
WINTER OPERATION PLAN AND CLIMATE EMERGENCY SITUATIONS FOR AURA INC

2020 Version



I. OBJECTIVE

- This plan has been prepared to control the risks that affect the facilities of the Observatory during winter season, and mainly to ensure the safety and health of AURA Inc workers, contractors, visitors and, in general, all persons who are in any of the Observatory sites, facilities in the mountain and/or during the development of periods of climatic emergency.

II. SCOPE

- Restrict, control and allow the operation of the Observatory in situations or conditions of adverse weather, such as: snowfalls, rains, storms or before any condition that, due to its unpredictable nature, is dangerous to AURA Inc workers in Cerro Tololo and Cerro Pachon;
- Having an adequate organization in situations of adverse weather conditions or in emergencies;
- Establish specific responsibilities in the different work areas;
- Minimize the effect that unpredictable weather conditions could cause to the personnel, machinery or facilities in the Observatory;
- Guarantee safe access routes for the transit of emergency vehicles after adverse weather conditions.

THIS PLAN AND ITS PROCEDURES ARE MANDATORY. COMPLIANCE IS REQUIRED FOR ALL PERSONNEL WHO VISIT OR PERFORM WORK ON A PERMANENT OR TRANSITIONAL BASIS AT THE AURA OBSERVATORIES FACILITIES, AT CERRO PACHÓN, CERRO TOLOLO, CERRO PEÑÓN AND CONTROL PUERTA. INCLUDING TECHNICAL PERSONNEL, SCIENTISTS, VISITORS, CONTRACTORS AND SUBCONTRACTORS.

III.- GENERAL PROCEDURE

Winter Period

The winter period at AURA Inc in Chile is considered the period between April 15th and September 15th of each year. However, the same action plan will be considered when unfavorable weather situations occur at any time of the year.

The FOC NOIR-Lab Management will keep updated information on the meteorological condition based on what has been reported by the Chilean Meteorological Directorate. In the context of the winter plan, the FOC NOIR-Lab Management are the Department Manager and the Head of Civil Works. In the event of a qualified emergency or climatic emergency situation, the FOC NOIR-Lab Management, acting in coordination with the Site Managers of the AURA-O Programs in Chile, will assume the management of the emergency situation, under which all the functional units of the Observatory will be immediately and from then-on under its supervision.

If the FOC NOIR-Lab Management is not available, the NOIR-Lab Mountain Assistant on duty will assume responsibility for the communication of operations during the period of climate emergency.

If none of the persons named above is available, the Director of COS NOIR-Lab will designate the person in charge of directing operations during periods of climate emergency.

During development of emergencies at the request of any of its members, the **Emergency Committee** will be constituted, which will be made up of the Director of AURA Observatory (or his/her designate), the Manager of FOC NOIR-Lab, the Expert of Safety of the different Programs and the representatives of the Programs or Site Managers, with operations based in La Serena. This Committee will have the mission of assisting the FOC NOIR-Lab Manager in his duties, to make contact with local authorities and public services, coordinate the allocation of special resources, or coordinate the designation of rescue teams or additional support during the development of climatic emergencies.

During the emergency, the Official Communication will only be issued by the person in charge of the emergency, Head of Civil Works with the support of the Mountain Assistant.

Control Puerta will only proceed according to its indications; No one else will be authorized to use radios to deliver information.

Outside the winter period and due to prolonged rainfall, thawing, roadcuts or other emergencies, the FOC NOIR-Lab Manager will be empowered to put this plan into effect on an exceptional basis.

Unexpected Bad Weather Situations

Personnel on duty in Telescope and Operations areas designated to report bad weather situations (with training) represent an important source of information to issue early alerts regarding bad weather conditions that may occur during night hours.

Both in Cerro Tololo and Cerro Pachón (8m Telescope, 4m Telescope, SOAR Telescope and Operations), the staff on duty should alert the FOC NOIR-Lab Management, represented by the Head of Civil Works or in his absence the Mountain Assistants, regarding any ‘threatening’ situation (snow, thunderstorms, heavy rain or other conditions that might be a risk) as soon as they become aware of the existence of adverse weather conditions, especially when there are no prior warnings regarding these conditions.

The personnel based in Cerro Pachon, in addition, must coordinate their movements (for example, from the telescope to the bedroom or, most important, to get down from the Mountain) with the Head of FOC and/or the Site Manager of its corresponding facilities to ensure that the evacuation operation is carried out with the highest level of safety.

IV.- EMERGENCY COMMITTEE

POSITION	PERSONNEL	LA SERENA	TOLOLO/ PACHON	MOBILE
COS Director	John Maclean	279		+16307881430
Head of Facilities Operations Chile (FOC)	Andres Sanhueza	205	463	9 9139 1894
Head Civil Work	Fabrizio Bruno	281	482	9 9825 7958
Electrical Engineer	Mauricio Soto	316	487	93259 4023
Facilities Lead Gemini Observatory	Jorge Parra	644	744	9 9543 0213
Telescope Manager Gemini Observatory	Pablo Diaz		717	997790256
Site Manager SOAR	Fabian Collao	307	509	9 8318 6117
Site Manager CTIO Manager TELOPS	Esteban Parkes	307	415	9 8595 6206
AIV Manager Vera Rubin	Jacques Sebag	399	535	9 5440 0409
Site Manager Vera Rubin	Eduardo Serrano	387	594	9 9327 0953

Safety AURA	Mario González	371	436	9 7878 2511
Safety NOIR-Lab	Mariela Silva	382	435	9 5123 3132
Safety Vera Rubin	Giovanni Corvetto	285	809	9 77130548
Safety Gemini	Randall Castillo			9 8890 2442

V.- RESPONSIBILITIES

1. The Head of Civil Works, in coordination with the FOC NOIR-Lab Manager or whoever represents him, will have the following responsibilities and powers:

- To communicate the emergency via Whatsapp to the group *Information Operations*.
- To coordinate the activities of the operations of both Mountains with the Emergency Committee.
- To coordinate emergency activities with the Site Managers and Gate Control according to the information provided by each Program before the start of an emergency, or by the information provided by the Emergency Committee, as appropriate.
- To notify the COS Director about the alert level. The Director will communicate the determination to the Legal Representative of AURA and the Director of AURA-O.
In case of highest emergencies, the Program Directors must be informed, and with the AURA-O Director will decide the levels of preventive measures that are pertinent to adopt.
- To restrict the transit of people and vehicles, through control puerta and La Serena Guards, depending on the alert level.
- To issue special instructions according to emergency or abnormal situations.
- To inform and continuous analysis of the development of the emergency.
- To stop activities.
- To decide the evacuation of the personnel to La Serena before scheduled, coordinating the particular situation of each Program with the Site Managers accordingly.
- If technical support is required, the Program Safety Coordinators and AURA should be consulted to the appointment of responsibilities and assignment of teams to face the emergency.
- To inspect and evaluate the conditions of the roads with the team work.
- To communicate every two hours of the progress of the emergency, or more frequently if necessary, by portable radio, radio station on the way or by telephone communication to the Mountain Assistant.
- To centralize the information in the Round Office Building with the Mountain Assistants; who will make the communication with the Directorate and Safety if the Head of FOC is not in a position to do so.

Evaluation and Maintenance of Roads

- To assume the responsibility for access (control puerta).
- To authorize the traffic of vehicles and instruct drivers regarding current road conditions and restrictions on the traffic of vehicles and people.
- To suspend light vehicular traffic when necessary; the use of vehicles will be restricted only to emergency vehicles.
- To suspend traffic of astronomical vehicles in the presence of snow and/or ice.
- To evacuate personnel from Gemini, Rubin and SOAR facilities in advance if current conditions allow effective risk control. Otherwise, people must remain in refugee facilities 20 Units, Hotel or dependencies in telescopes to provide safety and expedited routes for evacuation.
- To provide an itinerary transportation system for Astronomers between rooms and telescopes, as long as conditions are safe; otherwise, the telescope area will be evacuated in coordination with the Site Manager and the personnel in duty of these areas.
- The suspension of the traffic of personnel transport and transport of heavy cargo, safeguarding the integrity of people and avoiding further deterioration of the road roll folder.
- To keep risk places monitored and signed, such as: destruction of the road, water crossing, avalanches and/or landslides, roadcuts.
- To the clearing of earthmoving machinery roads and emergency teams, the base will be in Tololo or El Quisco if the emergency warrants it.

The Head of Civil Works will coordinate the road clearance work according to the following priority:

- The clearance begins on ***one road*** starting from Cerro Tololo, warehouse area, and proceeds to the parking telescope area. ROB Casino Tololo; Cerro Tololo - El Quisco; El Quisco - Cerro Pachon Hotel area; Cerro Pachon Hotel - Gemini Telescope and SOAR Telescope area, including entrance to Rubin site.
- Return to El Quisco and continue to the entrance in case the main road is in poor condition.
- Return to Tololo to enable on the way on two roads.
- All clearing will be done leaving a layer of approx. 5cm of snow on the ground so as not to damage the road surface.

Depending on the precipitation conditions, the clearance of the following routes will also be considered:

- Electrical distribution systems and drinking water.
- Clear the areas adjacent to each telescope and the parking areas.

Safety measures to enable roads:

- The clearance, cleaning and clearance of road works will be only performed during daylight hours, except for special instructions from the Head of FOC in the event of severe emergencies.
- The Heavy Equipment Operator will always be accompanied by an assistant, and equipped with a communication radio and will have the personal protection elements indicated for these operations.

2. Mountain Assistants

The Mountain Assistants located in the ROB Cerro Tololo building will be the communication center for all emergencies on the Mountain, and will maintain a continuous plan for radio, telephone, WhatsApp and email communications, in direct coordination with the Head of FOC. The responsibilities include:

- As dispatcher of communications in accordance with the instructions received from the person in charge of the Emergency within the Mountain Operations;
- Instruct the Guards about the level of alert, and the signaling adopted in Gate Control. The Guard of Gate Control and La Serena will maintain alerts as ordered by the Head of FOC through the Mountain Assistants, it is prohibited to order or change orders by any third party;
- Periodically report on the existing climate situation in Tololo/Pachon in coordination with the Head of FOC;
- Report traffic restriction to and from Tololo/Pachon;
- Respond to general inquiries in the mountains;
- Place notice of non-use of vehicles in astronomer's cars.

EVERYONE IS REQUIRED TO CONSULT WITH ROB (EXTENSION 440) OR VIA RADIO, BEFORE PERFORMING ANY WORK OR MOVEMENT OF PERSONNEL OR VEHICLES OR ANY EVACUATION PROCESS FROM ANY AREA IN THE MOUNTAIN OPERATIONS.

VI. COMMUNICATIONS

The Head of FOC may convene the heads of different areas to discuss the following points:

- Permanent coordination with the Mountain Assistant, informing the Program Directors, Safety Coordinators, Site Managers.
- Regular information with the Emergency Committee in La Serena.
- Formation of cleaning teams and designation of different areas by priority.
- Instruct Site Managers on special materials and equipment to distribute to the teams, operators and others as directed.
- Instruct the Head Chef on the preparation of emergency packages, which will be delivered to operators, drivers and other field personnel, as appropriate.
- Send written reports and/or by WhatsApp am and pm to the COS Director about local weather conditions, road conditions, decision making, special conditions, situation of resident and visiting staff, difficulties, pending tasks, necessary support or other conditions that merit to be informed (supported by pictures). This report must be ratified with the staff of the Chilean Meteorological Directorate.

In higher emergencies, the Head of FOC must inform the COS Director and agree on joint actions.

VII. ACTIVITIES AND RESPONSIBILITIES BY AREA

1. AREA OF OPERATIONS

Preparation for the Winter Period

- ***Road Maintenance***

Enabling of emergency roads and by-pass detours for safe evacuation of personnel; cleaning of sewers and drainage channels, repair of berms. Acquisition of warning signs.

- ***Machinery Maintenance***

The highest priority will be given to preventive maintenance, equipment, verification of mechanical conditions and emergency equipment. All vehicles and machinery must be implemented with emergency equipment and chains.

- ***Generator Maintenance***

Preventive maintenance of the generators will be carried out in the event of a power outage due to an electrical storm.

During the winter period

- **Operations:**

- Start Winter Plan; Poner en marcha Plan Invierno;
- Maintain authorization of emergency roads and by-pass detours for the safe evacuation of personnel; cleaning of sewers and drainage channels, repair of berms;
- Keep the main roads in good conditions.

- **Tololo Garage:**

- a) ***Motorfan:***

- Revision of:

- ✎ Fuel for 7 operational days minimum.
 - ✎ Oil levels.
 - ✎ Lights.
 - ✎ Windshield wiper.
 - ✎ Steel cables.
 - ✎ Turnbuckles and chains.
 - ✎ Shovel.
 - ✎ PEE:
thermal clothing and personal protective equipment, food.
 - ✎ Communication radio.

- b) ***Bulldozer (if required)***

- c) ***Front Loader (if required)***

- d) ***Double traction vehicles 4x4 (if required)***

- **Emergency vehicles**

- The Garage Supervisor and Site Managers at Cerro Tololo, Cerro Pachon and Cerro Peñon; they will be responsible for ensuring that emergency vehicles are in perfect mechanical conditions and with emergency equipment throughout the entire period of Winter Operation, according to the following guidelines:

- Vehicles filled with fuel.
 - Light, Windshield wiper and heating.
 - Steel cables, chains and shovels.
 - Emergency kits.

- Communication Radio VHF
- 4 batteries torch.
- Pliers.
- Yute bag.
- 2 pairs of chains and turnbuckles.
- Screwdriver.
- Fire extinguisher in good condition.
- Vehicle radiator with antifreeze.
- Tires must be with its tread in good condition.
- First Aid kit.
- Bottles of water.

These vehicles will be at the disposal of the Head of FOC or the person he designates.

- **Ambulances**

This vehicle must be checked by the Garage Staff. It will be the responsibility of the staff of the First Aid Rooms to report any damage in a timely manner.

- **Other equipment**

- a) ***Electric Backup Generators***

The proper functioning and condition of the emergency generators (start-up) will be verified, both in La Serena, Tololo and Pachon.

- b) ***Placement of Chains***

Each user must install the chains to their vehicle in charge when a climatic emergency occurs.

- c) ***Clothing and Personal Protective Equipment (PPE)***

It will be the responsibility of each program/service to coordinate that the personnel maintain and use appropriately the clothing and PEE that has been granted for weather emergency conditions.

2. OTHER DEPARTMENTS RESPONSIBILITIES

Personnel who are not part of crews or who have not been designated to carry out special tasks will remain at their workplaces and await instructions from their respective managers. These personnel ***should only channel their queries through their respective area managers*** in order to avoid a congestion of queries in Extension 440 (Round Office).

It will be the responsibility of each program/service to coordinate that the personnel maintain and use in an appropriate manner, and in a timely manner, the clothing and PPE that has been granted for climatic emergency conditions.

Preventative and corrective measures should be taken for the most critical workplace situations. In addition, if the personnel who are working outdoors or in risk areas suspend their activity, they should be supervised. When weather conditions are adverse, only personnel in charge of emergency operations will work outdoors.

3. PROGRAMS RESPONSIBILITIES.

- **Follow the instructions of the FOC designated emergency manager.**
- The Site Manager of each program will act as coordinator collaborating directly with the Head of FOC before, during and immediately after each period of climate emergency.
- The Site Manager of each program must inform the Head of FOC, by the most expeditious means available, the payroll of the personnel assigned to each of its units, and the payroll of the personnel on duty during weekends or during periods of emergency.

VII. GENERAL RULES FOR DRIVERS

Only FOC authorized vehicles may enter. All authorized drivers who transit through the areas located within the property of the observatory must inform themselves of the state of the roads and the meteorological situation of the place. And they must abide by instructions such as the mandatory use of chains.

This information will be available in the following places:

- Emergency Operations Center in the ROB Office of Cerro Tololo, extension 440, or through communication by the VHF radio communication system.
- Site Manager correspondant Program.
- Gate Control, who can only repeat the information issued by the FOC Management.

During periods of climatic emergency, vehicle traffic will be prohibited with the exception of vehicles specially equipped to circulate during these exceptional situations and duly authorized by the FOC Management. However, the vehicles that are authorized to circulate under climatic

emergency conditions must comply with the safety requirements demanded at the time, such as use of chains or others.

All personnel duly authorized access to operate vehicles during the emergency period, must:

1. Consult with their direct manager BEFORE starting the vehicle.
2. Consult with their direct manager BEFORE leaving the Tololo/Pachon area.
3. Proceed to the placement of chains.

VIII. GENERAL INSTRUCTIONS

1. The staff will follow the instructions of the Head of FOC or his representative.
2. Gate Control Tololo will not allow ANY vehicles to enter Tololo or Pachon without the prior authorization of the FOC Management.
3. The FOC Management will keep the office of the Director of COS and the Emergency Committee permanently informed of the evolution of the climatic emergency and the conditions of operations in the Mountain.
4. La Serena personnel who need to go up to Tololo or Pachon must consult with the Head of FOC and coordinate with ROB in Tololo before they leave.
5. Reception will notify all possible visitors of the cancellation of the mountain permit, also notifying the Visitor Service Guide of the action taken.
6. The Mountain Assistant will automatically assume the role of Operations or FOC.
7. On holidays, shift days and weekends, the Head of FOC will designate the person who will take responsibility for coordinating communications at the Mountain during the emergency period.

IX. ALERTS

The Alert procedure is a set of measures applied by the Organization for the safety of people, equipment and facilities in risky conditions caused by bad weather situations. The alert ranges are related to the magnitude and severity of the emergency.

Alert: According to the available weather forecast, the Alert level corresponds to a notice that the Head of FOC -or his representative- announces when the weather conditions may change due to forecasts of changes in the weather condition, such as snow storms, wind or rains. Given an Alert, the activities and recommendations are subject to the rules established by each alert.

The only person authorized to issue the Alert is the Head of FOC, or who represents him.

Alerts do not mean an imminent ‘danger’ condition, as they are only warnings of events or bad weather situations that are coming or are present, so we recommend that each time an Alert is issued:

- Do not be alarmed.
- Stay calm.
- Do not discuss or interfere with the instructions that are issued. Naturally, the suggestions will be duly considered.

ALERT 1 (Green)

The movement of food, fuels, materials and equipment is streamlined, in the face of the approach of a bad weather front that will affect the area.

- This alert should not cause greater concern among workers, since it only indicates that there is a great possibility that there is bad weather in the area and that even this front of bad weather could even dissipate.
- Heavy machinery is maintained in the El Quisco area.

In addition, it is necessary to warn the work areas of the descent of trucks and emergency materials to La Serena, and the Operations truck to Gate Control or La Serena.

ALERT 2 (Yellow)

Heavy rain in development, the Alert 2 cannot be dimensioned in time. So the passage from one alert to another can occur in a short period of time.

- Work is suspended on high surfaces and outdoors.
- Restricted vehicular traffic. Only for 4x4 vehicles, not Captiva models vehicles.
- Transit of people is suspended.
- Traffic and communications between La Serena/Pachon/Tololo are controlled.
- A report on weather conditions is issued in the morning and afternoon, every 12 hours.

ALERT 3 (Red)

Severe climatic conditions: snowfall, intense rains as a result of great frontal activity in the Area, little or no visibility, danger of landslides and roadcuts, high risk of cutting roads.

- Vehicle Traffic condition: Prohibited.
- Prohibited transit of people outdoors.
- Absolute control of traffic and all communications to the Head of FOC.

Once the storm has passed and the risk situation is contained within a tolerable range, as evidenced by on-site inspections and verification of damage control on roads and facilities, or at the request of the Emergency Committee, the Head of FOC will proceed to withdraw the corresponding alerts and all the personnel will be informed by means of the distribution of a written report to the Directors of the Programs and the Site Managers so that they take the measures of return to their normal operations accordingly.

The restriction that will be recommended once the alerts are completed will be reported, until returning to the normal work situation.

X. PROCEDURES FOR ACTION DURING ELECTRICAL STORMS.

As the lightning tends to go over any high object, be it a building or a tree, and as the electrical charges tend to accumulate at the highest points, the best protection is 'lightning rods', here are some recommendations given by the National Meteorological Institute:

- Do not take refuge under an isolated tree. Humidity and height increase the intensity of the electric field and attract the charge. Trees that form forest are less dangerous because they increase the chances that the electric spark will fall far.
- If you are in the middle of the field, do not run to escape the storm. It's very dangerous. If the thunderstorm is very intense, there is no problem in being horizontal on the ground, which minimizes the risk of being struck by lightning.
- Close doors and windows. Do not walk on wet floors or with wet footwear.
- Avoid staying on top of hills or on top of telescopes; seek shelter in low places or inside offices.
- Do not go out the door or have the windows open.
- Do not handle tools or metal objects during the storm.
- Stay away from metal bars or fences. They could cause death even without being in contact with them. For this reason, it is recommended to stay away from all kinds of machinery, vehicles and tools.
- During the storm do not use electrical appliances; use the phone only in an emergency.
- If you are inside a vehicle, you must stay inside. Vehicles are a good shelter inside, but being out or near a vehicle could be very dangerous.

Associated risks:

- Life of the people.
- Life of the animals.
- Damage to electrical and electronic equipment.
- Fires.

Comprehensive lightning protection system.

Suspend works:

- with cranes.
- welding.
- on electrical systems.
- at heights (towers, scaffolding, roofs)
- tank gauging.
- explosive works.
- outdoors, as maintenance.

XI. SNOW STORMS: PREVENTIVE MEASURES

- Closure of access roads to sites.
- Evacuation of minor vehicles.
- Avoid driving during snowfall
- In case of being surprised by bad weather, do not abandon the vehicle for any reason.
- If transit is required, the use of chains is mandatory.

XII. SANCTIONS

Considering that the procedures contained in this document are intended to protect the life, health and safety of people, and avoid material losses of a significant amount for the Organization, failure to comply with these procedures will be considered an act of inexcusable negligence and serious misconduct, which may be sanctioned up to the immediate termination of employment contracts in the case of AURA Chile personnel and contractors, in accordance with the disciplinary measures provided in the Internal Regulations of Order, Hygiene and Safety of AURA Inc.

This document has been reviewed and endorsed by the following people:

1. Andres Sanhueza, FOC NOIR-Lab Manager.
2. Fabrizio Bruno, NOIR-Lab Head of Civil work
3. Mariela Silva, Safety Coordinator NOIR-Lab

ANEX 1. EMERGENCY PHONES SUPPORT INSTITUTIONS

Institución	Teléfonos
ACHS Ambulance	1404
Ministry of Health COVID-19	600-360-7777
Vicuña Hospital	51 2 411263
La Serena Hospital	51 2 225569 (51 2 228103)
Vicuña Fire Station	51 2 225768 - 51 2 411242
La Serena Fire Station	132 / (51 2 225592)
Vicuña Police Station	133/ 51 2 651162
La Serena Police Station	133/ 51 2 211172 (51 2 651081 Primera comisaria)
La Serena Mutual	51 2 421600/ (Urgencia 51 2 223019)
Elqui Clinic	51 2 411263 (51 2 563000)
ACHS Vicuña	51 2 2411221
La Serena PDI	51 2 224488
Vicuña PDI	51 2 411897