift during weekends or throughout emergency periods.



## **VI. GENERAL RULES FOR DRIVERS**

All drivers who drive on AURA roads must inform themselves of the state of the roads and the climate conditions at the location beforehand. This information will be available at:

- The Emergency Operations Center at the Cerro Tololo ROB, tel. 440 or via VHF radio communications.
- Corresponding Program Site Manager
- Guard at the Entry gate.

Traffic is prohibited during weather emergency periods, aside from those vehicles that have been specially conditioned to transit during exceptional situations and have been duly authorized, by the NOAO-S Operations Manager, to operate during emergency weather conditions. As a precaution, it will be obligatory to use snow chains when driving under this situation.

All personnel authorized to operate vehicles during weather emergencies must:

- 1) Ask his/her direct supervisor BEFORE activating the vehicle.
- 2) Ask his/her direct supervisor BEFORE leaving the Tololo/Pachón area.
- 3) Mount the snow chains.

## **VII. GENERAL INSTRUCTIONS**

1. After consultation with the AURA-O Director and the Management of Administration and Facilities, the NOAO-S Operations Manager will determine the duration of the emergency situation.
2. All personnel will obey the instructions given by the NOAO-S Operations Manager.
3. The gatekeeper at the entrance will not allow **anyone** who does not possess a previous authorization, issued by the NOAO-S Operations Manager or the ROB, to continue on to Tololo or Pachón.
4. Upon notification by the ROB, Reception will communicate NOAO-S' operational situation to the Observatory Director, Administration and Facilities Manager, Personnel Office and Emergency Committee.
5. La Serena personnel who wish to travel to Tololo or Pachón must previously check with Reception, who in turn will check with the ROB on Tololo.
6. Reception will notify all Observatory public tour visitors as well as the tour guides, of the cancellation of the programmed tour.
7. The Tololo/Pachón Operations "Jefe de Turno" will automatically assume the function of Operations Manager NOAO-S during holidays, days off and weekends. Should this position be temporarily occupied by contractor or subcontractor personnel, the Operations Manager will designate the person who will be responsible of coordinating communications on the mountain during the emergency period.



## **VIII. ALERT WARNING**

The Alert warning procedure is a set of combined measures that the Organization applies to ensure the safety of people, equipment and installations during hazardous circumstances caused by foul weather conditions. The alert level is related to the magnitude and seriousness of the emergency.

**Alert:** The NOAO-S Operations Manager or his delegate will make an announcement based on the available weather forecast, informing that a change of weather conditions might bring snow storms, wind or rain. When an Alert is announced, all activities and recommendations are subject to the norms set forth for each Alert level.

The only person who is authorized to announce an Alert warning is the NOAO-S Operations Manager or his delegate.

An Alert warning does not mean imminent “Danger”, it is a notification of changing weather conditions that are present or may occur shortly, we therefore recommend that when an Alert is given you:

- Do not get distressed
- Be calm
- Do not argue about or interfere with instructions that are being given. All suggestions will naturally be suitably considered.

### **Alert 1 (Green)**

Diligence is applied to transport of food, fuel, material and equipment in anticipation to the possibility of foul weather conditions affecting the zone.

- This Alert should not cause unrest among staff, it only indicates that there are several possibilities of there being foul weather conditions, however the front could dissipate.
- The heavy equipment operator remains on Cerro Tololo.

### **Alert 2 (Yellow)**

Storm in progress, the evolution to Alert 2 cannot be estimated. Hence the progress from one alert to another can happen in minutes.

- All surface jobs are stopped.
- Traffic is restricted.
- Outdoor transit of persons is cancelled.
- Communications and traffic between La Serena/Tololo and Pachón is restricted.
- Weather information is provided every 12 hours.



### **Alert 3 (Red)**

Severe weather conditions of snow, intense rain, little or no visibility, danger of landslides and gorges on road, high possibility of road blockage.

- Vehicle traffic prohibited.
- It is prohibited for people to transfer themselves or transit outdoors.
- The NOAO-S Operations Manager has absolute control over all traffic and all communications.

Once the storm has abated and the unsafe condition is within a tolerable range according to site inspections that have assessed damage to road and installations, or upon a request by the Emergency Committee, Operations will remove the corresponding Alert indicator. Personnel will be informed by means of a written report to the Program Representatives and Site Managers, who will take the necessary steps to return to normal operations.

The restrictions recommended to be continued until back on normal work mode, will be made known once the “all clear” sign has been given.

## **IX. SAFETY GUIDELINES DURING THUNDERSTORMS**

Lightning tends to fall on elevated objects, whether it is a building or a tree, this is because electric charges are accumulated at the highest points. The best sources of protection are lightning rods. Following are some recommendations:

### **Safer Locations during Thunderstorms and Locations to Avoid:**

- No place is absolutely safe from the lightning threat, however some places are safer than others.
- Large enclosed structures (Substantially constructed buildings) tend to be much safer than smaller or open structures.
- In general, fully enclosed metal vehicles such as cars, trucks, buses and cars with the windows rolled up provide good shelter from lightning.

### **Avoid being in or near:**

- High places, isolated trees, telescopes, unprotected gazebos, shelters, communications towers, flagpoles, light poles, metal fences, convertibles, water (ocean, lakes, swimming pools, rivers etc.)
- If in an open field do not turn to escape the storm. You should have no problem lying flat on the ground, which will reduce the risk of being hit by lightning.

### **When you are inside:**

- You should close all doors and windows, and not walk on wet floors or with wet



shoes on.

- Do not handle tools or metallic objects during the storm.
- Avoid the use of telephone, taking a shower, washing hands, doing dishes, or any contact with conductive surfaces with exposure to the outside such as metal door or window frames, electrical wiring, cable TV wiring, plumbing, etc.
- Do not use electrical appliances.

#### Associated risks

- Human life
- Animal life
- Electrical and electronic equipment damage
- Fire

#### Lightning protection protocol:

If you are working at an Industrial site you will need a high level of protection:

Suspend all work:

- With cranes
- Soldering jobs
- On Electrical systems
- At heights (towers, rooftops, scaffolding)
- Plumbing work.
- Taking tank measurements
- Others?

### **X. SNOW STORMS – PREVENTIVE MEASURES**

- Close access roads to worksite.
- Evacuation of smaller vehicles.
- Avoid transit during snow fall.
- If caught in the storm, under no condition abandon your vehicle.
- If it is necessary to change locations, the use of snow chains is mandatory.

### **XI. PENALTIES**

Considering that the objective of the procedures addressed in this document is to safeguard the life, health and safety of people and avoid significant material loss for the organization, the non-compliance of any of these proceedings will be considered to be an act of inexcusable negligence and regarded as a severe fault, which could be penalized with immediate dismissal for AURA-O employees in Chile or the ending of a Contractor or Subcontractor contract.



**The Spanish version of this document has been checked and approved by the following:**

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**ANNEX**  
**EMERGENCY TELEPHONES**

❖ AURA INC. PERSONNEL EMERGENCY TELEPHONES

Personnel		La Serena	Tololo/Pachón	Home	Cel
R. C. Smith		<b>205214</b>	<b>205463</b>	<b>205520</b>	<b>074306434</b>
H. E. Bustos	*	<b>205321</b>	<b>205217</b>	<b>491424</b>	<b>98270270</b>
M. González	*	<b>205372</b>	<b>205440</b>	<b>551450</b>	<b>85951989</b>
R. Aguirre	*	<b>205383</b>	<b>205437</b>	<b>486832</b>	<b>97426840</b>
Gale Brehmer	*	<b>205415</b>	<b>205415</b>	<b>205298</b>	
E. Artigas	*	<b>205230</b>		<b>293539</b>	<b>99819301</b>
Peter Mcevoy		<b>205602</b>			<b>91286375</b>
Diego Maltes		<b>205702</b>			<b>98748083</b>
Eduardo Serrano		<b>205387</b>	<b>205500</b>	<b>485067</b>	<b>93270953</b>
Tim Abbott		<b>205216</b>		<b>294361</b>	<b>09-8748139</b>

(\*) MUST BE INFORMED ALWAYS

❖ EMERGENCY INSTITUTIONS TELEPHONES

Security Entity	Telephones
Hospital Vicuña	411263
Hospital La Serena	225569
Bomberos Vicuña	411242
Bomberos de la Serena	225768
Carabineros Vicuña	651162
Carabineros de la Serena	211172
Mutual Vicuña	411386
Mutual de la Serena	421600
Clínica Elqui	411263
Policía de Investigaciones de la Serena	224488
Policía de Investigaciones de Vicuña	411897