

ARM Mobile Facility 2 (AMF2)
Safety Manual

– AWARE –

**McMurdo Station
West Antarctic Ice Sheet (WAIS)**

Antarctica

PRO(ESH)029_AMF2 AWARE safety manual_160601

June 2016

Field Instruments Deployments and Operations (FIDO)
Los Alamos National Laboratory

www.fido.lanl.gov

PROCEDURE Author: FIDO/BoM	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 2 of 32
---	---------------------------------------	---

Contents

CONTACTS	4
INTRODUCTION	5
SOP: GENERAL WORK (ALL WORKERS).....	7
SIGN-OFF SHEET.....	7
GENERAL WORK OVERVIEW.....	8
1. <i>Orientation</i>	8
2. <i>General Rules:</i>	8
3. <i>Site Safety Equipment, Personal Protection Equipment (PPE)</i>	9
4. <i>Material Handling (all personnel)</i>	9
5. <i>Elevated Work Areas (all personnel)</i>	10
6. <i>Soldering (BoM technicians, ARM system specialists, and LANL employees)</i>	10
7. <i>Hazardous Materials (BoM technicians, ARM system specialists, and on-site technicians only)</i>	10
8. <i>Instruments (BoM technicians and ARM system specialists only)</i>	11
9. <i>Pressurized Gasses (BoM technicians, ARM system specialists, and LANL employees only)</i>	11
10. <i>Personal health, recreation, weather, local hazards awareness (all personnel):</i>	11
SOP: ELECTRICAL SAFETY (ALL WORKERS).....	12
SIGN-OFF SHEET.....	12
ELECTRICAL SAFETY OVERVIEW	13
1. <i>General Safety Requirements</i>	13
2. <i>Portable Electrical Equipment</i>	13
3. <i>Electrical Guarding</i>	14
4. <i>Extension Cords</i>	14
SOP: TOOL SAFETY (ALL WORKERS)	15
SIGN-OFF SHEET.....	15
TOOL SAFETY OVERVIEW	16
1. <i>Safety Requirements</i>	16
2. <i>Hand Tools</i>	16
3. <i>Power Tools (including soldering equipment)</i>	16
4. <i>Cutting Tools</i>	17
SOP: LADDER SAFETY	18
SIGN-OFF SHEET.....	18
LADDER SAFETY OVERVIEW	19
1. <i>Safety Requirements</i>	19
SOP: VAN ROOF ACCESS SAFETY	21
SIGN-OFF SHEET.....	21
VAN ROOF ACCESS SAFETY OVERVIEW	22
1. <i>Van Roof Work Rules</i>	22
SOP: COMPRESSED GAS CYLINDER HANDLING.....	23
SIGN-OFF SHEET.....	23
COMPRESSED GAS CYLINDER HANDLING OVERVIEW	24

PROCEDURE	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029
Author: FIDO/BoM		June 2016 Page 3 of 32

1. <i>General Handling</i>	24
2. <i>Valves and Regulators in General</i>	25
3. <i>Moving Regulator Gauge Apparatus from Empty Cylinder to Full Cylinder</i>	25
SOP: RADIOACTIVE SEALED SOURCE (RSS) SAFETY	26
RSS USER SIGN-OFF SHEET	26
RSS HANDLER SIGN-OFF SHEET	27
RADIOACTIVE SEALED SOURCE (RSS) SAFETY OVERVIEW	28
1. <i>Roles of RSS Users and Handlers</i>	28
2. <i>General Information for All:</i>	28
3. <i>RSS Specifications for M/AOS HTDMA and SMPS Instruments:</i>	28
4. <i>Installation and Removal (RSS Handlers Only)</i>	29
5. <i>Storage (RSS Handlers Only)</i>	29
ATTACHMENT 1: AMF2 AWARE MCMURDO SITE LOCATION	31
ATTACHMENT 2: AMF2 AWARE MCMURDO SITE INSTRUMENT VAN LAYOUT	32

Contacts

AMF2 On-site Operations

Krzysztof Krzton (Lead Technician)	Phone TBD k.krzton@bom.gov.au
Greg Stone (Site Technician)	Phone TBD g.stone@bom.gov.au
Site VOIP	TBD

AMF2 Management

Field Instrument Deployments and Operations (FIDO)

Los Alamos National Laboratory

Main Office	+1 505-667-1186
Kim Nitschke (Manager)	+1 505-667-4112 (o) +1 505-231-2191 (m) nitschke@lanl.gov
Heath Powers (Technical Operations Manager)	+1 505-606-0795 (o) +1 505-412-7920 (m) hpowers@lanl.gov

Earth and Environmental Sciences 14 Group (EES-14)

Los Alamos National Laboratory

Claudia Mora (Group Leader)	+1 505-665-7832 (o) cmora@lanl.gov
Robert Roback (Deputy Group Leader)	+1 505-667-8916 (o) roback@lanl.gov

Antarctic Support Contract (ASC)

Chad Naughton (Project Manager)	+1 (720) 568-2344 (o) Chad.Naughton.Contractor@usap.gov
Steve Zellerhoff (Project Manager)	stephen.zellerhoff.contractor@usap.gov

PROCEDURE	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 5 of 32
Author: FIDO/BoM		

Introduction

Purpose:

This document describes the hazards, their mitigations, and work guidelines associated with the operations and the use of the Atmospheric Radiation Measurement (ARM) Program's Mobile Facility 2 (AMF2) at McMurdo Station and Self Contained Instrument Platform (SKIP) at the West Antarctic Ice Sheet (WAIS), both deployed as part of ARM West Antarctic Radiation Experiment (AWARE). The Field Instrument Deployments and Operations (FIDO) team will oversee all activities during the installation phase. Australian Bureau of Meteorology technicians will operate and oversee the site for its term of deployment.

Policy:

Individuals working at or visiting the AMF2 and the SKIP on official business, or just for a casual visit, must follow the guidelines below:

- 1) Act and work safely and do not jeopardize their own safety or that of others at the site.
- 2) Perform work in such a manner that they do not jeopardize the operations of the site.
- 3) Read all sections of this Safety Manual that apply to the work you will be performing and sign the appropriate sign-off sheets to acknowledge their personal commitment to follow the guidelines, work restrictions, and precautions associated with those sections. **Australian Bureau of Meteorology (BoM) employees are to follow both LANL and BoM Safety Manuals.**
- 4) All visitors to the AMF2 must participate in a LANL/BoM-led environmental safety and health (ES&H) briefing before departing.
- 5) All visitors must submit an official ARM Site Access Request (SAR) online at <http://www.db.arm.gov/SARS2/> and cannot go to the facility until they receive approval from the AMF2 Site Manager.
- 6) Non-working casual visitors must be escorted by on-site personnel.
- 7) A LANL/BoM employee will be designated each day to ensure LANL visitors comply with LANL Policy and procedures.

Scope and Document Ownership:

- 1) This safety manual applies to activities related to the operations and the use of the AMF2 at McMurdo Station and the SKIP at WAIS.
- 2) The requirements of this document apply to all personnel who perform work on site and visitors, including, but not limited to, U.S. and non-U.S. subcontractors, LANL employees, and the employees of collaborating U.S. and non-U.S. organizations.

PROCEDURE Author: FIDO/BoM	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 6 of 32
--	---------------------------------------	---

How to Use This Manual:

To be authorized to perform work at the AMF2 McMurdo site and at the SKIP WAIS site, each worker must do the following:

- 1) Read the Standard Operating Procedure (SOP) appropriate for the work he/she intends to perform.
- 2) Walk through the procedure with a qualified person if that requirement is indicated.
- 3) Acknowledge he/she has read the procedure and agree to follow it by signing the sign-off sheet at the beginning of each SOP.
- 4) BoM employees are required to read and sign/date relevant Safe Work Method Statement listed in Site Safety Manual – BoM. Where no Safe Work Method Statement exists – one must be created using the forms provided in the BoM section of the manual and included in this Site Safety Manual.
- 5) Follow all procedures relevant to the work being undertaken.

PROCEDURE	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 8 of 32
Author: FIDO/BoM		

General Work Overview

Required for: All workers.

General: Overall site safety requirements not covered by a specific SOP.

Personal Protective Equipment (PPE): Safety glasses required for most work as noted below. Use gloves as needed.

1. Orientation:

- a. Upon arrival at the site, contact the on-site FIDO representative before you perform any work.
- b. Read the Safety Manual and the SOPs specific to the work you plan to perform, and sign each sign-off sheet acknowledging that you have read the SOP and that you agree to follow the guidelines.
- c. Familiarize yourself with the site layout – see Attachment 1 and 2 for site layout and container configuration.
- d. All work performed on site must be approved by the FIDO management. LANL employees must follow LANL work safety requirements and procedures. BoM employees are to follow both the LANL and BoM safety requirements and procedures as listed in AMF2-AWARE Site Safety Manual – BoM. Where discrepancies occur, these should be recorded in Site Safety manual, and the more onerous requirements and procedures are to be followed.

2. General Rules:

- a. If you feel uncomfortable with the safety of any work you are asked to perform, do not do it. Instead, immediately contact an on-site technician or management.
- b. Any site worker can recommend or order a work stoppage for safety concerns without reprisal.
- c. Clean up after yourself.
- d. For any work, use the five-step process below:
 - 1) Plan the work.
 - 2) Analyze the hazards.
 - 3) Implement controls to mitigate the hazards.
 - 4) Perform the work safely.
 - 5) Identify changes as needed to improve safety.
- e. Observe the two-person rule, and never work at the site alone. The second person should know all emergency contact information in case problems occur. (Exception: on-site technician and Radiosonde Operators).

<p>PROCEDURE</p> <p>Author: FIDO/BoM</p>	<p>AMF2 SAFETY MANUAL (AWARE)</p>	<p>PRO(ESH)029</p> <p>June 2016 Page 9 of 32</p>
---	--	---

3. Site Safety Equipment, Personal Protection Equipment (PPE):

- a. Fire:
 - 1) Fire extinguishers are located in all instrument containers.
 - 2) All instrument containers have emergency power shutoffs near the entrance.
 - 3) A flammable-liquid cabinet is located in the OPS van and the AOS van.
- b. General injury:
 - 1) First-aid kit is located in GP Van.
 - 2) Emergency contact phone numbers are posted inside OPS Van
 - 3) Flagging is available to mark tripping hazards such as boundary tapes, safety cones, and placards.
 - 4) All injuries must be reported to the EES-14 Management.
 - 5) Australian Bureau of Meteorology Personnel must also report all injuries and incidents to BoM as per BoM reporting procedures
- c. Eye protection:
 - 1) Eye wash bottle is located in GP Van.
 - 2) Safety glasses are available GP Van – wear them whenever necessary.
- d. Feet:
 - 1) Do not wear open-toe shoes.
 - 2) Wear steel-toe shoes if ongoing foot hazard is present.
 - 3) Toe protectors are available on site.
- e. Ears:
 - 1) Hearing protection headsets are available in GP Van.
- f. Hands:
 - 1) Work gloves are available in GP Van.
- g. General:
 - 1) Refer to system-specific SOPs for PPE not listed here but required for other work.

4. Material Handling (all personnel):

- a. Lifting more than the following is prohibited:
 - 1) 75 lbs. once per day.
 - 2) 55 lbs. 10 times per day.
 - 3) 25 lbs. above shoulders, below knees, or at arm’s length 25 times per day.
 - 4) 10 lbs. more than twice per minute for more than 2 hours per day.

<p>PROCEDURE</p> <p>Author: FIDO/BoM</p>	<p>AMF2 SAFETY MANUAL (AWARE)</p>	<p>PRO(ESH)029</p> <p>June 2016 Page 10 of 32</p>
--	---------------------------------------	---

- b. Wear closed-toe shoes.
- c. Use dollies for moving heavy items.
- d. Operation of mechanical lifting devices such as forklifts and cranes must be by trained and authorized personnel only. When such devices are used on site, everyone not associated with the work must stay clear.

5. Elevated Work Areas (all personnel):

- a. Climbing a ladder with feet above 6 feet is prohibited without conforming to *SOP – Ladder Safety*. Additional LANL employee requirements – see the SOP.
- b. Working on container roofs **without handrails** is prohibited unless conforming to *SOP – Van Roof Access Safety*. Additional LANL employee requirements – see the SOP.
- c. Access to top of radar vans is **prohibited** except by radar technicians.
- d. If the radar dish atop a radar van **stops** rotating, **do not** stand within 20 meters on an elevated position such as a ladder or other container. Note: The radar dish will stop periodically to point at the radar target, or if it is shut off, or when it malfunctions.

6. Soldering (BoM technicians, ARM system specialists, and LANL employees):

- a. Have a fire extinguisher on hand.
- b. Remove all combustibles from immediate soldering area.
- c. Wear safety glasses and gloves.
- d. Keep soldering area well ventilated.
- e. Equipment to be soldered must be de-energized.
- f. Turn off soldering equipment at end of work.
- g. Store soldering equipment in labeled drawers/containers.
- h. Workers shall be authorized to use soldering equipment as per *SOP – Tool Safety*.

7. Hazardous Materials (BoM technicians, ARM system specialists, and on-site technicians only):

- a. Materials approved for use include commonly used organic solvents used as lubricants and cleaning agents. Material Safety Data Sheets (MSDS) shall be available for all chemicals on site. All chemical users are responsible to understand potential chemical hazards stated in the MSDS.
- b. Prior to using chemicals, BoM technicians, ARM instrument mentors, and subcontractors must ensure that they are fully aware of the potential hazards, that they have discussed the chemical use in the plan of the day, that they follow their particular organization’s chemical safety protocols, and that they also follow all procedures and safety precautions as stated in the MSDSs.
- c. All chemicals shall be handled properly as per relevant MSDS.

<p>PROCEDURE</p> <p>Author: FIDO/BoM</p>	<p>AMF2 SAFETY MANUAL (AWARE)</p>	<p>PRO(ESH)029</p> <p>June 2016 Page 11 of 32</p>
--	---------------------------------------	---

- d. Chemicals shall be stored and disposed of properly.
- e. Clean minor spills using absorbent towels. Dispose of properly.

8. Instruments (BoM technicians and ARM system specialists only):

- a. Ceilometer (CSPHOT):
 - 1) Laser light is eye safe, as it is installed in a sealed container.
- b. Micropulse Lidar (MPL):
 - 1) Laser is eye safe in normal operating conditions; however, when opened for maintenance, pump diode is Class-4 laser and therefore an eye hazard.
- c. High Spectral Resolution Lidar (HSRL):
 - 1) Laser is eye safe in normal operating conditions; however, when opened for maintenance, it becomes class 3B laser and therefore an eye hazard.
- d. BSRWP and KAZR:
 - 1) Access to the top of the KAZR Van is prohibited except for FIDO-authorized technicians.
- e. Ka/X-SACR:
 - 1) During radar operations, if the radar dish stops rotating, do not stand within 20 meters on an elevated position such as a ladder or another container. Note: The radar dish will stop periodically to point at the radar target, or if it is shut off, or when it malfunctions.

9. Pressurized Gasses (BoM technicians, ARM system specialists, and LANL employees only):

- a. Low-pressure gasses are to be used as per manufacturer recommendations.
- b. Use cylinder dolly to move gas bottles and wear steel-toe shoes or toe covers.
- c. For helium cylinders, see *SOP – Compressed Gas (He) Cylinder Handling*. For additional LANL employee requirements, see the SOP.
- d. If working with cryogenics, LANL employees must follow LANL requirements outlined in P101-5.

10. Personal health, recreation, weather, local hazards awareness (all personnel):

- a. Visitors must complete Site Access Request on ARM website. URL: <https://www.db.arm.gov/SARS2/>
- b. All personnel to be familiar and to follow safety regulations and procedures of the McMurdo Site Operator – Antarctic Support Contractor
- c. Visitors may be required to take part in a pre-trip safety/logistics briefing led by LANL that includes health precautions and logistical preparation.
- d. Stay well hydrated and know the signs of fatigue and hypothermia.
- e. First-aid/CPR training is recommended for all visitors and **required for LANL employees.**

PROCEDURE	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 13 of 32
Author: FIDO/BoM		

Electrical Safety Overview

Required for: All workers who plan to use electrical equipment (e.g., tools, appliances, etc.), extension cords, or work on systems requiring lockout/tagout (LANL employees only). LANL employees must take the training contained in Electrical Safety Program P 101-13. All personnel performing work on electrical systems and equipment will control electrical hazards by following this SOP.

1. General Safety Requirements:

- a. Temporary and permanent power supplies for any job site will be laid out and installed only by qualified personnel.
- b. Workers in dangerous proximity to any part of an electrical power circuit in the course of their work shall protect themselves against electrical shock by removing the power or by guarding it by effective insulation or other means.
- c. Live work shall be authorized and completed by a qualified, licensed LANL electrician.
- a. Resetting of open breakers or operation of disconnects shall be performed under the direction of a FIDO Electrical Safety Officer (ESO).

2. Portable Electrical Equipment:

- a. Use double-insulated portable industrial-type electric tools and equipment meeting the requirements of a Nationally Recognized Testing Laboratory (NRTL) listing. FIDO Electrical Safety Officer (ESO) or a qualified, licensed electrician shall resolve questions concerning any particular grounding.
- b. Grounding of receptacles shall be accomplished in one of two ways:
 - 1) A built-in ground wire of green color attached to the ground pole of the receptacle.
 - 2) The conduit system, if installed in an approved manner, may be relied upon for grounding of a receptacle serving single phase appliances with ratings up to 230 volts.
- c. All single-phase, 15- and 20-ampere receptacle outlets operating at 120 and 240 volts, which are not part of the permanent wiring of the building or structure, must have Ground Fault Circuit Interrupter (GFCI) for personnel protection. The GFCI should be located at the power source so that all extension cords and tools are protected. In situations where GFCI protection is not practical for 240-volt equipment, follow the procedures above for assuring grounding conductors on all equipment.
- d. Exterior outlet boxes for portable extension cords for outdoor use shall be of weatherproof type maintained in good condition.
- e. All equipment (except for double insulated tools) and extension cord's grounding conductor shall be tested for continuity using a "continuity tester" with tone.

PROCEDURE Author: FIDO/BoM	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 14 of 32
--	---------------------------------------	--

3. Electrical Guarding:

- a. Suitable access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment. The minimum clearance for the work space shall be not less than 6 feet 3 inches high, or less than 3 feet in front of panels and live parts.
- b. The working space shall not be used for storage purposes except during shipping. The "keep clear" area must be identified with suitable floor markings and/or posting of signs or decals on the equipment.
- c. Energized parts of electrical equipment operating at 50 volts or higher shall be guarded against accidental contact by the use of approved cabinets or enclosures.

4. Extension Cords:

- a. Electrical cords and equipment connected to cords shall be visually inspected prior to each use and damaged cords removed from service. Visual inspection shall be for the following:
 - 1) Deformed, missing, or damaged pins.
 - 2) Insulation damage. Note: All repair insulation values must be equal to, or greater than, the original.
 - 3) Identification of possible internal damage.
 - 4) UL listing or equivalent.

PROCEDURE	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 16 of 32
Author: FIDO/BoM		

Tool Safety Overview

Required for: All workers who plan to use tools.

General: All workers at the AMF2 site shall use only approved tools and use them in a manner consistent with their intended use. Read tool operation manuals for manufacturer's recommendations.

Personal Protective Equipment (PPE): Safety glasses, gloves.

1. **Safety Requirements:** All hand tools, power tools (i.e., corded), battery-powered tools, soldering irons and other similar equipment shall be UL listed and maintained in a safe operating condition. Tools provided by other organizations shall be provided with safe operating procedures. Workers using tools shall be responsible for the inspection and repair of tools under their control.

2. **Hand Tools:** Use insulated or non-conducting tools when working near energized electrical circuits.

3. **Power Tools (including soldering equipment):**
 - a. Authorized users:
 - 1) Only BoM technicians, ARM system specialists, and LANL technicians are pre-authorized to use and repair tools of their trade.
 - 2) Other users such as non-technical LANL employees, balloon launchers, local contractors, can be authorized by demonstrating their expertise to BoM technicians (or others designated by FIDO) and document this authorization on the attached sign-off sheet. Do not attempt any operation without prior authorization. If you are unfamiliar or uncomfortable with a particular tool, do not use it. Similarly, if you are not trained to use a certain tool, do not use it.
 - b. Before using a power tool, verify voltage and frequency (i.e., 120 V, 60 Hz vs. 240 V, 50 Hz) of power tool to match outlet to be used.
 - c. Clean, test, and inspect all tools regularly.
 - d. Power tools shall not be used if safety equipment, such as shields, tool rests, hoods and guards have been removed or otherwise rendered inoperative.
 - e. Workers using tools under conditions that expose them to the hazards of flying objects shall use eye protection at a minimum and full-face shields if necessary.
 - f. Use double insulated portable industrial-type electric tools and equipment meeting the requirements of a NRTL listing. Tools used outside shall be powered by outlets with GFCI.
 - g. Portable grinders shall be provided with hood type guards with side enclosures that cover the spindle and at least 50 % of the wheel. All wheels shall be of the proper type, shall not exceed the grinder rating, and shall be inspected regularly for signs of fracture. Safety glasses are required.

PROCEDURE Author: FIDO/BoM	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 17 of 32
-------------------------------	-------------------------------	---

4. Cutting Tools:

- a. All cutting tools shall be guarded in such a manner as to prevent body contact with rotating or reciprocating blades.
- b. Always keep body parts clear of cutting parts and cut away from your body.

PROCEDURE	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 19 of 32
Author: FIDO/BoM		

Ladder Safety Overview

Required for: Anyone using a ladder on LANL property. LANL employees must comply with the LANL Fall Protection Program (P101-20) and take LANL Ladder Safety Training #12985.

General: Applies to safe use of ladders.

Required Equipment: Tie-off rope for top of ladder.

Ladder Use Rules: Before using any ladder, check it for defects, missing rungs, feet, or hardware (cracks in the side rails, corrosion or other damage). Repair or replace damaged ladders. Do not use a ladder that is in disrepair. Do not use painted ladders as the paint may conceal cracks or splits. Keep ladders clean and free from dirt and grease, which might conceal defects. If a ladder is to be replaced, immediately cut it in half to prevent its further use.

1. Safety Requirements:

- a. As soon as a ladder is placed, it must be tied off at the top and firmly placed at the bottom.
- b. Never put a ladder on top of boxes, tables, drums, forklifts, etc.
- c. When placing a ladder, be certain the side rails extend three feet above the top landing. This means placing the third rung even with the landing edge.
- d. Extension ladders must overlap a minimum of three rungs. Always ensure the hardware is fully engaged.
- e. Place ladders so that the distance from the foot of the wall is $\frac{1}{4}$ of the height of the landing edge. To help estimate, rungs are spaced one foot apart.
- f. Always wear shoes with substantial soles when using a ladder. Ensure that shoes are relatively clean, with no large amounts of mud, tar, or other substances on the soles.
- g. Never place a ladder in front of a door unless the door is locked, blocked or otherwise guarded.
- h. Do not use ladders in a horizontal position as runways or as scaffolds.
- i. Do not place a ladder against a windowpane or sash.
- j. When placing a ladder, make certain that both side rails have secure footing. Always provide solid footing on soft ground to prevent the ladder from sinking.
- k. Never lean a ladder against unsafe backing, such as loose boxes or barrels, posts, tree trunks, etc.
- l. Always face the ladder and hold on with both hands when going up or down. Do not carry things up or down a ladder. If tools or material must be handled, raise or lower them with a rope.
- m. Do not allow more than one person at a time to use a ladder.
- n. Keep ladders away from power lines. Assume all electrical lines are energized.
- o. Do not climb higher than the third rung from the top on strait or extension ladders, or the second tread from the top on stepladders.

PROCEDURE	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029
Author: FIDO/BoM		June 2016 Page 20 of 32

- p.** Do not use makeshift ladders, such as cleats fastened across a single rail.
- q.** Before starting to climb a stepladder, ensure that the ladder is fully open and the spreader/divider is locked in place.
- r.** A ladder must be set in a clear space, both on the ground and on the landing edge level, so that it is not necessary to climb over a pile of scrap to get onto the ladder, or necessary to dodge a “hot” line or other debris to get off the ladder.
- s.** Do not use a ladder in a strong wind except in an emergency, and then only when it is securely tied.
- t.** Do not leave a placed ladder unattended, especially outdoors, unless it is anchored at the top and bottom.
- u.** Never reach off to the sides while on a ladder.

PROCEDURE	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 22 of 32
Author: FIDO/BoM		

Van Roof Access Safety Overview

Required for: All workers accessing the top of a van that has no handrails.

General: The roof area of an instrument van without handrails is considered a Controlled Access Zone (CAZ). This plan is needed for access to van roof areas that are accessed infrequently and therefore do not have handrails. LANL employees must additionally take the work safety training LANL Fall Protection Program (P101-20).

Required Equipment: Ladder for van roof access, tie-off rope.

1. Van Roof Work Rules:

- a. Work on a van roof CAZ shall be done only with an additional worker to act as a "Safety Monitor."
- b. The safety monitor shall be a competent person who has read this procedure and who is capable of identify existing and predictable hazards in the surroundings of working conditions that are hazardous.
- c. Immediately after a worker climbs a ladder to the van roof, the "Safety Monitor" follows that worker on the same ladder to a height that enables him/her to be in visual view of the worker.
- d. The "Safety Monitor" shall be on the same plane as the work area, be in visual contact with the workers, and close enough to communicate orally with the workers on the van roof.
- e. The worker on the van roof shall stay at least 2 feet back from any van roof edge.
- f. The worker on the van roof shall maintain 3 points of contact to the surface (combination of hand, foot, knee, etc.) if possible.
- g. The "Safety Monitor" shall watch the worker on the roof at all times and warn him/her of any dangerous situations (i.e., too close to the edge, working in an unsafe manner, high winds, obstructions, etc.).
- h. The "Safety Monitor" shall not have other responsibilities which could distract him/her.
- i. Workers on a van roof CAZ must comply with any hazard warnings from the "Safety Monitor."
- j. The KAZR van does not have hand rails but requires some work to be performed on top of the container. For this work, once the KAZR antenna has been installed (installation work is conducted from ladders), work can be performed on the antenna from the top of the container if the worker wears a body safety-harness and uses the harness attachment point that is mounted on the KAZR antenna frame.

PROCEDURE Author: FIDO/BoM	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 24 of 32
-------------------------------	-------------------------------	---

Compressed Gas Cylinder Handling Overview

Required for: All personnel handling compressed gases – they must follow the requirements of the LANL Pressure Safety Program (P101-34) and take LANL Gas Cylinder Safety Training #9518.

General: The purpose of this procedure is to provide general guidelines safe handling of compressed gas cylinders such as helium.

Personal Protective Equipment (PPE): Safety glasses, steel-toe shoes.

Cautions and Hazards: Hazards generally associated with compressed gas cylinders are oxygen depletion, and mechanical injury if not handled, operated, and stored properly.

1. General Handling:

- a. Leave cylinders in place and secured to prevent them from falling and damaging the valves/regulator.
- b. Keep cylinder valve caps in place at all times, except when the cylinder is installed and connected to a pressure system.
- c. Replace the valve cap when cylinder is empty and mark it with an "X."
- d. Never force a valve open, and always open cylinder valves slowly.
- e. Maintain cylinders in good condition and maintain all cylinder labels.
- f. Cylinder shall be legibly marked with labels that identify the operating pressure, temperature, material of construction and contents.
- g. No maintenance or repair work on a cylinder shall be performed.
- h. Cylinders with damaged valves must not be used and shall be returned to the supplier noting the defect.
- i. Moving cylinders:
 - 1) Remove regulator and hose from the cylinder before moving it from the secured, in-use position.
 - 2) Move the cylinder on a cylinder dolly securing with restraining chain or strap fastened.
 - 3) Do not roll or drop cylinders.
 - 4) Do not lift cylinders by their protective caps or valves.

PROCEDURE Author: FIDO/BoM	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 25 of 32
--	---------------------------------------	--

2. Valves and Regulators in General:

- a. All cylinders shall have a shutoff valve designed according to the Compressed Gas Association (CGA) standards. This valve cannot be used to control the discharge rate; therefore a regulator must be connected to the cylinder while it is in use.
- b. Use only a regulator that has been approved for the gas in use.
- c. Do not attempt to repair a regulator. Expert repair and calibration of regulators are necessary for continued reliability and safety. Do not use an adapter.
- d. Each part of a compressed gas system that can be pressurized separately must be protected by a pressure relief device set to operate at pressure equal to or less than the Maximum Allowable Working Pressure (MAWP).

3. Moving Regulator Gauge Apparatus from Empty Cylinder to Full Cylinder:

- a. Put on safety glasses.
- b. On a full cylinder, remove outer cap, and then remove outlet plug using Allen wrench.
- c. Close the cylinder valve of the empty cylinder, and open the hose valve.
- d. Remove regulator gauge apparatus from the empty cylinder using open-end wrench
- e. Put on outlet plug loosely and mark the empty cylinder with an "X" to indicate that it is empty.
- f. Attach regulator gauge apparatus to the full cylinder using open-end wrench.
- g. Close the hose valve.
- h. Open the valve on the full cylinder completely, and then turn it back ¼ turn. (Note: Put your ear near the hose connection to listen for leaks.)
- i. The cylinder is now ready for balloon filling.

PROCEDURE Author: FIDO/BoM	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 28 of 32
---	---------------------------------------	--

Radioactive Sealed Source (RSS) Safety Overview

Required for: On-site Technicians, Operators, and Mentors of the Hygroscopic Tandem Differential Mobility Analyzer (HTDMA, employing Po-210 RSS) and the Scanning Mobility Particle Sizer (SMPS, employing Kr-85 RSS) instruments within M/AOS containers. All HTDMA and SMPS users must follow the requirements of the LANL Radiation Protection Program (P121) for “RSS Users” and take LANL Radioactive Sealed Source Safety Self-Study Training Course #15907. “RSS Handlers” are also required to take LANL Radiological Worker II Training Course 20301 or LANL-approved equivalent training and to be signed off and approved by a LANL Responsible Line Manager (RLM) as having met all requirements for RSS handling of Kr-85 and Po-210.

General: The purpose of this procedure is to provide general guidelines for safe operation of instruments containing RSS by users and for safe handling of RSS by LANL-approved designees within the overall operational guidelines of the M/AOS.

Personal Protective Equipment (PPE): Safety Glasses, nitrile or latex gloves required for handling RSS.

Cautions and Hazards: Hazards generally associated with RSS include radiation exposure and contamination.

1. Roles of RSS Users and Handlers:

- a. **RSS Users** are allowed to operate the instruments containing RSS, but are not approved to open the instruments containing RSS (HTDMA and SMPS) or to handle RSS at any time.
- b. **RSS Handlers** are permitted to operate the instruments containing RSS the same as RSS users. In addition to RSS User permissions, RSS Handlers also have the authority when approved by a LANL RLM as having met all training requirements to accept, handle or move RSS, including to install and/or remove RSS from the HTDMA and/or SMPS.

2. General Information for All:

- c. Notify the Site Operations Manager and the LANL RSS Custodian of any violations.
- d. RSS should always be stored in approved containers and packaging.
- e. Ensure correct postings/labels on containers and instruments when RSS are installed.
- f. Maintain RSS in good condition and maintain all labels.
- g. No maintenance or repair work on RSS shall be performed.
- h. Documentation will be collected in accordance with LANL RSS requirements and procedures in P121 based on U.S. DOE 10 CFR 835 and Appendix 16A for establishing accountability, posting and labeling requirements.

3. RSS Specifications for M/AOS HTDMA and SMPS Instruments:

- a. HTDMA: Po-210 RSS

PROCEDURE Author: FIDO/BoM	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029 June 2016 Page 29 of 32
---	---------------------------------------	--

- 1) 2 x U500 Staticmaster Ionizing Units (NRD, LLC).
- 2) U.S. National Regulatory Commission (NRC) Materials License number 31-28397-01E, expiration date January 31, 2025 (NRD, LLC).
- 3) NRC-Exempted Quantity of ²¹⁰Polonium not exceeding 500 microcuries (18.5 MBq) per Ionizing Unit or 1000 microcuries per instrument or shipment.
- 4) Excluded from OSHA Hazard Communication and Material Safety Data Sheet (MSDS) requirements as stated under 29 CFR 1910.1200 (b) (6) (xi).
- 5) Alpha-particle emitter with a half-life of 138 days.

b. SMPS: Kr-85 RSS

- 1) 1 x Aerosol Neutralizer, Model 3077A (TSI, Inc.).
- 2) Not exceeding 10 microcuries (370 MBq) per Aerosol Neutralizer.
- 3) Gas exempt from leak testing.
- 4) Beta-particle and gamma ray emitter with a half-life of 10.7 years.

4. Installation and Removal (RSS Handlers Only):

- a. Strictly adhere to manufacturer's specifications, AOS Procedures, and other on-site training and documentation received for the installation and use of RSS within the HTDMA and SMPS instruments.
- e. Wear eye protection and use latex or nitrile gloves.
- f. Have packing material and storage containers ready before removing RSS from the HTDMA or SMPS.
- g. Close the M/AOS container door and do not allow anyone to work inside the container while installing or removing RSS.
- h. Move slowly and deliberately when removing RSS and placing in packing containers, but do not take more time than necessary.

5. Storage (RSS Handlers Only):

- a. Always store in approved packaging and containers with correct labels.
- b. When RSS are in use, store approved packaging/containers in a safe place for reuse.

6. Disposal (RSS Handlers Only):

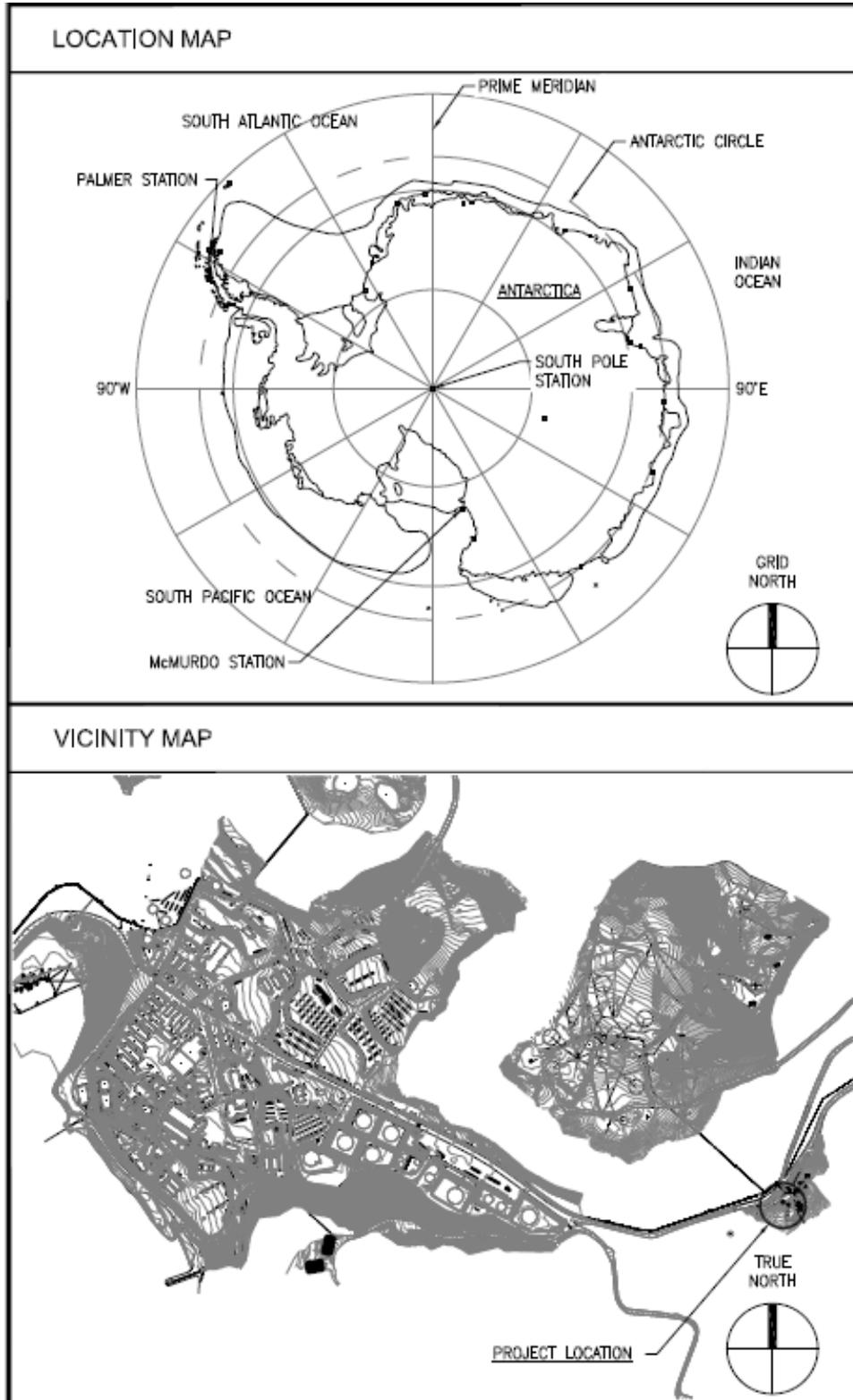
- a. Dispose of RSS by returning to the manufacturer.
- b. When RSS are expired they must be packed in accordance with Federal and U.S. Nuclear Regulatory Commission (NRC) regulations and returned to the vendor/supplier for correct

PROCEDURE	AMF2 SAFETY MANUAL (AWARE)	PRO(ESH)029
Author: FIDO/BoM		June 2016 Page 30 of 32

disposal. Approved packing/containers include original or equivalent packing as received from the vendor.

<p>PROCEDURE</p> <p>Author: FIDO/BoM</p>	<p>AMF2 SAFETY MANUAL (AWARE)</p>	<p>PRO(ESH)029</p> <p>June 2016 Page 31 of 32</p>
--	---------------------------------------	---

Attachment 1: AMF2 AWARE McMurdo Site Location



Attachment 2: AMF2 AWARE McMurdo Site Instrument Van Layout

