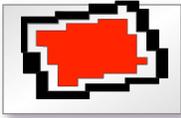


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**ADDENDUM - Atmospheric Radiation  
Measurement Program Second Mobile  
Facility  
(AMF2)  
Operational Support for  
MAGIC – HORIZON SPIRIT**

Date: April 30, 2013



## 1.0 GENERAL ADMINISTRATION

### 1.1 Scope

The purpose of this Appendix is to provide all AMF2 personnel and visitors with important health and safety information, procedures, and requirements particular to the second ARM Mobile Facility (AMF2) operations on Horizon Spirit in support of the DOE approved Field Campaign MAGIC. This information is a supplemental document to the *Atmospheric Radiation Measurement Program Mobile Facility-2 (AMF2) Safety Plan* (AMF2 Safety Plan).

This Plan, AMF-2 Safety Plan for MAGIC-Horizon Spirit provides safety related procedures for all personnel (including Argonne) entering the site to work, visit or observe. The plan presents the site's ES&H policy, work authorizations, characterizes on-site hazards, and identifies mitigations. The intent of these plans is to require workers to conduct their activities in a safe fashion and to provide them with the means to do so.

The ship also has its own ship safety plan which also covers various areas of safety onboard the ship while in port and at sea. Much of the ship's requirements are included in this safety plan. For a complete list of the ship's safety plan refer to The Horizon Safety Manual.

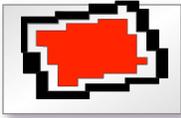
All AMF2 visitors must submit an official ACRF Site Access Request (SAR) online at <http://www.db.arm.gov/SARS2/> and are not allowed access to the site until they receive approval.

All AMF2 personnel are expected to abide by and follow all safety related plans and procedures during deployment.

**Vessel Familiarization Training:** All personnel associated with AMF2 are required to receive vessel orientation training. This will be provided by Horizon Spirit.

### 1.2 Operations

The locations of the AMF2 activities will be onboard the container ship Horizon Spirit while it transits between The Port of Los Angeles and The Port of Honolulu as shown in Figures 1, 2 and 3. A pre-site briefing will be required for all visitors in accordance with the AMF2 Safety Plan.



**Emergency Procedures:** Notify the Bridge immediately if you experience an emergency. Any emergencies aboard Horizon Spirit will be coordinated by the crew and will follow the ship procedures. Additional Emergency Procedures are provided in Attachment 3 *Emergency Procedures*. Additional emergency contact numbers are provided in Section 6.0

**AMF2 Answering Service (emergencies);**

A contracted answering service is available 24/7 to respond to phone calls at - **630 790 7149**



Figure 1 Horizon Spirit

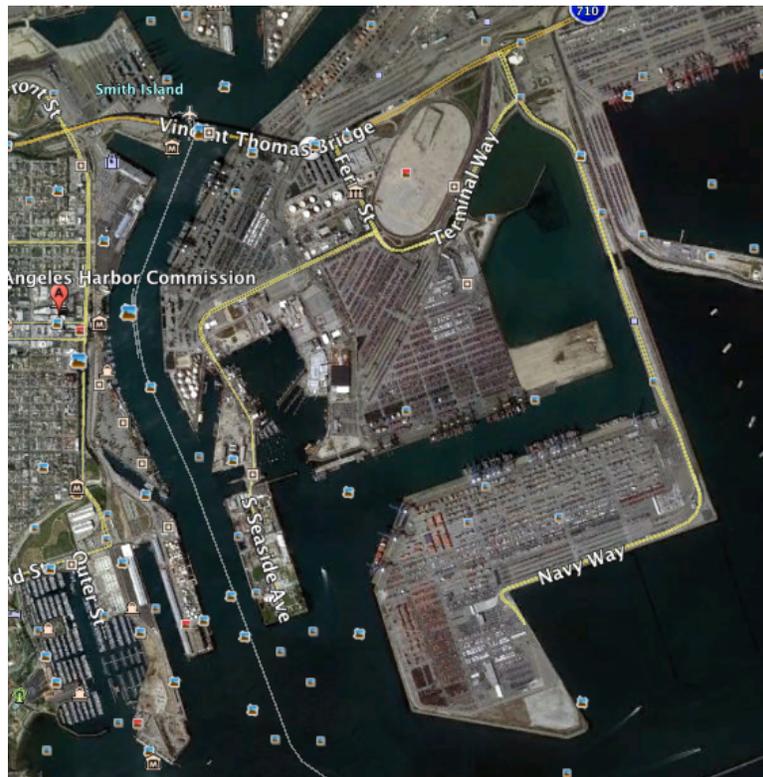
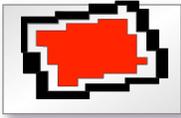


Figure 2 The Port of Los Angeles

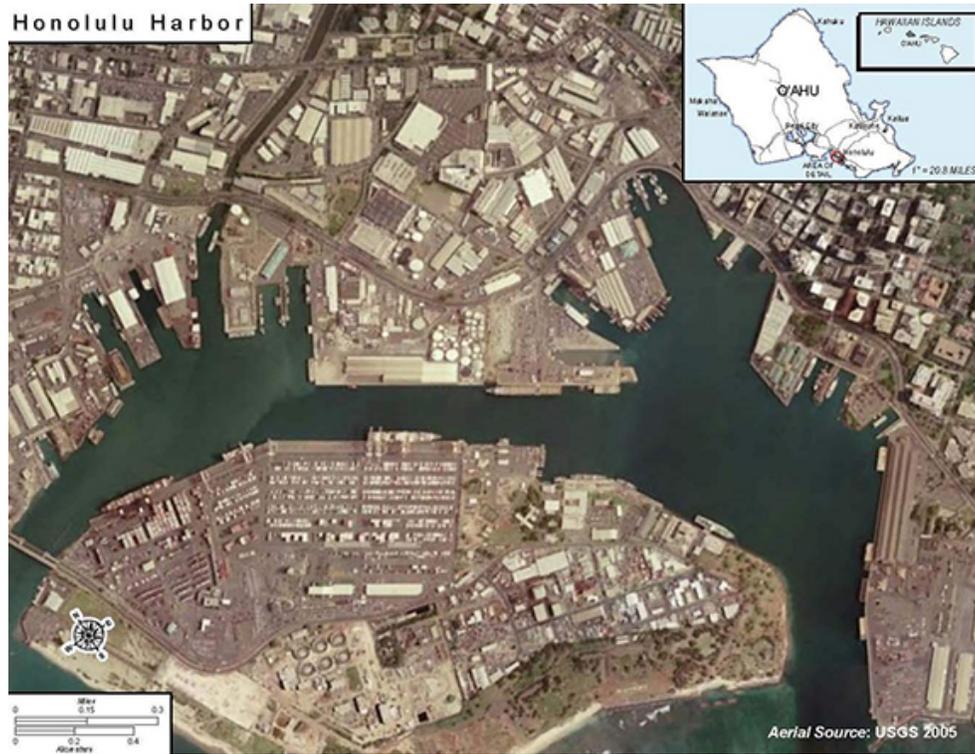
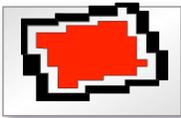


Figure 3 The Port of Honolulu

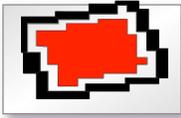
## 2.0 PLANNED ACTIVITIES

Activities addressed under this plan are associated with the installation and operation of AMF2 instruments onboard the ship Horizon Spirit. See the AMF2 Construction and Installation Plan for Installation and Attachment to the ship.

## 3.0 TIMELINE

TABLE 2. Schedule of planned activities

Date	Planned Activities
Aug 23 – Sep 30, 2012	AMF2 installation, set up of all instrument systems
Oct 1 – Feb 23, 2012	MAGIC – Operations Part 1
Jan 12-24, 2012	January Intensive Operations Period
Feb 23 – May 9, 2013	Dry-dock
May 9 – Sep 30, 2013	MAGIC-Operations Part 2



Jul 6-18, 2013	July Intensive Operations Period
Oct 1- Oct 31, 2013	Teardown and pack-up

#### 4.0 ORGANIZATION

The AMF2 Team will consist of:

1. Argonne National Laboratory AMF2 Management.
2. Two or three-person teams from Native, an Argonne ACRF contractor.
3. ARM Specialist or Instrument vendors.

AMF2 team members from Argonne and the Native Energy will primarily be involved in the setup and tear down operations and overall AMF2 management. Native Energy staff will be involved with all aspects of AMF2 operations including setup, tear down and routine operations and preventative maintenance.

#### 5.0 VISITORS

All visitors must take whatever training is required by Argonne and follow ARM, AMF2 and Horizon Spirit instructions.

Visitors must have an escort with them at all times while on deck.

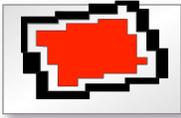
#### 6.0 EMERGENCY PLAN

In case of a medical emergency you must:

- Notify the Deck Duty Officer of the emergency and request the assistance of the ***Persons in Charge of Medical Care*** (Captains and Chief Mates).
- Follow the Emergency Plan outlined in the Health and Safety Plan to notify AMF2 and ANL Line Management.

Once the Persons in Charge of Medical Care are notified they will assess the situation. They have an on call 24hour/7 day a week medical advisory service that can assist them with assessing the gravity of the medical situation.

In case an evacuation is recommended or needed the Captain of the ship will contact the Coast Guard. Once the Coast Guard is notified the situation becomes a Coast Guard action and they will direct all action from that point forward. When the ship is within



range of the helicopter the USCG will airlift the injured/sick party off the ship to an appropriate medical care facility.

It is possible that the ship may be diverted from normal track in assisting the USCG but this will be at the discretion of the USCG.

In the unfortunate event of a death while at sea the body will be preserved in the vessel's freezer until the ship's next port call. At that time, arrangements will have been made for the ship to be met in port by the proper authorities/services to handle the body as requested by the authorities or the individuals family.

It is highly recommended that anyone travelling on the ship have a recent physical and that all existing medical conditions are discussed with your Doctor regarding the potential for exacerbating the problem while at sea.

#### **LOCAL EMERGENCY NUMBERS**

**Nicki Hickmon**

AMF2 Site Manager  
Argonne National Laboratory

Phone: 1-630-252-7662

E-mail: [nhickmon@anl.gov](mailto:nhickmon@anl.gov)

**Mike Ritsche**

AMF2 Technical Operations Manager  
Argonne National Laboratory

Phone: 1-630-252-1554

E-mail: [mtritsche@anl.gov](mailto:mtritsche@anl.gov)

**Monte Brandner**

ACRF Safety Coordinator  
Argonne National Laboratory

Phone: 1-605-574-2116

E-mail: [lmbrandner@anl.gov](mailto:lmbrandner@anl.gov)

**Patrick Dowell**

AMF2 Lead Technician  
109596 Coal Road  
Billings, Ok 74630

Phone: 1-580-388-4050

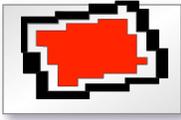
E-mail: [pdowell@ops.sgp.arm.gov](mailto:pdowell@ops.sgp.arm.gov)

**Bill Gasper**

ESH Coordinator  
Argonne National Laboratory

Phone: 1-630-525-4878

E-mail: [wgasper@anl.gov](mailto:wgasper@anl.gov)



## 7.0 ACTIVITY REVIEW AND HAZARD ASSESSMENT

Since the onsite personnel will be working different shifts, the onsite personnel will meet once a day to discuss any changes or new events in the past 24 hours, and they will discuss the proposed activities for the day. Any unusual or new activity not already evaluated will undergo a review by all AMF2 participants and other team members to address safety concerns and questions. Items to be reviewed during these safety discussions include:

- Potential physical and biological hazards
- Site-specific procedures to be followed for particular activities
- Required personal protective equipment or supplies
- Emergency procedures
- Staff responsibilities
- Expected weather conditions
- Permission from ship's captain (if needed)

## 8.0 GENERAL SAFETY PRECAUTIONS

The AMF2 Safety Plan will be the guide to safe operations. In any case, attention to detail and recognition of the equipment and operating procedures by each person will be paramount.

### 8.1 Shipboard Specific Training

Training on the use of survival suits, emergency beacons, firefighting, man overboard, and abandon ship procedures will be covered by ship personnel. This training is mandatory for all AMF2 personnel.

### 8.2 Shipboard Drills

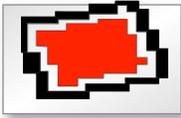
Lifeboat and "over the side" drills will be conducted. Attendance is mandatory.

### 8.3 Noise

Ships can be very noisy. Hearing protection maybe required and is available onboard ship.

### 8.4 Mechanical

Equipment and system components come under loads due to the action of ship motion and the seas. Minimize time beneath working sheaves and the line of the electromechanical cable leading from the winch to the equipment deployed over



the side or stern of the ship. Avoid hydraulic lines and systems when they are working. Always look up before walking out on deck.

Care should be taken when working around the AMF2 stabilization platform(s) to avoid crush/pinch points.

#### 8.5 Electrical

Connection of equipment to ships power must be done under the supervision of qualified ship's personnel. Between the ships power supply and the equipment there is a mechanical lock out breaker and an isolation transformer. Any Lock Out/Tag Out will be performed by ship personnel. The "lockout" breaker must be off and locked out prior to connecting or disconnecting the deck cable.

#### 8.6 MSDS

MSDS information for all chemical products must be provided to Argonne and ship operator. A copy of all MSDS sheets will also be kept with AMF2 in a binder located in the OPS Van. Another copy will be kept in the project binder at Argonne.

#### 8.7 Bad Weather & High Seas

Severe rolling/pitching of the vessel can lead to physical injury and can cause sea sickness. Falling overboard can lead to hypothermia and death, even in the tropics. Never go out on deck alone at night without a second person nearby. The ship's officers determine when it is safe to work. Work on deck may be disallowed during bad weather and at night. Work may be prohibited in any location of the ship by order of the captain. Researchers must follow the instructions of captain and crew. Personnel should consult their physician on appropriate seasickness medications.

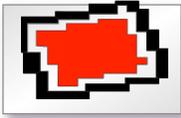
#### 8.8 Hard Hats

Hard hats with chin straps shall be worn whenever an overhead hazard exists either onboard or ashore.

#### 8.9 Safety Vests

Safety vests shall be worn whenever cargo is being worked.

#### 8.10 Life Vests



When needed life vests (PFDs) must be worn. Ship personnel will inform passengers and provide the PFDs.

#### 8.11 Eye Protection

Eye protection shall be worn by all persons at all times on deck, in tanks and holds and in machinery spaces. Proper eye protection shall also be worn by persons grinding, chipping, sandblasting, painting, working with solvents, cleaning agents or chemicals or anytime there is a chance of eye injury anywhere on board the ship when performing or supervising any kind of work. Protective eyewear shall be provided to and will be used by visitors, contractors and other shore side personnel at gangways and entrances to the machinery spaces. These requirements shall apply at all times, whether ship is underway, docking or undocking, at anchor, in shipyard or alongside a pier.

#### 8.12 Footwear

Appropriate footwear (work boots with non-slip soles, safety toes, as required) shall be worn for the job and job location. Unprotected “bare” feet and “flip-flops” are strictly prohibited at all times aboard ship. Tennis shoes/sneakers are inappropriate while working on deck. Appropriate foot wear must be worn at all times while working on deck.

#### 8.13 Gloves

Hand protection is required when hands are exposed to hazards that may cause cuts/lacerations, abrasions, punctures, chemical burns, thermal burns, or contamination from a hazardous substance. General work gloves will be provided by AMF2.

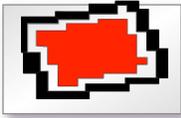
#### 8.14 Climbing

Occasional climbing of the ship’s mast will be required. This will only be conducted when the ship is in port and with the consent of the Captain. Climbing can only be performed by trained and qualified individuals. Two properly outfitted approved climbers must be available during all climbing events in the event a rescue is needed. A Climbing Plan and Climbing Procedures are provided as Attachments to this document.

### 9.0 SAFETY EQUIPMENT

9.1 General Individual safety items required for the trip are listed below:

Provided by Individual:



- Sunscreen
- Bug repellent and/or bug repellent clothing
- Protective clothing (sunglasses, hat)
- Adequate foot protection

Provided by AMF2:

- Drinking Water
- Iridium Phone
- Hard Hats
- Work gloves
- Over boot toe guards

Provided by Horizon Spirit:

- Life Vests
- Hearing Protection

## 9.2 Safety Harness

Safety harnesses are to be worn when climbing the IMO Pilot ladder, working over the side, or whenever there is a chance of falling. All tools will be tied off to the harness to prevent falling objects.

Working Aloft – Do not go above the flying bridge (just above the wheelhouse or up on the foremast unless you have permission from the Mate on Watch and he has both radars secured and both radar indicators are tagged with signs for them to be kept “OFF”.

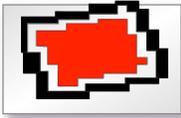
Stay clear of all antennas at all times. When in use, these antennas can develop very high voltages.

Access to the Flying Bridge will be allowed when the ship is in port and must be authorized by the ship's crew.

## 9.3 Ladder Safety

The following procedures shall be followed regarding the maintenance and use of portable ladders onboard.

- Inspect all portable ladders before use and document inspections weekly using Site Survey checklist - record and report any problems.
- Ladders will be used only while the ship is in dock
- Make sure that tie off lines are attached to the ladder when in use



- Tie off ladder to prevent slipping
- Label defective ladders and place them where no one will use them.
- Place ladder on a stable foundation before climbing.
- Place base of ladder at a distance from the structure  $\frac{1}{4}$  the ladder length, where possible
- Have another person hold the ladder until it can be tied off.
- Extend ladder at least 3 feet above structure being worked.

## 10.0 COMMUNICATIONS

An AMF2 Iridium phone (incoming call number: 011-88-1677-727571) will be available for use when the ship is underway for emergency operational purposes. A list of pertinent emergency phone numbers (included in Section 6.0 of this plan) shall be readily available to the field team.

AT&T 3G and 4G communication will be available in port for data communications only.

## 11.0 PHYSICAL HAZARDS

### 11.1 Fire

Fire hazards can always occur. Fire extinguishers are in both the OPS, radar and APS vans. Immediately upon discovering the fire inform the bridge. If the fire is controllable and the individual is trained in extinguisher use, determine a safe exit route and use fire extinguishers to put out the fire.

### 11.2 Mechanical Hazards

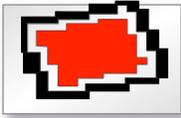
Mechanical hazards could be posed by equipment used on board. The advice of operating personnel will be followed regarding hazards of moving equipment.

### 11.3 Weather Hazards

Weather conditions will be continuously monitored by the ship's crew and by AMF2 personnel during installation activities and normal operations. Care will be taken to avoid severe weather. If sudden weather extremes occur, all personnel will take appropriate cover. Follow emergency instructions provided.

### 11.4 Heat-Related Illnesses

Sun exposure and winds can be significant and lead to physical problems. Team



members should be aware of the causes and symptoms of heat-related illnesses. Heat-related illnesses include heat stroke, heat exhaustion, heat cramps, heat rash, heat syncope, and heat fatigue. The symptoms, prognosis, and treatment of these conditions are stated below. The prevention of heat-induced illnesses includes heat acclimation and maintaining water and electrolyte balance. Drinking adequate fluids and periodic rest breaks in the shade or in air-conditioned vehicles will also help with the regulation of body temperature.

Heat stroke or hyperthermia is a life-threatening medical emergency. Symptoms include high body temperature (104 °F to 108 °F) usually with hot dry skin, mental confusion, convulsions, and unconsciousness. The body temperature needs to be lowered by removing outer clothing, wetting the skin with water and fanning vigorously. Inform the Bridge and follow instructions given.

Heat exhaustion is the result of water imbalance in the body - loss of water from sweating exceeds the amount of water drunk. Symptoms include fatigue, extreme weakness, nausea, headache, dizziness, and cool, clammy skin. The person should be moved to a cool area to rest with an intake of cool liquids. Heat exhaustion can be prevented by heat acclimatization and sufficient fluid intake.

Heat cramps are the result of the loss of salt in the body from sweating. This produces painful muscle cramps of the leg, arm, or abdomen. The cramps should disappear with a normal salted diet.

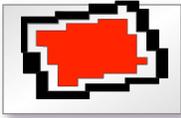
Heat rash or prickly heat occurs in hot humid areas when skin and clothing are wet and not allowed to dry. This condition can be prevented by keeping the skin dry and clean.

Heat syncope occurs in individuals not acclimatized to heat. Symptoms include dizziness and/or fainting while standing in the heat. The person should be moved to a cooler area for rest and adequate cool liquids.

Heat fatigue is caused by the combination of discomfort, physical strain, and hormonal changes while working and living in hot climates. Acute and chronic heat exposures produce behavioral responses such as impairment of alertness, cognitive, and sensory motor performances and reduce concentration and performance capacity. Move the person to a cooler area to rest.

## 11.5 Dehydration

During any season, dehydration can occur. Increasing the amount of liquids ingested is the most important factor in maintaining comfort, normal mental and physical capacity, and good health. High temperatures in the summer, in



combination with increased physical activity can lead to dehydration. Dehydration causes painful constipation and can lead to other illnesses. Persons should drink at least eight glasses of water each day at regular intervals. Caffeinated liquids are not considered hydrating fluids.

### 11.6 Solar Radiation

Prolonged exposure to the sun can result in painful sunburns. All field personnel should obtain and use a sunscreen or sun block to prevent sunburns. A sun protection factor (SPF) of 30 or higher is recommended. Be especially sure to cover sensitive areas (ears, nose, and face) and reapply sunscreen or sun block regularly throughout the day. In addition, a hat is recommended to prevent burning of the scalp and to shade the face and neck.

Sunglasses are recommended.

### 12.0 CHEMICAL HAZARDS

No chemical hazards are anticipated beyond those in the AMF2 Safety Plan.

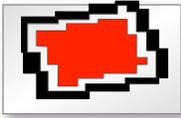
### 13.0 BIOLOGICAL HAZARDS

No biological hazards are likely during this operation.

### 14.0 RADIATION HAZARDS

Exposure to radio frequency energy (RF) from an antenna may cause thermal injuries including tissue damage from increased heating and body temperature. Keep everyone at a safe distance from the antenna when system power is ON. Personnel must maintain a minimum separation distance as listed below for the following equipment. Failure to do so could result in exposure to radio frequency energy (RF) transmitted from the antenna that could result in serious injury or death.

Iridium Antenna	1 meter
MWACR	1 meter
KAZR	1 meter
RWP	1 meter



Never substitute any antenna for the one supplied or recommended by the manufacturer or dealer. Substitution of antenna could cause exposure to excess radio frequency radiation which could result in serious injury or death.

All radars and the Iridium phone must be turned off prior to entering port and cannot be turned back on until the ship is back out to sea.

## 15.0 Safety Rules and Habits for Shipboard Survival

Never run on the ship. There is no hurry.

Never jump off anything, no matter how short the height. What you are planning to land on may move while you are in the process coming down.

Remember one hand for the ship and one hand for yourself. **Always**, keep one hand free to grab the railing or other hand hold when moving about the ship even when you are taking a shower.

When you open or close a door, close it so it catches, dog it down, or hook it back. Do not let go of the door until you do one of the foregoing. The movement of the ship will cause unsecured doors to move unexpectedly. Open all doors slowly as the movement of the ship can add unexpected momentum and you could lose control of the door.

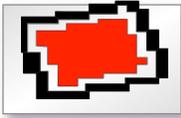
Even if the door is properly secured, never put your fingers in the door jamb even if a door is secured open. Doors can easily become unsecured and smash or in extreme cases cause the loss of a finger or fingers.

Always wear **proper footwear** for the job and the job location. Bare feet or stocking feet are acceptable when in bed but be aware walking around your room in them could lead to slips and falls due to unexpected ship movement. Shower clogs/flip flops are appropriate when in your room but never on deck or even going from your room to the dining area.

When walking, treat any deck as if it were a slick deck. Weather decks, even when free of oil, become slick in rain, etc. Engine decks often are not free of all oil in spite of the best efforts.

If you see oil on the deck, clean it up immediately.

If you see any safety hazard, report it to the bridge.



During rough weather, it is safer to walk on the LEE side of the vessel. Frequently, the windward side may be dryer, but it is not always safer. It is unlikely that anyone will be washed overboard from the lee side or has been struck by the sea on the lee side. This ship may take seas over the deck during extreme weather. For example, this ship has taken seas one deck above the main deck and caused flooding in the EMERGENCY DIESEL GENERATOR ROOM.

In rough weather, never go out on deck alone.

#### CARGO OPERATIONS -

When going ashore, keep in mind; the terminal can be an extremely dangerous place. If transportation is provided, use it. Where no transportation is provided, use the SAFETY WALKWAYS. Do not take shortcuts through the container aisles. The drivers do not expect you to be anywhere but in the walkways. Keep your eyes open at all times.

Never walk under a container that is being lifted by a crane.

When in port, especially during Cargo Operations, use the offshore side of the ship or the tunnels below deck to travel fore and aft.

When in port, don't linger on deck, even on the offshore side.

#### ELEVATOR

If elevators are available refer to the ship's procedures for instructions on use.

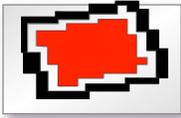
Keep everything shipshape. Neatness and tidiness are necessary virtues. Keep your room secure - all loose gear put away or secured. The same holds true for your workspace. Immediately learn the location of your lifeboat, life preserver, survival suit, fire extinguishers, and other safety apparatus. Know the signals used in the event of emergency and where you are to go.

Before you use any product or tool, read the instructions for safe use or follow the instructions of your supervisors.

### 16.0 Safety Rules in the Engine Room and ON Deck

#### 16.1 Ear Protection

Your ears are precious and irreplaceable. The vessel is provided with very good hearing protectors. Be sure you wear these ear protectors when



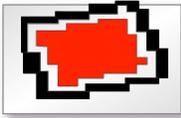
working in high noise areas. Wear them all the time when the machinery is operating.

### 16.2 Respiratory Protection

The use of respiratory protection is not anticipated for AMF2 personnel.

### 16.3 Hand Protection

Hand protection is required when hands are exposed to hazards that may cause cuts/lacerations, abrasions, punctures, chemical burns, thermal burns, or contamination from a hazardous substance.

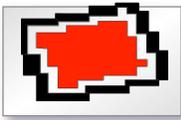


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## MODIFICATION AND FEEDBACK ON THE SAFETY PLAN

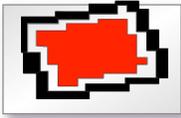
This plan can be modified if necessary to address unanticipated situations. Any modifications will be made in writing and all AMF2 team members will be informed of changes or additions. Agreement of AMF2 management to any modifications must be indicated by signature.



## Site Survey

To facility improvements in safety and operations an AMF2 site survey and inspection will be conducted at least once per week using the following checklist. Any findings will be discussed with AMF2 and Native Energy management. The following checklist should be used as guidance for AMF2 facility inspections.

Item	Yes	No	N/A
1. Are all floor areas kept clean, and free of refuse? Are spills of any type promptly cleaned-up?			
2. Are all floor mats flat and placed so they won't cause tripping hazard?			
3. Are interior and exterior passageways, aisles and exit accesses kept clear?			
4. Are electrical cords placed where they do not pose a tripping hazard to personnel?			
5. Are electric cords frayed/worn or have wires sticking out? Plugs worn/have wires sticking out?			
5 a. Are all electrical devices NRTL certified or have they been inspected and labeled by authorized Designated Electrical Equipment Inspector.			
5 b. Are all GFCI outlets tested and labeled (annual basis).			
6. Are extension cords single use?			
7. Are electrical extension cords not used as substitute for fixed wiring, attached to building surfaces, run through doorways, windows or through holes in walls, ceilings, or floors?			
8. Are outlets covers broken/missing/wires sticking out?			
9. Do electrical cords with three prong plug have one firmly attached?			
10. Are all waste baskets emptied regularly to prevent insect/rodent infestation?			
11. Are all waste baskets placed under desks to prevent tripping or falling?			
12. Are all chairs kept against desk when not in use to prevent injury?			
13. Are chairs serviceable/NO missing parts?			
14. Are cabinet and desk drawers closed to prevent tripping hazard?			
15. a. Are desks/cabinets/shelves/cubicles serviceable?			
15. b. If anything unserviceable in 15a, are there any damaged surfaces that would cause injury?			
16. Are computers/UPS/printers/monitors situated in a safe manner?			
17. Are appliances in good repair/clean?			



18. Are all cleaning supplies, office supplies put away properly?			
19. Are outside areas clean and free of debris (To include stairs, sidewalks, driveway and roof)?			
20. Are only step stools or ladders used to retrieve or store anything above shoulder level?			
21. Inspect all portable ladders.			
22. Make sure that tag lines are attached at each end of every ladder.			
23. Is team lifting considered when lifting heavy or awkward objects?			
24. Are heavy objects not stored on top of cabinets, shelves, etc., where they may fall on personnel?			
25. Are floors inside OPS and GP vans kept dry or covered with a rubberized rug?			
26. Test battery in Smoke and Carbon Monoxide detectors.			
27. Fire Extinguishers: Is the needle in the green section and is pin installed?			

