

Atmospheric Radiation Measurement Program Mobile Facility One (AMF1)

Safety Plan

– India –

ARIES Observatory
Nainital

PRO(ESH)-015.009

May 2011

Field Instrument Deployments and Operations (FIDO)

Los Alamos National Laboratory

U.S. Department of Energy

www.FIDO.lanl.gov

I. Purpose:

This document describes the hazards and their mitigations associated with the operation of the ARM Mobile Facility One (AMF1) at Aryabhata Research Institute of Observational Sciences (ARIES) in Nainital, India.

Emergency Contacts

Police	108
Fire Department	108
Ambulance	108
Emergency Medical Clinic/hospital	Phone: +91 (0) 5942-235022 or 5942-233712 – only last six digits required when calling within Nainital using landline.
B.D. Pandey Hospital Mallital, Nainital	
Mr. Carlos Sousa (AMF1 On-Site Technician)	Phone: +91 (0) 88-6077-6417
Territory Broadcasting (TBPL)	
	E-mail: carlos@tbpl.com.au
Mr. Mike Alsop (AMF1 Technical Lead)	E-mail: mike.alsop@tbpl.com.au
Territory Broadcasting (TBPL)	
Prof. S.K. Satheesh (GVAX Co-PI)	Phone: +91 (0) 80-2293-3070
Indian Institute of Science (IISc)	
	E-mail: profsks@gmail.com , satheesh@caos.iisc.ernet.in
ARIES Contact #1:	Phone: +91 (0) 94-1179-3315 (mobile)
Dr. Manish Naja (On-Site Project Coordinator)	E-mail: manish@aries.res.in
ARIES Contact #2:	Phone: +91 (0) 95-5783-7894
Dr. Narendra Singh	E-mail: narendra@aries.res.in
Mr. Kim Nitschke (GVAX Project Manager).....	Phone: +1 505-667-1186
Field Instrument Deployments and Operations (FIDO) Office	
Los Alamos National Laboratory	
	E-mail: nitschke@lanl.gov
U.S. Embassy New Delhi	Phone: +91 (0) 11-2419-8000
Shantipath, Chanakyapuri	
New Delhi 110021	
	Fax: +91 (0) 11-2419-0017
	Website: http://newdelhi.usembassy.gov/

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II. Work Control:

A. On-Site Safety:

- All visitors must have submitted a Site Access Request (SAR) before visiting AMF1 site.
- All visitors must report to the installation or pack-up lead or on-site technician before beginning work each day.
- All visitors to AMF1 site who plan to perform work must read this document and sign-in to acknowledge that they have reviewed and understood its contents. **Review the Hazard Control Matrix below that addresses types of site activities, hazards, and authorizations.**
- All visitors must comply with all applicable rules and regulations established by the host organization.

B. Work Authorization, Personnel Limitations, and Hazard Control

Personnel authorization categories (see Hazard Control Matrix):

- **Casual Visitors** – anyone who visits without working to include LANL managers.
- **All Personnel** – including local on-site Observers and the categories listed below.
- **Install/Dismantle Team** – contracted by LANL.
- **Australian Bureau of Meteorology (BOM)** – technicians contracted by LANL.
- **ARM System Expert** – contracted by LANL.
- **Professional Service Provider** – specialists such as electricians, HVAC technicians, etc., contracted by LANL or IISc.

Hazard Control Matrix (with work authorization CATEGORIES, work hazards, and controls):

CATEGORY: Casual Visitor controls – NOT authorized to perform any work:

Work	Work controls, tools – Casual Visitor
Casual visit to site	<ul style="list-style-type: none"> ▪ Escort by on-site personnel. ▪ Visitors may be asked to clear any area during movement of equipment or other operations.

CATEGORY: All Personnel (except casual visitors) work authorizations and controls:

Work hazard or authorization	Work controls, tools – All Personnel
General Hazards	
Injury, fire emergency	<ul style="list-style-type: none"> ▪ Do not work alone on site – adhere to “Two-Man Rule.” ▪ During routine operations when only one ARM person is on site, that person must instruct a local “buddy” to notify emergency contacts, should emergency situation occur.

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Work hazard or authorization	Work controls, tools – All Personnel
	<ul style="list-style-type: none"> ▪ First-aid kit and AED in A2 Van. ▪ Emergency contacts inside A2 Van. ▪ Iridium phone in A2 Van for on and off site. ▪ Fire extinguishers in each van. ▪ Emergency power shutoff in each van for electrical fires. ▪ Know signs of heat stroke – see ES&H briefing. ▪ If locked inside a van, the person inside can still get out by undoing the thumbscrew that holds the latch or using the round escape hatch on the roof. ▪ ARM visitors to AMF1 site must participate in FIDO-led ES&H briefing before departing their home countries.
Lifting, dropping	<ul style="list-style-type: none"> ▪ Lifting of more than 23 kg per person prohibited. ▪ No open-toe shoes – slipover toe and metatarsal caps are available on site when a potential for a foot injury exists. ▪ Dollies are available for transporting heavy items. ▪ Work gloves are available in S4 Van.
Tripping, falling	<ul style="list-style-type: none"> ▪ Flagging for guy wires and other exposed projections is available on site. ▪ Use of ladders reaching above 2 m prohibited. ▪ Use stairs to access areas above 2 m. ▪ Access allowed to instrument stand platforms and atop transportainers with railings only. ▪ Cable covers are used for most cables, but during installation, watch for cables running along ground.
Working at elevated locations on towers or transportainers	<ul style="list-style-type: none"> ▪ Climbing AOS tower not allowed. ▪ Climbing MET tower not allowed. ▪ Working atop transportainers without handrails not allowed.
Rain, wind, dust, lightning	<ul style="list-style-type: none"> ▪ Extreme temperatures may require special clothing. ▪ Go immediately inside a van or vehicle if a lightning storm threatens (i.e., strikes are within 5 km, or a 30-sec delay away).
Personal health – disease, respiration, sun, overheating	<ul style="list-style-type: none"> ▪ Obtain recommended vaccinations and medicines. ▪ Take precautions for sunburn. ▪ Drink bottled water whenever available and stay hydrated. ▪ Know your own personal limits for fatigue. Take a break or stop work when you need rest.
Plant and animal/insect life	<ul style="list-style-type: none"> ▪ Do not handle rodents, living or dead, found on site.
Off-site activity, driving, recreation, tours, pedestrians on the road	<ul style="list-style-type: none"> ▪ Use common sense and take precautions when off site. ▪ If driving, be extremely careful, and absolutely do not drink and drive. ▪ Beware of pedestrian on roads. ▪ Beware of animals, particularly cows and monkeys.
Theft, vandalism, violence	<ul style="list-style-type: none"> ▪ Lock doors of transportainers when leaving site. ▪ Report unauthorized personnel on site to FIDO. ▪ Contact U.S. Embassy and other emergency contacts as appropriate.
Threat to ARM staff such as civil unrest (Action dependent on severity of threat)	<ul style="list-style-type: none"> ▪ Contact U.S. Embassy. ▪ Notify coworkers, local government, and FIDO. ▪ Lock site. ▪ Return to hotel/residence. ▪ Arrange for increased local security for site ▪ Fly home if advised by FIDO or U.S. Embassy. ▪ Follow up assessment with U.S. Embassy to plan next steps – resumption of operations or pack up and ship out.

Work hazard or authorization	Work controls, tools – All Personnel
Electrical Work Authorization	
Minor electrical work	<ul style="list-style-type: none"> ▪ Use Ground-Fault Interrupting (GFI) breakers for all extension cords, especially those placed outside enclosures. ▪ All electrical equipment should have a UL label, or another recognized testing laboratory to UL. ▪ Use UL-approved, three-wire electrical extension cords only for short duration, temporary connections. ▪ Extension cords may not be used in series. ▪ Extension cord shall be protected to avoid damage from sharp edges and shall be routed so as not to create tripping hazards. ▪ Extension cords should be orange or yellow in color for high visibility.
Hazardous Materials	
Using lubricants, cleaning agents, adhesives, and other chemicals	<ul style="list-style-type: none"> ▪ Small amounts of lubricants, cleaning agents, adhesives, and other chemicals will be occasionally required at AMF1 site. In general, they should be limited to less than 1 kg each. ▪ Read the Material Safety Data Sheet (MSDS) for any chemical that is to be used. ▪ Chemicals shall be used, stored, and disposed of properly. ▪ Battery acid shall be stored in secondary containment pan.
Using fuel	<ul style="list-style-type: none"> ▪ Gasoline shall not be stored at the site unless in approved safety containers. ▪ Diesel fuel is handled only by local suppliers in most cases. Diesel fuel can be hand-pumped from tank to tank by on-site Observers if necessary.
Clean up of chemical and oil spills	<ul style="list-style-type: none"> ▪ Contact the local representatives (if listed herein) for major spills; this may include any chemicals, cleaner, solvent, or oil. ▪ Minor spills are to be cleaned using absorbent, disposable towels and then placed in a hazardous waste receptacle.
Tool Use Authorization	
Hand tools	<ul style="list-style-type: none"> ▪ Hand tools are to be used as per manufacture's recommendations. ▪ Inspect hand tools for defects before use. Any defective tool shall be removed from service. ▪ Use tools for their designed purpose only. ▪ Wear safety glasses and work gloves (available on site) when using tools. ▪ Always cut away from your body when using sharp tools.
Pressurized gasses Work Authorization	
Compressed helium (He), and nitrogen (N) gases	<ul style="list-style-type: none"> ▪ Follow the Compressed Gas Cylinder Procedure <i>PRO(OPS)-031</i>.

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CATEGORY: Install and dismantle team work authorizations and controls:

Work & associated hazards	Work controls, tools – Install and dismantle team
Electrical work authorizations	
Electrical work on DC systems	<ul style="list-style-type: none"> ▪ None.
Power tools, shop equipment, hatches, doors, ports	<ul style="list-style-type: none"> ▪ Inspect portable electric tools prior to use. With the exception of double-insulated tools, all portable electrical tools requiring 60-Hz power shall be equipped with three conductor cables and grounded plugs. ▪ Any tool with frayed cords, exposed wiring, missing ground plugs, etc., shall be removed from service. ▪ Keep body parts away from cutting parts of power tools. ▪ Electrical equipment and tools used at AMF1 site shall have UL approval ratings where possible. ▪ Electric-powered heaters and fans shall have UL approval ratings. ▪ Equipment owned and furnished by other organizations and agencies (non-LANL/PNNL) shall be provided with appropriate safe-operating procedures. These procedures must be observed by all personnel working at or visiting AMF1 site. ▪ Operate all equipment as per site procedures and manufacturer’s recommendations. ▪ Lockout/Tagout: Any equipment tagged with a “Lockout/Tagout” indicator may not be operated.

CATEGORY: BOM technicians and ARM system experts work authorizations and controls:

Work & associated hazards	Work controls, tools – BOM techs and ARM instrument experts
Electrical work authorization	
Equipment installation using outlets	<ul style="list-style-type: none"> ▪ Reset breakers.
Electrical work on DC systems	<ul style="list-style-type: none"> ▪ None.
Power tools, shop equipment, hatches, doors, ports	<ul style="list-style-type: none"> ▪ Inspect portable electric tools prior to use. With the exception of double-insulated tools, all portable electrical tools requiring 60-Hz power shall be equipped with three conductor cables and grounded plugs. ▪ Any tool with frayed cords, exposed wiring, missing ground plugs, etc., shall be removed from service. ▪ Keep body parts away from cutting parts of power tools. ▪ Electrical equipment and tools used at AMF1 site shall have UL approval ratings where possible. ▪ Electric-powered heaters and fans shall have UL approval ratings. ▪ Equipment owned and furnished by other organizations (non-LANL/PNNL) and agencies shall be provided with appropriate safe operating procedures. These procedures must be observed by all personnel working at or visiting AMF1 site. ▪ Operate all equipment as per site procedures and manufacturer’s recommendations. ▪ Lockout/Tagout: Any equipment tagged with a “Lockout/Tagout” indicator may not be operated.
Large or heavy equipment, air conditioning units	<ul style="list-style-type: none"> ▪ Follow all electrical controls listed.

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Work & associated hazards	Work controls, tools – BOM techs and ARM instrument experts
Hazardous Materials	
Butanol (A1 Van only)	<ul style="list-style-type: none"> ▪ Butanol containers must be stored sealed in a chemical cabinet. ▪ All equipment using butanol shall be vented to outdoors. ▪ Notify FIDO immediately of any odors inside A1 Van.
Soldering operations	<ul style="list-style-type: none"> ▪ Soldering must be performed in designated work areas only. ▪ Soldering equipment shall be turned off at the end of work shifts or when personnel leave the site for times exceeding one hour. ▪ Solder and related equipment shall be stored in labeled drawers or lockers.
Radiant energy work authorizations	
MPL and Ceilometer lasers, and 95-GHz radar (WACR)	<ul style="list-style-type: none"> ▪ Ceilometer's laser light is eye safe as installed in a sealed container. ▪ MPL laser is eye safe in normal operating conditions; however, <u>when opened for maintenance, pump diode is Class-4 laser; therefore it is an eye hazard.</u> ▪ WACR is low energy and not a hazard.
Power tools, shop equipment, hatches, doors, ports work authorizations.	<ul style="list-style-type: none"> ▪ Inspect portable electric tools prior to use. With the exception of double-insulated tools, all portable electrical tools requiring 60-Hz power shall be equipped with three conductor cables and grounded plugs. ▪ Any tool with frayed cords, exposed wiring, missing ground plugs, etc., shall be removed from service. ▪ Keep body parts away from cutting parts of power tools. ▪ Electrical equipment and tools used at AMF1 site shall have UL approval ratings where possible. ▪ Electric-powered heaters and fans shall have UL approval ratings. ▪ Equipment owned and furnished by other organizations and agencies (non-LANL/PNNL) shall be provided with appropriate safe operating procedures. These procedures must be observed by all personnel working at or visiting AMF1 site. ▪ Operate all equipment as per site procedures and manufacturer's recommendations. ▪ Lockout/Tagout: Any equipment tagged with a "Lockout/Tagout" indicator may not be operated.
Large or heavy equipment, air conditioning units	<ul style="list-style-type: none"> ▪ Follow all electrical controls listed.
Pressurized gasses work authorization	
Pressurized gasses such as AMF low-pressure compressor for shutter operations, portable air compressor for tools, dry air compressor	<ul style="list-style-type: none"> ▪ Use compressed gases as per mfr recommendations.

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CATEGORY: Professional service provider specialists work authorizations and controls:

Work & associated hazards	Work controls, tools – Professional service provider (Electrician, HVAC tech, etc.)
Electrical work authorization	
Equipment installation using outlets	<ul style="list-style-type: none"> ▪ Reset breakers.
Electrical work on DC systems	<ul style="list-style-type: none"> ▪ None.
Electrical work on AC systems, wiring, transformers, UPS systems, power panels	<ul style="list-style-type: none"> ▪ Work on 220 VAC, 3-phase or 110 VAC, 1-phase exposed connectors by trained personnel only. ▪ Only certified electricians are authorized to work on 220 VAC or 110 VAC systems. ▪ Only qualified electricians are allowed to open AC distribution, control cabinets, or enclosures when power is applied. ▪ All electrical loads must be disconnected and locked out before connecting or disconnecting the main AC power cables to any enclosure or van. ▪ All energized electrical work, other than diagnostics and testing, shall be performed de-energized whenever possible. FIDO may approve procedures for energized electrical R&D work when items below have been addressed: <ol style="list-style-type: none"> 1) Potential hazards associated with the task 2) Minimum work clearances required 3) What barricades are required and their placement 4) What personal protective equipment is required 5) Test instruments to be used 6) Proper instructions for safety using test instruments 7) Minimum number of workers required to do the task 8) Description of the duties of each worker 9) Sequence of steps which affect safety 10) Lockout/Tagout required for all work on energized systems ▪ All electrical maintenance or repair of electrically powered equipment or electrical supply systems shall be done as follows: <ol style="list-style-type: none"> 1) Maintenance procedures shall not be performed by a lone person where a dangerous or lethal hazard exists. Two knowledgeable persons shall be present, one of whom is clear of the hazard. Whenever possible, troubleshooting of energized equipment should be avoided. 2) Before starting work, de-energize all voltage sources and provide a positive method of ensuring that voltage will stay off. Lockout/tag out procedures must be used. 3) When working on energized equipment, personnel shall work with one hand whenever possible. <u>Note: Use rubber mats or other insulating material that will keep the operator isolated from ground.</u> 4) When using an oscilloscope or other test equipment, probes shall be connected to oscilloscope or other test equipment before being connected to the equipment under test and shall remain connected to the oscilloscope or other test equipment throughout the test.
Electrical work on grid power systems	<ul style="list-style-type: none"> ▪ Only local utility power company technicians are allowed to work on 416 VAC, 3-phase site power supply.
Large or heavy equipment, air conditioning units	<ul style="list-style-type: none"> ▪ Follow all electrical controls listed.
Cranes, hoist, slings, rigging, and forklift operations for moving the AMF vans and their components	<ul style="list-style-type: none"> ▪ Any work requiring a forklift or crane will be performed by owner/operators of the equipment. <u>No untrained AMF1 team member is authorized to operate equipment owned by local service providers.</u> ▪ If any crane or forklift work is to be performed on site, all team members, visitors, and colleagues must be warned of the work and asked to clear a suitable wide area around the work.
Diesel Generator noise, battery chemicals, mechanical parts, fuel	<ul style="list-style-type: none"> ▪ Use headset ear protection – available in S4 Van. ▪ Work on generator is as per maintenance schedule. ▪ Refer to <i>PRO(GEN)-004</i> and <i>PRO(GEN)-012</i>.

C. General Guidelines

1. All work performed at AMF1 site must be approved by FIDO.
2. If you feel uncomfortable with safety of any work you are asked to perform, **DO NOT DO IT**. Instead, contact FIDO at +1 505-667-1186.
3. In case of ES&H incidents:
 - Any team member of or visitor to AMF1 site can recommend or order a work stoppage for ES&H concerns without reprisal. Work will not recommence until the incident is resolved.
 - Any team member who does not adhere to the ES&H guidelines outlined in this document will be asked to leave AMF1 site.
4. Awareness of consequences:
 - Know hazards involved and safety equipment required for mitigating those hazards.
 - Identify potential waste and disposal methods to be followed.
 - Read operating manuals for test equipment or tools before using these devices. Observe manufacturer's safety recommendations.
 - Read the Material Safety Data Sheet (MSDS) for any chemical that may be used.
 - Personnel shall:
 - ⇒ Plan the work.
 - ⇒ Analyze the hazards.
 - ⇒ Develop and implement controls to mitigate the hazards.
 - ⇒ Perform the work safely after you have confirmed your readiness to do so.
 - ⇒ Identify improvements to further enhance the safety of the operation.
5. Follow the "Two-Man Rule" – visitors are not allowed to work alone at AMF1 site.
6. Visitors are responsible for cleaning up areas they use.

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III. Background:

The U.S. Department of Energy's (DOE) Atmospheric Radiation Measurement Program (ARM) relies on climate research facilities to measure surface components of solar and terrestrial radiation, surface meteorology, cloud properties, and other atmospheric quantities in various locations throughout the world, which include the U.S. Southern Great Plains (SGP), the Tropical Western Pacific (TWP), and the North Slope of Alaska (NSA).

The ARM Mobile Facility One (AMF1) is the fourth ARM field measurement facility designed to be easily transported and deployed for short-term campaigns anywhere in the world. The deployment and operation of the AMF1 is the responsibility of the Field Instrument Deployments and Operations (FIDO) Office at Los Alamos National Laboratory (LANL), Los Alamos, New Mexico, U.S.A.

FIDO operates the AMF1 in collaboration with a host organization or government. The ARM Climate Research Facility (ACRF) Science Board selects the deployment locations based on formal proposals.

IV. ES&H Policy:

Individuals working at or visiting AMF1 site on official AMF1 business, for an Intensive Operational Period (IOP), or just for a casual visit, must notify FIDO about travel plans well in advance of departure and in sufficient time to comply with the following policies:

- All personnel who are at AMF1 site are required to act and work safely and not to jeopardize their own safety or that of others at the site.
- All personnel who are at AMF1 site must perform work in such a manner that they do not jeopardize the operation of AMF1.
- All visitors must read AMF1 Safety Plan and agree to comply with its recommendations and guidelines as per their specific authorization. All visitors are to sign the visitor sign-in sheet acknowledging their personnel authorization and the work restrictions and precautions associated with that authorization.
- All visitors to AMF1 site from outside the host country must participate in a FIDO-led ES&H briefing before departing for the host country.
- All visitors to AMF1 site must also follow all applicable local regulations and codes. In general, new construction shall follow U.S. regulations, unless local regulations are more stringent.
- All AMF1 visitors must submit an official ACRF Site Access Request (SAR) online at <http://www.db.arm.gov/SARS2/> and cannot go to the site until they receive an approval.

V. Scope and Document Ownership:

- This plan applies to activities relating to AMF1 shelters and associated components within AMF1 site only. It does not cover work performed off site that is the responsibility of others. No work outside of AMF1 site is authorized by FIDO unless specified in writing. If off-site work is proposed and funded by DOE, it should follow the ARM Safety Policy online at http://www.arm.gov/about/safety_policy and the DOE Integrated Safety Management online at <http://www.eh.doe.gov/ism/diagram.html>.
- This document covers activities that normally occur in light electro-mechanical laboratories and activities common to mobile electro-optic laboratories with no chemical or wet-lab facilities.
- This plan is to be implemented as of the date of publication and continue in effect until superseded by a revision.
- The requirements of this document apply to all LANL employees, all U.S. subcontractors of LANL, and employees of collaborating U.S. organizations who visit AMF1 site. In addition, non-U.S. contractors, governments, and other organizations must also follow the requirements outlined in this document.

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VI. References:

FIDO/AMF Operations procedures – see FIDO web site at www.FIDO.lanl.gov.

VII. Attachments:

1. AMF1 Visitor Sign-in Sheet

