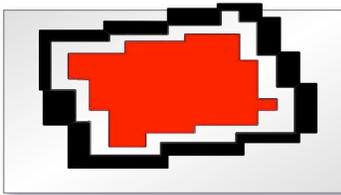


ENVIRONMENTAL HEALTH AND
SAFETY MANUAL FOR
ATMOSPHERIC RADIATION
MEASUREMENT PROGRAM
AMF2

REV. A



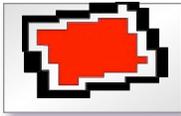
NATIVE ENERGY & TECHNOLOGY, INC

Prepared for:
U.S. Department of Energy
Argonne National Laboratory
Argonne, IL 60439

Contract No. 2-BB47-P-00097-00

Prepared by:
Native Energy and Technology, Inc.
110 Broadway, Suite 690
San Antonio, Texas 78205

April 29, 2013



ENVIRONMENTAL HEALTH AND SAFETY
MANUAL FOR
ATMOSPHERIC RADIATION
MEASUREMENT PROGRAM
AMF2

Approved by:

John Morris
President

Diana Davis
Vice President

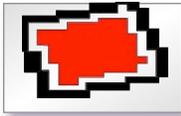
Patrick Dowell
Lead Technician/SSO

Nicki Hickmon
AMF2

Michael Ritsche
AMF2

Bill Gasper
ESH
Argonne National Laboratory

LaMonte Brandner
Field Operations Oversight
Argonne National Laboratory



Native Energy and Technology, Inc.

ENVIRONMENTAL HEALTH AND SAFETY MANUAL FOR ATMOSPHERIC RADIATION MEASUREMENT PROGRAM AMF2

AMF2 Safety Staff

Patrick Dowell

Mike Ritsche

Nicki Hickmon

William Gasper

LaMonte Brandner

John Schatz



TABLE OF CONTENTS

TABLE OF CONTENTS	i
LIST OF ABBREVIATIONS	v
1. GENERAL ADMINISTRATION	6
1.1 About This Manual	6
1.1.1 Introduction	6
1.1.2 Scope	6
1.1.3 Applicability	7
1.1.4 Manual Updates	7
1.1.5 Health and Safety Policy	7
1.1.6 Implementation Responsibilities	8
1.1.7 Visiting the Site	9
1.2 Handling Investigations and Reporting of Accidents, Injuries, and Unusual Occurrences	9
1.3 Environment, Safety, and Health Training	9
1.4 Working Alone	10
1.5 Safety Committees	10
1.6 Stop Work Authority	11
2. DRUG TESTING	12
3 OCCUPATIONAL MEDICAL PROGRAMS	14
4 HAZARDOUS MATERIALS	15
4.1 Hazard Communication	15
4.2 Chemical Hygiene Plan	15
4.3 Chemical and Laboratory Safety	15
4.4 Chemical Carcinogens	16
4.5 Chemical Monitoring in the Environment and Work Place	16
4.6 Cryogenic Safety	16
5. IONIZING RADIATION PROTECTION	18
6 NON-IONIZING RADIATION PROTECTION	19
7 WORK SPACES	20
7.1 Lockout/Tagout: Control of Hazardous Energy	20
7.1.1 Hazards	20
7.1.2 Hazard Controls	20
7.1.3 Definitions	20



7.1.4	Training.....	21
7.1.5	Preparation for Lockout/Tagout Procedures.....	21
7.1.6	Routine Maintenance and Machine Adjustments.....	22
7.1.7	Locks, Hasps, and Tags	22
7.1.8	SOP: General Lockout/Tagout Procedures	22
7.1.9	SOP: Release from Lockout/Tagout.....	24
7.1.10	SOP: LOTO Procedure for Electrical Plug Type Equipment.....	24
7.1.11	SOP: LOTO Procedures Involving More Than One Employee	25
7.1.12	SOP: Management's Removal of Lockout/Tag Out	25
7.1.13	Contractors	25
7.2	Shipboard Deployment.....	25
7.2.1	Purpose.....	25
7.2.2	Shipboard Specific Training.....	25
7.2.3	Shipboard Drills	25
7.2.4	Noise	25
7.2.5	Mechanical.....	25
7.2.6	Electrical	26
7.2.7	MSDS.....	26
7.2.8	Bad Weather & High Seas	26
7.3	Ergonomics and the Prevention of Musculoskeletal Disorders.....	26
7.4	Noise Control and Hearing Conservation	26
7.5	Office Safety.....	27
7.6	Reserved.....	Error! Bookmark not defined.
7.7	Safe Use of Tools.....	27
7.7.1	Purpose	27
7.7.2	Scope	27
7.7.3	Procedures	27
7.8	Scaffolds, Platforms, and Portable Ladders	31
7.8.1	Ladder Safety.....	31
7.8.2	Ladder Hazards	31
7.8.3	Ladder Inspection	32
7.8.4	Ladder Storage.....	32
7.8.5	Ladder Weight Ratings.....	32
7.8.6	Limits on Ladder Length	32
7.8.7	Ladder Setup.....	32



7.8.8	Ladder Maintenance	33
7.8.9	Ladder Inspections	33
7.9	Natural Hazards.....	33
7.9.1	Temperature Extremes	33
7.9.2	Spiders	35
7.9.3	Reptiles	35
7.9.4	Animals.....	35
7.9.5	Terrain Hazards.....	36
7.10	Severe Weather	36
7.10.1	General	36
7.10.2	Site Weather Alert Condition	Error! Bookmark not defined.
7.10.3	Establishing the Initial Daily Weather Alert Condition	36
8	EMERGENCY MANAGEMENT	37
8.1	Emergency Management	37
8.2	Alarm Systems Inspections.....	Error! Bookmark not defined.
9	ELECTRICAL SAFETY	38
9.1	Electrical Safety	38
9.2	Ground Fault Circuit Interrupters	38
9.3	Lightning Protection	39
10.	ENVIRONMENTAL PROTECTION PROGRAM	40
11.	FIRE PROTECTION	41
12.	PERSONAL PROTECTIVE EQUIPMENT (PPE)	42
12.1	Hazard Assessment and Equipment Selection.....	42
12.2	Defective and Damaged Equipment	42
12.3	Training	42
12.4	PPE Selection.....	43
12.4.1	Controlling Hazards.....	43
12.4.2	Selection Guidelines	43
12.4.3	Fitting the Device	43
12.4.4	Devices With Adjustable Features	43
12.5	Eye and Face Protection.....	44
12.5.1	Eye and Face Protection Specifications.....	44
12.5.2	Eye and Face Protector Use	45
12.6	Head Protection	46
12.6.1	Selection Guidelines for Head Protection.....	46



12.7	Foot Protection	47
12.7.1	General Requirements.....	47
12.7.2	Selection Guidelines for Foot Protection.....	47
12.8	Hand Protection	47
12.8.1	General Requirements.....	47
12.8.2	Selection Guidelines for Hand Protection.....	48
12.8.3	Selection of Gloves for Chemical Hazards	48
12.9	Hearing Protection	49
12.9.1	Engineering Controls	49
12.9.2	Administrative Controls	49
12.9.3	Types of Hearing Protectors.....	50
12.9.4	Use of Hearing Protectors	50
12.10	Respiratory Protection	51
13.	PRESSURE SAFETY	52
13.1	Pressure Vessels and Air Compressors	52
13.2	Compressed Gas Cylinder.....	52
14.	TRAFFIC SAFETY AND VEHICLE ACCIDENT REPORTING	54
15.	MATERIAL HANDLING SAFETY.....	55
15.1	Material Handling	55
15.1.1	Training.....	55
15.1.2	Equipment Inspection	55
15.2	Hoisting and Rigging Safety	56
16.	CONSTRUCTION AND SERVICE CONTRACTOR SAFETY	57
17.	HEALTH AND SAFETY PROCEDURES FOR WORK NOT AT THE main site	58
18.	EXIT SYSTEMS AND LIFE SAFETY	59
19.	PACKING AND TRANSPORTATION OF HAZARDOUS MATERIAL	60
20.	APPENDIXES	62
A.	Site Survey	62
B.	Visitor Sign-in Sheet	64
C.	Controlled Substance Act Section 202.....	69
D.	Occupational Exposure of Hazardous Chemicals in the Laboratories.....	77
	DISTRIBUTION.....	86



LIST OF ABBREVIATIONS

AMF2	ARM 2 nd Mobile Facility
ANL	Argonne National Laboratory
ANSI	American National Standards Institute
ARM	Atmospheric Radiation Measurement
CO ₂	Carbon Dioxide
dB(A)	Decibel on the “A” weighted scale
DOE	Department of Energy
DOT	Department of Transportation
DTN	Data Transmission Network
ES&H	Environmental Safety and Health
GFCI	Ground Fault Circuit Interrupter
GSA	Government Services Administration
ISM	Integrated Safety Management
JSR	Job Safety Requirement
LN ₂	Liquid Nitrogen
MSDS	Material Safety Data Sheets
NR	Noise Reduction Factor
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
SOP	Standard Operating Procedure
SOW	Statement of Work
SSO	Site Safety Officer



1. GENERAL ADMINISTRATION

1.1 About This Manual

1.1.1 Introduction

The policy of Native Energy and Technology is that **all** activities shall be conducted in a safe and reasonable manner. Incorporation of ISM¹ principles and core functions into all activities form the basis of a sound ES&H² system. The health and safety of all employees and the general public and the protection of the environment from adverse impacts will take precedence over the operation of all Native Energy and Technology managed facilities. It is the policy of Native Energy and Technology that the ARM³ AMF2⁴ program will comply with all applicable health, radiological safety, environmental protection, and fire protection regulations and policies promulgated by the DOE⁵, ANL⁶, and other regulatory bodies.

1.1.2 Scope

This document provides basic information on established Native Energy and Technology policies and procedures designed to provide a safe working environment and to ensure continued compliance with applicable safety and environment protection regulations and requirements at the AMF2⁷ research site. However, this manual does not seek to be an all-encompassing safety manual; rather, it is designed to provide AMF2 site operations staff with a basic understanding of how Native Energy and Technology policies and procedures coincide with ANL and DOE directives in the areas of safety, health, and environmental protection. In some instances critical information contained in other relevant documents has been distilled and included in this manual for the reader's convenience. However, the reader must consult other documents for more detailed information.

It is the continuing responsibility of all site operations employees to become familiar with and maintain compliance with the policies, procedures, and directives contained or referenced in this manual.

Formal updates to this document will occur biennially or as required. Changes or additions necessitated by changes to the basic ANL or DOE directives on which this manual are based may occur more immediately via written addenda. Necessary changes or additions to this

1	ISM	Integrated Safety Management
2	ES&H	Environmental Safety and Health
3	ARM	Atmospheric Radiation Measurement
4	AMF2	ARM Mobile Facility 2
5	DOE	Department of Energy
6	ANL	Argonne National Laboratory
7	AMF2	ARM Mobile Facility 2



document identified by site operations should be brought to the attention of the SSO⁸. The SSO, via written memoranda, will inform the Project Manager and Onsite Manager. Until such changes or additions are formally incorporated (either by written addenda or formal revisions), the directives contained in this manual will prevail. Likewise, request for exceptions or variances to the requirements contained herein should be directed in writing to the Project Manager. When granting such variances or exceptions is beyond the Project Manager's authority, appropriate authorities will be consulted.

1.1.3 Applicability

Compliance with these policies and procedures will apply to the AMF2 facilities for site operations employees, visitors, temporary appointees, students, and contracted workers.

1.1.4 Manual Updates

This manual has been formatted to facilitate updates and additions. It is the continuing responsibility of the SSO to keep this manual updated and current.

1.1.5 Health and Safety Policy

The policy of Native Energy and Technology is that all activities for which Native Energy and Technology have primary responsibility will be conducted in such a manner that all reasonable precautions are taken to protect the health and safety of employees and the general public. Likewise, the facilities for which Native Energy and Technology has primary responsibility will be operated and maintained in a safe condition at all times. Therefore, the health and safety of site operations employees, visitors, and the general public will take precedence over the policy of Native Energy and Technology. Further, all reasonable steps will be taken to minimize dangers from all hazards to life, property, and the environment. The AMF2 site will comply fully with all health, radiological safety, industrial safety, fire protection, and environmental protection rules and policies of Native Energy and Technology, ANL and DOE, including the applicable policies and procedures outlined in the ANL Health and Safety Manual. The intent of Native Energy and Technology and the AMF2 site is to follow the seven guiding principles and five core functions of the ISM system for all work activities. A description of these principles and core functions is listed below.

ISM Seven Guiding Principles

Principle 1 - Line Management Authority and Accountability for ES&H

Principle 2 - Clear Roles and Responsibilities for ES&H

Principle 3 - Competence Commensurate with Responsibilities

Principle 4 - Balanced Priorities

Principle 5 - Identification of ES&H Standards and Requirements

Principle 6 - Establishment of Hazard Controls

⁸ SSO Site Safety Officer



Principle 7 - Operations Authorization ISM

Five Core Functions

Core Function 1 - Define the Scope of Work (Work Planning)

Core Function 2 - Analyze the Hazards

Core Function 3 - Develop and Implement Controls

Core Function 4 - Perform Work within Controls

Core Function 5 - Feedback and Continuous Improvement

1.1.6 Implementation Responsibilities

Safety at Native Energy and Technology is a line responsibility, extending from the company President to the Project Manager, to the Onsite Operations Manager and to all site operations employees. Responsibility for safety is automatically delegated with responsibility for performance of an operation.

Native's President has primary responsibility for the safety of operations and facilities at the AMF2 site and for taking necessary measures to ensure that the AMF2 facilities and activities comply with established safety and health requirements. The President must verify compliance with all applicable components of the Native Energy and Technology /AMF2 safety program as set forth by Native Energy and Technology policy. In addition, the President must ensure that safety analysis is developed for all new or significantly modified activities that fall outside normal operations covered in this manual. The President or designee must approve such safety analysis before the operations are allowed to proceed.

The Project Manager and Onsite Operations Manager are responsible for being knowledgeable of and implementing applicable safety policies and directives and taking other actions as necessary to provide for the safety of the personnel and operations they supervise. This responsibility includes taking positive actions to determine and reduce, as necessary, the hazards associated with their operations; instructing employees in safe work methods and associated safety requirements; and ensuring that all personnel perform their work in a safe manner.

Site Operators, including special term appointees, students, and visitors, are responsible for performing their work in a manner that will not endanger themselves or their coworkers and for complying with established safety rules and requirements. Employees are encouraged to contribute to the safety program and have the responsibility for bringing to the attention of their supervisor or the SSO any condition that they consider to be unsafe.

The **Site Safety Officer**, the senior person present, is responsible for providing guidance and oversight of the site safety program. Ensures that all site personnel and visitors are complying with applicable safety requirements. The SSO is responsible for the maintenance of the site safety plans, procedures, and records. A weekly Site Survey (Appendix A) will be completed and e-mail to AMF2 Ops on a weekly bases.



1.1.7 Visiting the Site

All visitors must read the Safety Plan and agree to comply with its recommendations and guidelines as per their specific authorization, and sign the visitor sheet (Appendix B) acknowledging their personnel authorization and the work restrictions and precautions associated with that authorization.

All visitors to the AMF2 site from outside the host country must participate in an ANL led ES&H briefing before departing for the host country.

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

1.2 Handling Investigations and Reporting of Accidents, Injuries, and Unusual Occurrences

Listed below are specific requirements for the AMF2 site. In the event of an accident or incident, take the following steps:

1. Take immediate action to minimize the injury and place personnel in a safe condition. In case of a medical emergency dial the appropriate emergency number.
2. Locate and complete the Native Energy and Technology "Incident Description" form with as much detailed information as possible.
3. Give the completed form to the SSO or the Onsite Operations Manager within 12 hours of the injury.
4. The ARM-AMF2 Project Manager and appropriate ANL, listed in the Site Specific Appendix, personnel should be called by phone and informed of all incidents/accidents as soon as the emergency situation is under control.

1.3 Environment, Safety, and Health Training

The objective of the ES&H training program is to empower the employee to protect their own health and safety and that of their fellow employees, and to safeguard the environment.

Specific Requirements:

1. There will be multiple safety in-services presented throughout the year. They will cover topics that are mandated by federal, state or local law or any topic that the AMF2 Site Safety Committee deems as a necessary topic.



2. Any visitor to the site other than delivery will be given safety orientation. All safety orientations must be renewed on an annual basis.
3. All contractors are required to attend a site safety orientation and discuss specific safety aspects of the job they are performing with their employees.
4. All records of training or meetings will be kept in the OPS Van cabinet with another copy with the Project Manager.

1.4 Working Alone

It is the policy of Native Energy and Technology that employees working alone should not be subject to increased risk as a consequence of working alone. This section provides guidance on when working alone may be allowed and suggests a mechanism for monitoring those who are authorized to work alone.

Specific Requirements:

1. Prior to granting approval to work alone, a detailed safety analysis shall be conducted. The safety analysis will include the type of work to be done, risk potential, the employee's training and experience, and the employee's physical limitations.
2. When working alone, a designated phone check system will be applied; i.e., the Site Operators perform a check in call or email every couple of hours.

1.5 Safety Committees

The AMF2 Safety Committee is a multi-disciplinary committee. Its purpose is to analyze and identify safety issues and develop recommendations for resolving them.

The Safety Committee is comprised of the following:

1. SSO
2. AMF2 Site Manager – Nicki Hickmon (temporary representative)
3. AMF2 Technical Operations Manager – Michael Ritsche
4. ANL Project/ESH Coordinator – William Gasper
5. ANL STA Field Safety Coordinator – LaMonte Brandner

Minutes of the meeting will be filed in the Safety Office and a copy is sent to ANL ES&H personnel.



1.6 Stop Work Authority

It is an inviolate principle that site operations, visitors, facility users, and contractors must not be exposed to unsafe conditions or conduct activities that adversely affect the environment. Anyone who finds himself or herself engaged in an unsafe activity or observes unsafe working conditions is **empowered and obligated to stop any activity** that he or she deems to have placed him or her or others in immediate danger. It is also an obligation of anyone stopping work to bring such conditions immediately to the attention of line management of the relevant organization.

Work must not be restarted until the activity is deemed safe; e.g., appropriate hazard control measures are in place. Authorization to proceed is granted by the SSO and Onsite Operations Manager. Native Energy and Technology has responsibility to document the original condition and the corrective action in a format and at a level of rigor commensurate with the seriousness of the situation and present ANL management with all pertinent information. ANL line management is expected to communicate lessons learned through existing communication channels. Line management is expected to communicate this policy to subordinates.



2. DRUG TESTING

As part of Native Energy and Technology policy (see Native Energy and Technology Alcohol and Drug Free Policy), all AMF2 personnel are required to submit to urine and/or blood alcohol testing for reasons specified in the following policy:

The Company is committed to providing a safe and productive workplace for its employees. In keeping with this commitment, the following rules regarding alcohol and drugs of abuse have been established for all staff members, regardless of rank or position, including both regular and temporary employees. All employees must carefully review and sign the Drug-Free Workplace Policy. The rules apply during working hours to all employees of the Company while they are on Company or government premises or elsewhere on Company business.

Being under the influence of illegal drugs, alcohol, or substances of abuse on Company property is prohibited. In addition, injuries sustained while under the influence of drugs or alcohol may not be covered under Worker's Compensation.

Working while under the influence of prescription drugs that impair performance is prohibited. An employee who is under doctor's care and is taking these drugs to treat a condition will be considered temporarily unable to work and must notify his or her supervisor that he or she is unable to work. Once he or she no longer requires the medications, he or she may return to work with a work release signed by a medical professional (a doctor or a registered physician's assistant P.A.).

So that there is no question about what these rules signify, please note the following definitions: If there are any questions they should be directed to Tom Flannery, Mike Ritsche, Nicki Hickmon, LaMonte Brander, William Gasper, or John Schatz.

Company or government property: All Company owned, leased, and operated property used by employees.

Controlled substance of abuse: Any substance listed in Schedules I-V of Section 202 of the Controlled Substance Act, as amended. See Appendix C.

Drug: Any chemical substance that produces physical, mental, emotional, or behavioral change in the user.

Drug paraphernalia: Equipment, a product, or material that is used or intended for use in concealing an illegal drug, or otherwise introducing into the human body an illegal drug or controlled substance.

Illegal drug: Any drug or derivative thereof whose use, possession, sale, transfer, attempted sale or transfer, manufacture, or storage is illegal or regulated under any federal, state, or local law or regulation. Any drug, including – but not limited to – a prescription drug, used for any reason other than that prescribed by a physician.



Under the influence: A state of not having the normal use of mental or physical faculties resulting from the voluntary introduction into the body of an alcoholic beverage, drug, or substance of abuse.

Consistent with the rules listed above, any of the following actions constitute a violation of the Company's policy on drugs and may subject an employee to disciplinary action, up to and including immediate termination:

- Using, selling, purchasing, transferring, manufacturing, or storing an illegal drug or drug paraphernalia, or attempting to or assisting another to do so while in the course of employment
- Being in an impaired condition or under the influence of alcohol and illegal drugs while working or reporting to work, conducting Company business, or being on company property.



3 OCCUPATIONAL MEDICAL PROGRAMS

All AMF2 site personnel are trained in first aid and cardiopulmonary resuscitation. The site has one Automatic External Defibrillator, located in the General Purpose Van. First aid kits are located in the General Purpose Van as well. This and any further medical equipment will be listed in the Site Specific Appendix.



4 HAZARDOUS MATERIALS

4.1 Hazard Communication

Hazard Communication Standard (OSHA⁹ 29 CFR 1910.1200) is based on the concept that employees have the "Right to Know" about the hazards associated with the chemicals to which they may be exposed and what protective measures are available to them.

Specific Requirements:

1. A request for MSDS¹⁰ will be attached to every chemical purchase.
2. Annually, or more frequently as required, the SSO or designee will conduct an inventory of chemicals on site.
3. The SSO will keep a master list of chemicals on site.
4. The master copy of MSDS will be in the Safety Office.
5. All construction contractors will fall under the hazard communication program for construction 29 CFR 1926.59.
6. Each year a safety in-service will be provided to all employees covering all aspects of the Haz/Com program as outlined in the Federal Register.
7. All visitors and contractors are required go through safety orientation that addresses the Haz/Com standard.

4.2 Chemical Hygiene Plan

The Chemical Hygiene Plan is an OSHA 29 CFR 1910.1450, "Occupational Exposure Hazardous Chemicals in the Laboratories" (the OSHA Laboratory Standard). It applies to facilities engaged in the laboratory use of hazardous chemicals. Because of the small amount of chemical usage at the AMF2 site, this section is not applicable at present. Annually a reassessment will be conducted to determine applicability of this standard See Appendix D.

4.3 Chemical and Laboratory Safety

The site uses few chemicals other than common consumer items; however, precautions are taken to mitigate exposure. Items such as proper PPE¹¹ and eyewash stations.

are provided at the site.

⁹ OSHA Occupational Safety and Health Administration

¹⁰ MSDS Material Safety Data Sheets

¹¹ PPE Personal Protective Equipment



4.4 Chemical Carcinogens

It is the responsibility of all site personnel and contractors to read the MSDS of each product used. The MSDS contains information regarding the carcinogenicity of the product and the proper abatement and mitigation controls.

4.5 Chemical Monitoring in the Environment and Work Place

Environmental Monitoring is conducted to assure that applicable OSHA and other regulatory requirements for environmental protection are met. Monitoring of airborne chemicals in the work place is conducted to evaluate the effectiveness of existing engineering controls, determine the need for additional controls, and demonstrate compliance with occupational exposure regulations.

4.6 Cryogenic Safety

This section establishes the practices and procedures associated with handling and using cryogenic materials. Cryogenics may burn exposed flesh and may become an asphyxiant. LN₂¹² is the most common cryogenic material used at the AMF2 site. Listed below are specific actions to take:

Specific Requirements:

1. PPE

- Don proper PPE: Goggles, Face shield, Gloves, and Long Sleeved Apron.
- Make sure all exposed flesh is covered.
- Slowly pour LN₂. It may boil and spit at first, so use extreme caution.

2. Pressure Protection

- Even a small amount of heat can create a significant pressure increase in a cryogenic system. Cryogenics can vaporize and expand to more than 700 times their liquid volume. Because of that, a pressure relief must be provided to every part of the cryogenic system that may be isolated by valving and sealing.
- Periodic inspections of the pressure relief will take place and will be conducted by qualified personnel.

3. Containers

Cryogenic liquids must be stored in multi-wall, insulated cylinders commonly called dewars to minimize evaporation and venting of vaporized liquid. These vessels are similar to a large vacuum flask, having two shells with a partial vacuum or insulating material within the annular area. The inner shell is constructed from nickel, steel, 304

¹² LN₂ Liquid Nitrogen



stainless steel or an aluminum alloy suitable for the intended service per the specifications in 49 CFR 178 or ASME Boiler and Pressure Vessel Code, Section VIII (Division 1) or DOE order 420.1, "Facility Safety". Small volumes of 4 liters or less may be stored in a wide mouthed atmospheric glass dewar or flask.

4. Training

All personnel must be trained and familiar with the hazards involving cryogenics. This topic will be included in the annual Hazards Communication seminar. For those using cryogenics, a detailed training seminar will be conducted covering the hazards, proper PPE and proper decanting techniques. The training will include "hands-on" training.

5. Equipment Safety

- Storage dewars, process vessels, piping, etc. will be labeled with the common name of the cryogen.
- Operators should stand clear of boiling or splashing liquid and its gases.
- Mechanical devices (e.g., tongs) should always be used to withdraw objects immersed in a cryogenic liquid.
- Cryogenic containers will not be transported within the enclosed area for a motor vehicle.
- Storage dewars will be secured with a chain to prevent tipping over.

6. Maintenance and Inspection

Cryogenic systems and equipment must be inspected and maintained by qualified personnel, and the inspection results shall be documented. Qualified personnel shall visually inspect every cryogenic system or piece of equipment before being placed into service. A dewar that leaks, has dents, shows evidence of rough usage, rusting or corrosion or has defective valves or safety devices shall be removed from service, repaired, and re-qualified for use before returning to service.



5. IONIZING RADIATION PROTECTION

The AMF II AOS system currently has Polonium-210 500 micro Curies. The radioactive device consists of radioactive material contained in a sealed source within a shielded device. The device is designed with inherent radiation safety features so that it can be used by persons with no radiation training or experience. The spent product is shipped back to the manufacture for disposal.

For other sources the AMFII has the following procedures in place to safeguard ionizing material being brought in:

1. Purchase Request system has safety review of all materials purchased.
2. All shipments arriving to the site are checked against manifest for their content.
3. Equipment brought in by visiting scientist must file certain forms before bringing equipment; these forms are reviewed by Site Safety.



6 NON-IONIZING RADIATION PROTECTION

This chapter outlines the practices, procedures, and requirements for working with radio frequency/microwave radiation, lasers, as well as electric and magnetic fields.

Specific Requirements:

1. All instruments that produce non-ionizing radiation will go through a safety evaluation prior to acceptance onsite. Instrumentation existing onsite will have periodic monitoring performed to determine any changes against original baseline monitoring.
2. Any laser use (class 3a, 3b, or 4) requires use of approved Laser Eye Safety Goggles located at AMF2. All laser operations will be conducted in compliance with parent document Z-136.1 “American National Standard for Safe Use of Lasers (2007)” and vertical standard Z-136.6 “American National Standard for Safe Use of Lasers Outdoors (2005)”.
 - A. The use of the laser safety eye protection is not required for daily rounds on the instruments.
 - B. Laser Eye Safety Goggles must be worn when any maintenance is being performed on any instrument that has a laser.
 1. Laser Eye Safety Goggles must be inspected before each use to ensure that it will provide proper protection looking for deep scratches, cracks and broken pieces.
 2. If any damage is discovered upon inspection the goggles will not be used and will be disposed of and replaced.
 - C. If any work inside a container requires laser eye protection to be used a warning sign on the outside of the container personnel door will be displayed alerting personnel of the potential for eye injury and the requirement to “ask before entering”.
 - D. The Safety Officer should be contacted for any further situations not covered in the above instruction.
3. All radar and other non-ionizing producing equipment mainly found in the radio frequency and microwave regions of the band, must comply with IEEE, ICNIRP and OSHA standards.

Please reference Field Campaign Experiment ES& H Criteria policy for further information.



7 WORK SPACES

7.1 Lockout/Tagout: Control of Hazardous Energy

Control of hazardous energy is the purpose of the Lockout/Tag out Program. This program establishes the requirements for isolation of both kinetic and potential electrical, chemical, thermal, hydraulic, pneumatic, and gravitational energy prior to equipment repair, adjustment or removal. Reference: “OSHA Standard 29 CFR 1910. 147, The Control of Hazardous Energy.”

7.1.1 Hazards

Improper use or failure to use lockout/tagout procedures may result in:

1. Electrical shock
2. Chemical exposure
3. Skin burns
4. Lacerations and amputation
5. Fires and explosions
6. Chemical releases
7. Eye injury
8. Death

7.1.2 Hazard Controls

1. Only authorized and trained employees may engage in tasks that require use of lockout/tagout procedures.
2. All equipment has a single source of electrical power.
3. Lockout procedures have been developed for all equipment and processes.
4. Restoration from lockout is a controlled operation.

7.1.3 Definitions

1. **Authorized (Qualified) Employees** are the only ones certified to lockout/tagout equipment or machinery. Whether an employee is considered to be qualified will depend upon various circumstances in the workplace. It is likely for an individual to be considered "qualified" with regard to certain equipment in the workplace, but "unqualified" with regard to other equipment. An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person, is considered to be "qualified" for the performance of those duties.



2. **Affected Employees** are those employees who operate machinery or equipment upon which lockout or tagout is required under this program. Training of these individuals will be less stringent in that it will include the purpose and use of the lockout procedures.
3. **Other Employees** are identified as those that do not fall into the authorized, affected or qualified employee category. Essentially, it will include all other employees. These employees will be provided instruction in what the program is and told not to touch any machine or equipment when they see that it has been locked out or tagged out.

7.1.4 Training

1. Authorized Employees Training

All AMF2 Techs will be trained to use the lockout/tagout Procedures. The Maintenance Supervisor or Safety Coordinator will conduct the training at the time of initial hire. Retraining shall be held at least annually. The training will consist of the following:

- Review of general procedures
- Review of specific procedures for machinery, equipment, and processes
- Location and use of specific procedures
- Procedures when questions arise

2. Affected Employee Training

- Meteorologists will trained and authorized in lockout/tagout will repair, replace, or adjust machinery, equipment, or processes.
- Unauthorized employees may not remove locks, locking devices, or tags from machinery, equipment, or circuits.
- Purpose and use of the lockout procedures.

3. Other On-site Employee Training

- Only trained and authorized employees will repair, replace, or adjust machinery or equipment.
- Other employees may not remove locks, locking devices, or tags from machinery, equipment or circuit.

7.1.5 Preparation for Lockout/Tagout Procedures

A lockout/tagout survey has been conducted to locate and identify all energy sources in order to verify which switches or valves supply energy to machinery and equipment.



7.1.6 Routine Maintenance and Machine Adjustments

Lockout/tagout procedures are not required if equipment must be operating for proper adjustment. This rare exception may be used only by trained and authorized employees, when specific procedures have been developed to safely avoid hazards. All consideration shall be made to prevent the need for an employee to break the plane of a normally guarded area of the equipment by use of tools and other devices.

7.1.7 Locks, Hasps, and Tags

All qualified maintenance personnel will be assigned a lock with one key, hasp, and tag. All locks will be keyed differently, except when a specific individual is issued a series of locks for complex lockout/tagout tasks. In some cases, more than one lock, hasp, and tag are needed to completely de-energize equipment and machinery. Additional locks may be checked out from the Department or Maintenance Supervisor on a shift-by-shift basis. All locks and hasps shall be uniquely identifiable to a specific employee.

7.1.8 SOP: General Lockout/Tagout Procedures

Before working on, repairing, adjusting, or replacing machinery and equipment, the following procedures will be utilized to place the machinery and equipment in a neutral or zero mechanical state.

1. Preparation for Shutdown

- Before an authorized or affected employee turns off a machine or piece of equipment, the authorized employee will have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the means to control the energy.
- Notify all affected employees that the machinery, equipment or process will be out of service.

2. Machine or Equipment Shutdown

- The machine or equipment will be turned off or shutdown using the specific procedures for that specific machine. An orderly shutdown will be utilized to avoid any additional or increased hazards to employees as a result of equipment de-energization.
- If the machinery, equipment or process is in operation, follow normal stopping procedures (depress stop button, open toggle switch, etc.).
- Move switch or panel arms to "Off" or "Open" positions and close all valves or other energy isolating devices so that the energy source(s) is disconnected or isolated from the machinery or equipment.

3. Machine or Equipment Isolation



- All energy control devices that are needed to control the energy to the machine or equipment will be physically located and operated in such a manner as to isolate the machine or equipment from the energy source.

4. Lockout or Tagout Device Application

- Lockout or tagout devices will be affixed to energy isolating devices by authorized employees. Lockout devices will be affixed in a manner that will hold the energy isolating devices from the "safe" or "off" position.
- Where tagout devices are used, they will be affixed in such a manner that will clearly state that the operation or the movement of energy isolating devices from the "Safe" or "Off" positions is prohibited.
- The tagout devices will be attached to the same point a lock would be attached. If the tag cannot be affixed at that point, the tag will be located as closely as possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.
- Lock out and tag out all energy devices by use of hasps, chains and valve covers with assigned individual locks.

5. Stored Energy

- Following the application of the lockout or tagout devices to the energy isolating devices, all potential or residual energy will be relieved, disconnected, restrained, and otherwise rendered safe.
- Where the reaccumulation of stored energy to a hazardous energy level is possible, verification of isolation will be continued until maintenance or service is complete.
- Release stored energy (capacitors, springs, elevated members, rotating fly wheels, and hydraulic/air/gas/steam systems) must be relieved or restrained by grounding, repositioning, blocking and/or bleeding the system.

6. Verification of Isolation

- Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employees will verify that isolation or de-energization of the machine or equipment has been accomplished.
- After assuring that no employee will be placed in danger, test all lockouts/tagouts by following the normal start up procedures (depress start button, etc.).

Caution: After testing, place controls in neutral position.

7. Extended Lockout/Tagout

Should the shift change before the machinery or equipment can be restored to service, the lockout/tagout must remain. If the task is reassigned to the next shift, those



employees must lock out and tag out before the previous shift may remove their lock and tag.

7.1.9 SOP: Release from Lockout/Tagout

Before lockout or tagout devices are removed and the energy restored to the machine or equipment, the following actions will be taken:

1. The work area will be thoroughly inspected to ensure that nonessential items have been removed and that machine or equipment components are operational.
2. The work area will be checked to ensure that all employees have been safely positioned or removed. Before the lockout or tagout devices are removed, the affected employees will be notified that the lockout or tagout devices are being removed.
3. Each lockout or tagout device will be removed from each energy isolating device by the employee who applied the device.

7.1.10 SOP: LOTO Procedure for Electrical Plug Type Equipment

This procedure covers all electrical plug-type equipment such as battery chargers, some product pumps, office equipment, powered hand tools, powered bench tools, lathes, fans, etc.

When working on, repairing, or adjusting the above equipment, the following procedures must be utilized to prevent accidental or sudden startup:

1. Unplug electrical equipment from wall socket or in-line socket
2. Attach "Do Not Operate" tag and plug box and lock on end of power cord
An exception is granted to not lockout/tagout the plug if the cord & plug remain in the exclusive control of the employee working on, adjusting, or inspecting the equipment
3. Test equipment to assure power source has been removed by depressing the "Start" or "On" switch
4. Perform required operations
5. Replace all guards removed.
6. Remove lock and plug box and tag
7. Inspect the power cord and socket before plugging the equipment into the power source. Any defects must be repaired before placing the equipment back in service

Note: Occasionally used equipment may be unplugged from the power source when not in use.



7.1.11 SOP: LOTO Procedures Involving More Than One Employee

In the preceding SOPs¹³, if more than one employee is assigned to a task requiring a lockout/tagout, each must also place his or her own lock and tag on the energy isolating device(s).

7.1.12 SOP: Management's Removal of Lockout/Tag Out

Only the employee that locks out and tags out machinery, equipment, or processes may remove his/her lock and tag.

7.1.13 Contractors

Contractors working on company property and equipment must use this lockout/tagout procedure while servicing or maintaining equipment, machinery, or processes.

7.2 Shipboard Deployment

7.2.1 Purpose

Some deployments may be aboard a ship and these guidelines outline the special requirements for shipboard deployments.

7.2.2 Shipboard Specific Training

Training on the use of survival suits, emergency beacons, firefighting, man overboard, and abandon ship procedures will be covered once on the ship by the ship's crew.

7.2.3 Shipboard Drills

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

7.2.4 Noise

Ships can be very noisy. Hand signals may be necessary. Be prepared to learn hand signals. Make sure eye contact is made with personnel operating equipment before you proceed. Always look up before walking out on deck.

7.2.5 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

¹³ SOP Standard Operating Procedure



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.

7.2.6 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. The "lockout" breaker must be off and locked out prior to connecting or disconnecting the deck cable.

7.2.7 MSDS

MSDS information for all chemical products must be provided to the chief scientist and ship operator. MSDS information will be kept in a readily accessible location detailed in the Site Specific Appendix. A copy will be kept at ANL, Native and deployment site.

7.2.8 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.

7.3 Ergonomics and the Prevention of Musculoskeletal Disorders

This chapter informs the reader on the requirements for good ergonomic controls. Please see the AMF2 site specific policy (Appendix A).

7.4 Noise Control and Hearing Conservation

This chapter covers noise exposure and controls.

Base line audiograms—because of the very limited noise exposure, no audiogram is necessary.

For more information, please reference 29 CFR 1910.95 "Occupational Noise Exposure" 1.6.

For activities such as mowing and weed eating, the site provides hearing protection (e.g., ear plugs and ear muffs)



7.5 Office Safety

This chapter discusses areas of hazard encountered in normal office environments and precautions to be taken to minimize the hazard.

Specific Requirements:

1. The tops of cabinets, file banks, and bookcases over five feet high must be kept clear of all materials (supplies, books, papers, files, bottles, boxes, house plants, fans, equipment, tools, etc.) that have the potential to cause injury if the material is dislodged and falls.
2. A 22" clearance will be maintained for an internal egress path (e.g., between a workers desk and the exit); all aisles and walkways must be kept free and unobstructed
3. File/Desk drawers, bookcases, and cabinet doors that do not retract completely must be closed when not in use to avoid trip and bump hazards.
4. Hands and fingers should be kept clear of pinch points before closing or file drawers.
5. All food should be stored in closed containers to prevent attracting vermin.
6. Personnel are encouraged to keep their office clean and organized to reduce the number of potential hazards.

7.7 Safe Use of Tools

This chapter informs the reader of the policy of working safely with tools.

Specific Requirements: See the following pages for specific guidelines and clarifications.

7.7.1 Purpose

The purpose of this policy is to provide ideas and guidelines for the safe use and storage of hand and power tools.

7.7.2 Scope

This procedure applies to all personnel at the AMF2 site.

7.7.3 Procedures

7.7.3.1 Hand Tools

1. Worn or broken tools should be repaired or replaced. Appropriate safety equipment must be worn at all times.
2. Tools not in use should be stored in proper locations (gang boxes, tool boxes, cabinets, etc.).
3. Tools shall not be left on overhead work areas where they may fall and strike someone below (i.e., laid on top steps or hung from rungs of ladders).



4. Sharp or pointed tools shall not be carried in pockets or belts unless the points or edges are protected with a cover.
5. Any tool, which is repaired, must be inspected and approved by the SSO before use.

7.7.3.2 Power Tools

1. Follow all manufacturers' instructions regarding the safe storage, operation, and maintenance of power tools.
2. Do not use a power tool unless you have been properly trained, and if necessary certified, on how to use the tool properly and safely.
3. All guards must be in place before operating power tools. Employees shall not tie back or otherwise render the guard useless.
4. Do not wear loose fitting clothing or jewelry when using power tools.
5. Disconnect the tool from the power source before changing bits, blades, etc.
6. Remove the chuck keys, etc. before using a power tool.
7. All power tools shall be either double insulated or have a 3-prong power plug with grounded extension cords and receptacles. A GFCI¹⁴ shall be used with electrical power tools.
8. When plugging in the equipment, make sure your finger is not on the trigger and the switch is in the "Off" position.
9. Do not use electric tools that have worn or damaged cords/plugs.
10. Keep work and walking areas clear of cords that may create a tripping hazard.
11. Never use compressed air to blow off equipment or clothing.
12. When working with small pieces, secure them with clamps or a vice.

7.7.3.3 Hammers (including sledges and axes)

1. Hammers should not be used as a wrecking tool (i.e., using claws to rip boards).
2. Heads shall be inspected for security to handle before each use. Heads shall not be attached to the handle except by the designed mechanism.
3. Heads that are damaged (chipped, splitting, etc.) shall be replaced or repaired.
4. Tools that have wooden handles shall be inspected before each use. Handles found to be splitting or splintering shall be replaced. Repairing of handles with tape or other means is not allowed.

¹⁴ GFCI Ground Fault Circuit Interrupter



5. Employees using sledges and axes must check behind them before swinging.

7.7.3.4 Chisels and Punches

1. Keep chisels and punches sharpened.
2. Strike blows firmly on the head of the chisel or punch and aim the point away from you.
3. Mushroomed heads shall be ground down to prevent spalling.

7.7.3.5 Wrenches

1. Always use the proper tool for the job. Cheater bars shall not be used.
2. Whenever possible, always pull on a wrench instead of push. Also make sure you have good footing in order to avoid a fall should the wrench slip.
3. Never use hand sockets on power or impact tools.
4. Never use a hammer on a wrench unless the wrench is specifically designed to be hit.

7.7.3.6 Pliers

1. Never use pliers as a striking tool.
2. Use the proper type of pliers for cutting hardened wire.
3. Use the proper type of pliers for the job to be performed.

7.7.3.7 Screwdrivers

1. Use the proper size and type screwdriver for the job to be performed.
2. Never use a screwdriver as a chisel or pry bar.
3. Keep screwdriver handles free of grease and oils.
4. Screwdrivers with broken tips or handles, or which are bent, shall not be used.

7.7.3.8 Saws

1. Keep blades sharp. Re-sharpen or replace blades that have lost good cutting teeth.
2. Lubricate hacksaw blades with light machine oil during use to prevent heat buildup, which can cause the blade to break.
3. Store saws so that the cutting edges will not be contacted when reaching for other tools.



4. Do not jam or force power saws into the work.
5. Portable power saws shall have a spring-loaded operating trigger.
6. Keep your hands and power cords out of the cutting line.
7. Do not clamp or tie the guard open.
8. Do not operate the equipment if the guard is not working properly.
9. Radial arm saws shall be self-retracting.
10. Wear hearing protection.

7.7.3.9 Drills

1. Do not use dull or chipped bits.
2. Let the bit cool before changing or adjusting.
3. Do not force the drill into the work.
4. Make sure of what is behind or under what you are drilling into.
5. Use a light oil to keep bit lubricated and cool during use.

7.7.3.10 Grinders

1. Grinders shall not be operated without guards in place.
2. Tool rests must be adjusted to no more than 1/8" from the wheel. Never adjust a tool rest while the grinder is operating.
3. Do not grind on the side of a wheel unless the wheel is designed as a side grinder.
4. Never leave a running grinder unattended.
5. Make sure the work area around the grinder is clear and other employees are attentive to your work before starting it up. Stand to one side when starting the grinder.
6. Always secure loose clothing before using a grinder.

7.7.3.11 Pneumatic Tools

1. Only qualified persons shall operate pneumatic tools.
2. Air compressors shall have a check valve in case there is a break in the line.
3. Assure that the tool is securely fastened to the air line and all couplings in the line are secured (pinned) to each other.
4. Do not hoist, lower, or carry a tool by the hose.



5. Do not make any adjustments to a pneumatic tool until all air pressure is out of the line and tool.
6. Pneumatic impact tools shall have safety clips or retainers to retain tool bits.
7. Manufacturer's guidelines for safe storage and use shall be followed.
8. Locate air lines so they do not create a tripping hazard.

7.7.3.12 Records

Maintenance and inspection records have been established and maintained by the SSO for all power tools.

7.8 Scaffolds, Platforms, and Portable Ladders

It is the policy of Native Energy and Technology to comply with all DOE and OSHA regulations in regard to scaffolds, platforms and portable ladders.

Specific Requirements:

7.8.1 Ladder Safety

Ladders present unique opportunities for unsafe acts and unsafe conditions. Employees who use ladders must be trained in proper selection, inspection, use, and storage. Improper use of ladders has caused a large percentage of accidents in the workplace. Use caution on ladders. OSHA reference: (29 CFR 1910.25, 1910.26, and 1910.27).

7.8.2 Ladder Hazards

Falls from ladders can result in broken bones and death. Ladder safety is a life-saving program at our company.

Hazards include:

1. Ladders with missing or broken parts.
2. Using a ladder with a weight rating that is too low.
3. Using a ladder that is too short for the purpose.
4. Using metal ladders near electrical wires.
5. Using ladders as working platforms.
6. Objects falling from ladders.



7.8.3 Ladder Inspection

Inspect ladders before each use:

1. All rungs and steps are free of oil, grease, dirt, etc.
2. All fittings are tight.
3. Spreaders or other locking devices are in place.
4. Non-skid safety feet are in place.
5. No structural defects; all support braces intact.

Do not use broken ladders. Most ladders cannot be repaired to manufacturer specifications. Throw away all broken ladders.

7.8.4 Ladder Storage

Store ladders on sturdy hooks in areas where they cannot be damaged. Store to prevent warping or sagging. Do not hang anything on ladders that are in a stored condition.

7.8.5 Ladder Weight Ratings

1. I-A 300 pounds (heavy duty)
2. I-250 pounds (heavy duty)
3. II-225 pounds (medium duty)
4. III-200 pounds (light duty)

7.8.6 Limits on Ladder Length

1. A stepladder should be no more than 20 feet high.
2. A one-section ladder should be no more than 30 feet.
3. An extension ladder can go to 60 feet, but the sections must overlap.

7.8.7 Ladder Setup

The following procedure must be followed to prevent ladder accidents:

1. Place ladder on a clean, slip-free level surface.
2. Extend the ladder to about 4 feet above the top support or work area.
3. Anchor the top and bottom of the ladder.
4. Place the ladder base 1/4 the height of the ladder from the wall when using an extension ladder.
5. Never allow more than one person on a ladder at a time.



6. Use carriers and tool belts to carry objects up a ladder.
7. Do not lean out from the ladder in any direction.
8. If you have a fear of heights—don't climb a ladder.
9. Do not allow others to work under a ladder in use.

7.8.8 Ladder Maintenance

1. Keep ladders clean.
2. Never replace broken parts unless provided by the original manufacturer.
3. Do not attempt to repair broken side rails.
4. Keep all threaded fasteners properly adjusted.
5. Replace worn steps with parts from manufacturer.

7.8.9 Ladder Inspections

1. Annually ladders are inspected and an inspection decal is affixed to the ladder.

7.9 Natural Hazards

Because of the rural setting of the AMF2 site, ARM personnel may experience exposure to many natural hazards. Natural hazards include weather, insects, reptiles, animals, and terrain. ARM personnel will stay alert for these hazards and follow proper procedures to reduce the potential exposure to adverse natural hazards.

7.9.1 Temperature Extremes

7.9.1.1 Cold Weather Exposure

During the winter months at the AMF2 site cold weather is almost a certainty. There are two main personal effects cold weather can produce.

1. Hypothermia

Hypothermia results when the body loses heat faster than it can produce it. When this situation first starts to occur, the blood vessels start to constrict. The hands and feet are first affected. Next involuntary shivers begin to occur. The shivering is your body's first warning sign. Further heat loss produces speech difficulty, forgetfulness, lack of manual dexterity, collapse, and finally death.

2. Frost Bite

As your blood vessels constrict to keep vital organs warm, hands and feet can experience frostbite. They are the first body parts affected. Usually it begins with



a burning sensation followed by numbness. The numbing phase is very dangerous and actual frostbite may occur.

7.9.1.2 Cold Weather Exposure Prevention

1. Dress warmly and wear layered clothing. Cover all exposed flesh. If clothes become wet, change them as soon as possible.
2. Check the wind-chill chart figure A-1 to determine cold weather exposure hazard guidance based upon wind and temperature.

7.9.1.3 Cold Weather Driving

1. Take along hot liquids (e.g. decaffeinated coffee), blankets, and flash lights to aid you if your car has problems (survival kit).
2. In snow and icy conditions, remember to allow extra time to get to your destination. Also, bring along a shovel and sand or kitty litter to assist you in the event you get stuck.
3. Remember, if roads are slick and hazardous call the highway patrol (or authority having jurisdiction) for their advice and then notify the AMF2 on Site Manager of the situation.

7.9.1.4 Hot Weather Exposure

Depending on the location of AMF2 the summers can be very hot. Listed below are hot weather emergencies.

1. Heat Cramps

This is the first stage of hyperthermia. This condition is caused when the individual has been working in the heat and has not been drinking adequate fluids. The person becomes dehydrated and begins to have cramps of the legs and stomach. The person will usually be sweaty, and the skin temperature will be close to normal. Usual treatment is to provide the person with cool water or other rehydrating fluids such as Gatorade, Squincher, etc. The person should rest in a cool area until his condition improves.

2. Heat Exhaustion

This is the stage of hyperthermia where a person may actually become dazed and nausea/vomiting may start. This person usually has started having cramps and ignored them or, if the temperature is high enough, may have not even experienced heat cramps. This person will usually be soaked in sweat and skin temperature is very warm.

Treatment is to move the individual to a cool area and loosen their clothing. If the person is totally alert, give them a cool drink. A medical evaluation is recommended.

3. Heat Stroke



THIS IS AN EXTREME MEDICAL EMERGENCY! The individual experiencing heat stroke has used all internal mechanisms for cooling of the body. The person will probably be nearly unconscious and unable to correspond with other people. This person may have wet clothes from the sweat; but if sweat is wiped from the body, it does not reappear. The skin will be very red (flushed) and hot to touch.

Treatment for this individual is immediate transportation to a medical facility. If immediate transportation is not available, remove the victims clothing and begin to cool the body with cool, not cold, water.

7.9.2 Spiders

In the United States, the two most dangerous spiders are the black widow and the brown recluse.

1. The black widow is a small, shiny spider, less than one-half inch long but with a leg span of up to two inches. It has a red hourglass shaped on its underside. A bite from a black widow spider can cause severe pain and muscle spasms, heavy sweating, stomach cramps, nausea, vomiting, and tightness in the chest, breathing difficulty, and a sharp rise in blood pressure.
2. The brown recluse is brown or brown-yellow. It has a dark, violin-shaped area on its back. The brown recluse is found under rocks and woodpiles as well as in closets and attics. A bite from the brown recluse can cause severe pain, reddening, blistering, and death of the tissue at the site of the wound, followed by a deep ulcer. The bite may not be noticed at first. Pain at the site begins one to four hours later.

If a spider bites you, try to identify the type. If possible, kill the spider without smashing it beyond recognition. Call the on site manager and advise them of the situation. Then, seek medical attention for the bite.

7.9.3 Reptiles

If a snake bites you, call emergency medical services and advise them of the situation. Wash the wound and keep the affected part still. Splint a bitten arm or leg. Keep the affected area lower than the heart to slow down progress of the venom from the bite site to the heart. If possible, carry a victim who must be transported, or have him or her walk slowly. If you know the victim cannot get professional medical care within 30 minutes, consider suctioning the wound using a snakebite kit.

7.9.4 Animals

Because AMF2 may be in a rural setting, you may come in contact with various animals. For the most part, animals will keep their distance and are more frightened of you than you are of them.



7.9.5 Terrain Hazards

Although this is site dependent, many times rural areas have uneven surfaces, rocks protruding from the ground, tree branches, and vegetation, all of which make walking somewhat difficult. Remember to always look before taking a step and clear possible tripping hazards.

7.10 Severe Weather

7.10.1 General

AMF2 site personnel must be aware of site weather conditions at all times and take necessary orderly steps to identify, inform, and manage potential severe weather conditions and the effect of those conditions on site personnel and equipment.

7.10.2 Establishing the Initial Daily Weather Alert Condition

7.10.2.1 Normal daily operations

The following procedures are used to set the initial weather alert condition for the site:

1. Upon arrival at the site, activate the National Oceanic and Atmospheric Administration weather radio, if applicable on site, and listen to and record the forecast weather condition and any alert, watch, and warning areas discussed. (Domestic only)
2. Use internet tools such as NOAA or local news channels to assess the storm threat.



8 EMERGENCY MANAGEMENT

8.1 Emergency Management

The site devotes considerable time and effort to designing facilities and planning work to minimize hazards from fires, explosions, and other extraordinary events. Listed below are specific requirements for emergency management.

Specific Requirements:

1. The Emergency Management team at the AMF2 site includes the following:
 - Onsite Safety Officer, or senior person on site
 - AMF2 Technical Operations Manager
 - AMF2 Site Manager

This team is responsible for coordination of all emergency type responses and for performing drills.

2. For severe weather emergencies, please see Chapters 7-14 of this manual.



9 ELECTRICAL SAFETY

9.1 Electrical Safety

This chapter represents the general safety requirements for work with electricity at Native Energy and Technology AMF2 site.

Specific Requirements:

All repair of electrical equipment will be de-energized and locked out and tagged out (see 7-1 lockout/tagout—control of hazardous energy of this manual). In rare cases, when de-energization cannot be made, the Site Operations Manager shall notify the SSO, in writing, to begin the "Hot Work Permit" process. All hot work requirements will then be followed.

9.2 Ground Fault Circuit Interrupters

A GFCI is a fast acting electric circuit-interrupting device that is sensitive to very low levels of current flow to ground and is intended for the protection of personnel from harmful electrical shocks. UL Class A GFCIs will trigger and open the protected circuit if the ground current reached a level of 4- 6 milliamperes.

Specific Requirements.

1. Where GFCIs are required

GFCIs are required at any location where a person, in relation to an energized electrical appliance and ground, has a high risk for becoming the ground-return path for the electrical current. A GFCI will protect that person. Such locations include but are not limited to:

- Construction and maintenance sites
- Outdoor receptacles
- Wet or damp areas
- Within 6 feet of sinks in rest rooms and kitchens
- Motor vehicle garage type occupancies
- Exposed energized parts of test or development bench work apparatus
- All portable electric hand held motorized tools such as drills and saws shall be plugged into a GFCI-protected circuit.

2. Testing

- Operational: Each time a GFCI outlet is used a trip test shall be done.
- GFCI's outlets that do not pass will be reported to the facilities department and replaced. (The trip button on the GFCI may be used without a secondary tester



for normal use) I suggest a secondary tester be used at least twice a year during documented inspections) Monte

9.3 Lightning Protection

This chapter deals with protecting both facilities and personnel from lightning.

Specific Requirements:

1. All existing and applicable buildings and instruments have lightning protection.
2. Prior to the installation of any new buildings or instruments a review will be conducted in relation to the need for lightning protection.



10.ENVIRONMENTAL PROTECTION PROGRAM

The policy of the Native Energy and Technology – AMF2 site is to provide a healthy environment for all employees and to comply with applicable environmental executive orders, laws and regulations promulgated by the President, DOE, and other federal, state or local agencies.

The AMF2 site will comply with all directives addressing environmental protection from Argonne National Laboratory and the site specific NEPA Environmental audit.



11.FIRE PROTECTION

This chapter covers fire protection issues at the AMF2 site. It is the intent of Native Energy and Technology to comply with all applicable National Fire Protection Association codes and DOE orders.

Specific Requirements:

1. The AMF2 has smoke detectors and fire extinguisher throughout the site.
2. In addition to the fire detection sensors, onsite monitors make building checks during normal working hours, keeping an eye out for any smoke or fire hazard.
3. The site staff inspects fire extinguishers weekly.
4. Annually, fire safety training is given to site personnel. Fire extinguisher training is included. Participants get hands-on training on how to extinguish fires.
5. The SSO conducts frequent inspection of facilities looking out for fire hazards and life safety issues.
6. The on-site staff will biennially inspect and conducts replacement of batteries on all smoke detectors.



12. PERSONAL PROTECTIVE EQUIPMENT (PPE)

This chapter covers the requirements for PPE.

Engineering controls shall be the primary methods used to eliminate or minimize hazard exposure in the workplace. When such controls are not practical or applicable, PPE shall be employed to reduce or eliminate personnel exposure to hazards. PPE will be provided, used, and maintained when it has been determined that its use is required and that such use will lessen the likelihood of occupational injuries and/or illnesses.

Specific Requirements:

All personal protective clothing and equipment will be of safe design and construction for the work to be performed. Only those items of protective clothing and equipment that meet National Institute of Occupational Safety and Health or ANSI¹⁵ standards will be procured or accepted for use.

12.1 Hazard Assessment and Equipment Selection

Hazard analysis procedures shall be used to assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of PPE. If such hazards are present, or likely to be present, the following actions will be taken.

1. Select, and have each affected employee use, the proper PPE.
2. Communicate selection decisions to each affected employee.
3. Select PPE that properly fits each affected employee.

12.2 Defective and Damaged Equipment

Defective or damaged PPE shall not be used.

12.3 Training

All employees who are required to use PPE shall be trained to know at least the following:

1. When PPE is necessary.
2. What PPE is necessary.
3. How to properly don, remove, adjust, and wear PPE.
4. The limitations of the PPE
5. The proper care, maintenance, useful life, and disposal of the PPE.

¹⁵ ANSI American National Standards Institute



Each affected employee shall demonstrate an understanding of the training and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE.

Certification of training for PPE is required by OSHA and shall be conducted annually. Records of training are kept by the SSO.

12.4 PPE Selection

12.4.1 Controlling Hazards

PPE devices alone should not be relied upon to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound manufacturing practices.

12.4.2 Selection Guidelines

The general procedure for selection of protective equipment is to:

1. Become familiar with the potential hazards and the type of protective equipment that is available and what it can do (i.e., splash protection, impact protection, etc).
2. Compare the hazards associated with the environment (i.e., impact velocities, masses, projectile shape, radiation intensities) with the capabilities of the available protective equipment.
3. Select the protective equipment that ensures a level of protection greater than the minimum required to protect employees from the hazards.
4. Fit the user with the protective device and give instructions on care and use of the PPE. It is very important that end users be made aware of all warning labels for the limitations of their PPE.

12.4.3 Fitting the Device

Careful consideration must be given to comfort and fit. PPE that fits poorly will not afford the necessary protection. Continued wearing of the device is more likely if it fits the wearer comfortably. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.

12.4.4 Devices With Adjustable Features

Adjustments should be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position. Particular care should be taken in fitting devices for eye protection against dust and chemical splash to ensure that the devices are sealed to the face. In addition, proper fitting of helmets is important to ensure that it will not fall off during work operations. In some cases, a chin strap may be necessary to keep the helmet on an employee's head. (Chin straps should break at a reasonably low force, however, so as to



prevent a strangulation hazard). Where manufacturer's instructions are available, they should be followed carefully.

12.5 Eye and Face Protection

The majority of occupational eye injuries can be prevented by the use of suitable/approved safety spectacles, goggles, or shields. Approved eye and face protection shall be worn when there is a reasonable possibility of personal injury.

1. Each employee shall use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids, or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.
2. Each employee shall use eye protection that provides side protection when there is a hazard from flying objects. Detachable side protectors are acceptable.
3. Each employee who wears prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or shall wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.
4. Eye and face PPE shall be distinctly marked to facilitate identification of the manufacturer.
5. Each employee shall use equipment with filter lenses that have a shade number appropriate for the work being performed for protection from injurious light radiation.

Typical hazards that can cause eye and face injury are:

1. Splashes of toxic or corrosive chemicals, hot liquids, and molten metals
2. Flying objects, such as chips of wood, metal, and stone dust
3. Fumes, gases, and mists of toxic or corrosive chemicals
4. Aerosols of biological substances

Prevention of eye accidents requires that all persons who may be in eye hazard areas wear protective eyewear. This includes employees, visitors, contractors, or others passing through an identified eye-hazardous area. To provide protection for these personnel, activities shall procure a sufficient quantity of heavy-duty goggles and/or plastic eye protectors, which afford the maximum amount of protection possible. If these personnel wear personal glasses, they shall be provided with a suitable eye protector to wear over them.

12.5.1 Eye and Face Protection Specifications

Eye and face protectors procured for, issued to, and used by employees, contractors and visitors must conform to the following design and performance standards.



1. Provide adequate protection against the particular hazards for which they are designed.
2. Fit properly and offer the least possible resistance to movement and cause minimal discomfort while in use.
3. Be durable.
4. Be easily cleaned or disinfected for or by the wearer.
5. Be clearly marked to identify the manufacturer.
6. Persons who require corrective lenses for normal vision, and who are required to wear eye protection, must wear goggles or spectacles of one of the following types
 - Spectacles with protective lenses that provide optical correction
 - Goggles that can be worn over spectacles without disturbing the adjustment of the spectacles
 - Goggles that incorporate corrective lenses mounted behind the protective lenses

12.5.2 Eye and Face Protector Use

12.5.2.1 Safety Spectacles

Protective eyeglasses are made with safety frames and tempered glass or plastic lenses, temples and side shields which provide eye protection from moderate impact and particles encountered in job tasks such as carpentry, woodworking, grinding, scaling, Inc.

12.5.2.2 Single Lens Goggles

Vinyl framed goggles of soft pliable body design provide adequate eye protection from many hazards. These goggles are available with clear or tinted lenses, perforated, port vented, or non-vented frames. Single-lens goggles provide similar protection to spectacles and may be worn in combination with spectacles or corrective lenses to insure protection along with proper vision.

12.5.2.3 Welders/Chippers Goggles

These goggles are available in rigid and soft frames to accommodate single- or two-eyepiece lenses.

Welders goggles provide protection from sparking, scaling, or splashing metals and harmful light rays. Lenses are impact resistant and are available in graduated shades of filtration.

Chippers/grinders goggles provide eye protection from flying particles. The dual protective eyecups house impact-resistant clear lenses with individual cover plates.

12.5.2.4 Face Shields

These normally consist of an adjustable headgear and face shield of tinted/transparent acetate or polycarbonate materials, or wire screen. Face shields are available in various



sizes, tensile strength, impact/heat resistance, and light ray filtering capacity. Face shields will be used in operations when the entire face needs protection and should be worn to protect eyes and face against flying particles, metal sparks, and chemical/biological splash.

SELECTION CHART GUIDELINES FOR EYE AND FACE PROTECTION		
The following chart provides general guidance for the proper selection of eye and face protection to protect against hazards associated with the listed hazard "source" operations.		
Source	Hazard	Protection
Impact - Chipping, grinding, machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Flying fragments, objects, large chips, particles, sand, dirt, etc.	Spectacles with side protection, goggles, face shield. For severe exposure, use face shield.
Heat - Furnace operation and arc welding	Hot sparks	Face shields, spectacles with side protection. For severe exposure, use face shield.
Chemicals - Acid and chemical handling, degreasing, plating	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield.
Dust - Woodworking, buffing, general dusty conditions	Nuisance dust	Goggles, eyecup and cover types

12.6 Head Protection

Hats and caps have been designed and manufactured to provide workers protection from impact, heat, electrical, and fire hazards. These protectors consist of the shell and the suspension combined as a protective system. Safety hats and caps will be on nonconductive, fire and water resistant materials.

Head protection will be furnished to, and used by, all employees and contractors engaged in construction and other miscellaneous work in head-hazard areas. Engineers, inspectors, and visitors at construction sites will also be required to wear head protection.

12.6.1 Selection Guidelines for Head Protection

All head protection is designed to provide protection from impact and penetration hazards caused by falling objects. Head protection is also available which provides protection from electric shock and burn. When selecting head protection, knowledge of potential electrical hazards is important. Class A helmets, in addition to impact and penetration resistance, provide electrical protection from low-voltage conductors (they are proof tested to 2,200 volts). Class B helmets, in addition to impact and penetration resistance, provide electrical protection from high-voltage conductors (they are proof tested to 20,000 volts). Class C helmets provide impact and penetration resistance (they are usually made of aluminum which conducts electricity) and should not be used around electrical hazards.



12.7 Foot Protection

12.7.1 General Requirements

Each affected employee shall wear protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where employee's feet are exposed to electrical hazards.

12.7.2 Selection Guidelines for Foot Protection

Safety shoes and boots provide both impact and compression protection. Where necessary, safety shoes that provide puncture protection can be obtained. In some work situations, metatarsal protection should be provided; and, in other special situations, electrical conductive or insulating safety shoes would be appropriate. Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts, or heavy tools, which could be dropped and for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling s) around bulk rolls (such as paper rolls) and around heavy pipes, all of which could potentially roll over an employee's feet. Safety shoes or boots with puncture protection would be required where sharp objects such as nails, tacks, screws, large staples, scrap metal, etc. could be stepped on by employees causing a foot injury.

12.8 Hand Protection

12.8.1 General Requirements

1. Hand protection is required when employees' hands are exposed to hazards such as those from skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes.
2. Skin contact is a potential source of exposure to toxic materials. It is important that the proper steps be taken to prevent such contact. Gloves should be selected on the basis of the material being handled, the particular hazard involved, and their suitability for the operation being conducted. One type of glove will not work in all situations.
3. Most accidents involving hands and arms can be classified under four main hazard categories: chemicals, abrasions, cutting, and heat. There are gloves available that can protect workers from any of these individual hazards or combination of hazards.
4. Gloves should be replaced periodically, depending upon frequency of use and permeability to the substance(s) handled. Gloves overtly contaminated should be rinsed and then carefully removed after use.
5. Gloves should also be worn whenever it is necessary to handle rough or sharp-edged objects or very hot or very cold materials. The type of glove materials to be used in these situations include leather, welder's gloves, aluminum-backed gloves, and other types of insulated glove materials.



6. Careful attention must be given to protecting your hands when working with tools and machinery. Power tools and machinery must have guards installed or incorporated into their design that prevent the hands from contacting the point of operation, power train, or other moving parts. To protect the hands from injury due to contact with moving parts, it is important to:
 - Ensure that guards are always in place and used.
 - Always lock out machines or tools and disconnect the power before making repairs.
 - Treat a machine without a guard as inoperative.
 - Do not wear gloves around moving machinery, such as drill presses, mills, lathes, and grinders.

12.8.2 Selection Guidelines for Hand Protection

Selection of hand PPE shall be based upon an evaluation of the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use, and the hazards and potential hazards identified. Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. There is no glove that provides protection against all potential hand hazards, and commonly available glove materials provide only limited protection against many chemicals. Therefore, it is important to select the most appropriate glove for a particular application and to determine how long it can be worn, and whether it can be reused. It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated; e.g., chemical hazards, cut hazards, flame hazards, etc. Before purchasing gloves, request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated. Other factors to be considered for glove selection in general include:

6. As long as the performance characteristics are acceptable, in certain circumstances, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types.
7. The work activities of the employee should be studied to determine the degree of dexterity required, the duration, frequency, the degree of exposure of the hazard, and the physical stresses that will be applied.

12.8.3 Selection of Gloves for Chemical Hazards

The first consideration in the selection of gloves for use against chemicals is to determine, if possible, the exact nature of the substances to be encountered. Read instructions and warnings on chemical container labels and MSDS before working with any chemical. Recommended glove types are often listed in the section for PPE.



All glove materials will eventually become permeated by chemicals. However, they can be used safely for limited time periods if specific use and glove characteristics (i.e., thickness and permeation rate and time) are known. The Safety Office can assist in determining the specific type of glove material that should be worn for a particular chemical.

1. The toxic properties of the chemicals must be determined, in particular, the ability of the chemical to cause local effects on the skin and/or to pass through the skin and cause systemic effects.
2. Generally, any “chemical resistant” glove can be used for dry powders;
3. For mixtures and formulated product (unless specific test data are available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials.
4. Employees must be able to remove the gloves in such a manner as to prevent skin contamination.

12.9 Hearing Protection

12.9.1 Engineering Controls

After it is determined that noise exposure above 85 dB(A)¹⁶ is present, engineering controls should be evaluated and implemented to reduce the noise exposure before administrative controls are initiated. Some examples of engineering controls include:

1. Noise reducing baffles
2. Compartmentalization
3. Installation noise-reducing gears
4. Installation of rubber pads under machinery.

When new equipment or machinery is evaluated for purchase, the Safety Manager should be consulted to conduct an evaluation from a safety and health standpoint. One criteria of the evaluation should include the amount of noise the equipment will produce and how it will affect the overall noise exposure.

12.9.2 Administrative Controls

After engineering controls are evaluated for effectiveness or feasibility, administrative controls should be considered to reduce noise exposure. Administrative controls include restricting exposure time or using PPE.

¹⁶ dB(A) Decibels on a “A” weighted scale



PPE, such as earplugs or muffs, may be used to reduce the amount of noise exposure. Each plug or muff has a NR¹⁷ as evaluated by American National Standard Institute Standards (S3.19 – 1974 or Z24.22 – 1957). For example, if a work area has an ambient noise exposure of 96 dB(A), the hearing protectors should be rated 6 NR or better to be effective.

According to OSHA Regulations, each location with noise exposures of 85 to 89 dB(A) will provide hearing protectors for the employee's optional use. Noise exposures at 90 dB(A) or above require the mandatory use of hearing protection. Further, OSHA requires that a variety of hearing protectors (a variety of both plug and muff type hearing protectors) will be available for employees to choose from.

12.9.3 Types of Hearing Protectors

Hearing protection devices are the first line of defense against noise in environments where engineering controls have not reduced employee exposure to safe levels. Hearing protective devices can prevent significant hearing loss, but only if they are used properly. The most popular hearing protection devices are earplugs, which are inserted into the ear canal to provide a seal against the canal walls. Earmuffs enclose the entire external ears inside rigid cups. The inside of the muff cup is lined with acoustic foam, and the perimeter of the cup is fitted with a cushion that seals against the head around the ear by the force of the headband.

12.9.4 Use of Hearing Protectors

Management, supervision, and employees shall properly wear the prescribed hearing protectors while working in or traveling through any section of a location that is designated a high noise area (excluding offices, break rooms, and rest facilities). The following rules will be enforced:

1. Personal stereos, such as iPods, will not be permitted in any operating area of company property.
2. Hearing protectors (at least two types of plugs and one type of muffs) will be provided and maintained by the Company.
3. Hearing protectors and replacements will be provided free of charge.
4. Hearing protectors will be properly worn at all times, except in offices, break rooms, rest facilities.
5. Preformed earplugs and earmuffs should be washed periodically and stored in a clean area, and foam inserts should be discarded after each use. It is important to wash hands before handling preformed earplugs and foam inserts to prevent contaminants from being placed in the ear, which may increase your risk of developing infections.

¹⁷ NR Noise Reduction Factor



12.10 Respiratory Protection

This chapter establishes the requirements for fitting and training of personnel and the proper selection, use, and maintenance of respiratory protective equipment. This chapter is not applicable.

Specific Requirements:

The SSO will act as the respirator program administrator. Should the need arise to have respiratory protection, the employee(s) needing respiratory protection will have a complete physical to see if any health restrictions apply. The SSO will then select the proper respirator and filters and train and conduct respirator fit testing to employee(s).



13.PRESSURE SAFETY

13.1 Pressure Vessels and Air Compressors

This chapter outlines the policy and procedure for routine and special inspections and installations of high-pressure equipment. Native Energy and Technology will comply with all applicable regulations as found in 29 CFR 1910.101.

13.2 Compressed Gas Cylinder

This chapter establishes the requirements and procedures for identification, storage, handling, and use of compressed gas cylinders. Helium is the primary gas used at the site; LN2 is a distant second along with CO₂.

Specific Requirements:

1. Helium Bottles and Regulators

- Helium bottles contain compressed gas and must be handled with care.
- All helium bottles will be secured (across the upper half but below the shoulder) and in an upright position. Check daily to confirm this.
- Use only bottles labeled as helium. If the label does not say helium, do not use. Call the SSO.
- When using the gas, open the bottle and regulator valves slowly, never use hammers or wrenches to open the valves.
- Never use a cylinder that is leaking. Notify the SSO.
- To change the regulator to another bottle:
 - Confirm that the cylinder valve is closed
 - Open the regulator valve to bleed off any pressure.
 - Using the supplied wrench, remove the regulator.
 - Place the regulator on the full tank and tighten with the wrench.
 - Open the regulator valve slightly.
 - Open the cylinder valve slightly and check for leaks.
 - Place the cylinder cover on the empty tank and then install the "empty" tag.

3. LN2 Usage

- LN2 dewars contain compressed gas and must be handled with care.
- If the LN2 dewar is leaking, report this immediately to the SSO.



- LN2 is a cryogenic material and may cause burns if in contact with exposed flesh. Therefore proper PPE must be worn including: goggles, face shield, apron, and cryo-gloves
- LN2 dewars will be secured (across the upper half but below the shoulder) and in an upright position. Check daily to confirm this.
- Use only bottles labeled as LN2. If the label does not say LN2, do not use. Call the SSO.



14. TRAFFIC SAFETY AND VEHICLE ACCIDENT REPORTING

This chapter outlines practices with regard to traffic safety.

Specific Requirements:

1. The implementation of the Defensive Driving Program is the responsibility of the SSO.
 2. All persons driving rental vehicles will have a valid driving license and are subject to a records check of their license upon initial employment and periodically thereafter.
- Should an accident occur involving a rental vehicle, perform an immediate assessment of the situation and then call the AMF2 Site Manager, with what occurred.



15.MATERIAL HANDLING SAFETY

15.1 Material Handling

Specific requirements:

1. The Shipping/Receiving department uses several material handling devices, they are:
 - a. Manual pallet truck
 - b. Various types of Dollies and hand trucks

15.1.1 Training

Personnel receive initial training and then recurrent training every three years.

15.1.2 Equipment Inspection

Equipment must be inspected daily before use. The following list may not be all inclusive depending upon equipment.

1. Check operation controls and parts.
 - Casters
 - Load wheels
 - Steering wheel
 - Hydraulic control and cylinder
 - Fluid level
 - Forks
2. Check area for debris and hazardous conditions.
3. Functional check of equipment
 - Raise forks
 - Lower forks
 - Check steering
 - Move into load
 - Raise load
 - Lower load
 - Raise again
 - Begin movement and check steering



4. Safe operation of manual pallet truck

- All loads must be equally distributed before being fully engaged. Center of gravity should be within 24" of the backrest horizontally and within 24" from the forks vertically.
- Operate only on level, smooth surfaces; on inclines and ramps, the load must be kept on the down grade side, away from the operator.
- Brake by lowering the load.
- Always keep one hand on the lowering control to facilitate rapid lowering for stopping. Raise load only as high as needed for clearance; keep as low to the ground as possible.
- Keep in mind the momentum created once the manual pallet truck is moving. **Do not** try to stop by pulling back on the truck. Lower the load to stop. Keep good posture. Face the load when maneuvering. Do not twist or bend when pulling or pushing load.

15.2 Hoisting and Rigging Safety

There are Davit Cranes attached to some of the roofs of the containers for use by site personnel for raising and lowering equipment on and off the roofs that are within the weight restrictions of the Davit crane

When a crane service is contracted, a SOW is created and a JSR document is attached. In that document, specific instruction is inserted regarding crane safety and documentation that the contractor must provide. An example of the verbiage is listed below.

1. Cranes

- A copy of the last annual and the last monthly inspections shall accompany every crane. Site safety reserves the right to review maintenance records at any time.
- The operator shall be certified to operate the equipment and copies of the certification shall be provided to the SSO upon arrival at the site.
- All lifts require submittal and approval, by Site Safety, of a hoisting and rigging plan before attempting the lift. This plan shall include:
 - The type of crane and lifting device
 - The type of rigging required
 - Weights of lift
 - Drawing showing the hardware attachments to the crane
 - A list of qualified operators and riggers



16.CONSTRUCTION AND SERVICE CONTRACTOR SAFETY

This chapter addresses the safety requirements for contractors working at the AMF2 site.

Specific Requirements:

Prior to the start of a construction job, a detailed SOW is written which describes the work to be done by the contractor. Attached to the SOW is a JSR document. The JSR document provides a Hazard Analysis of the SOW and provides safety regulations to follow. Once the SOW is awarded to a contractor, the contractor will submit a Job Safety Analysis to the AMF2 SSO for approval. When the contractor arrives at the job site, the SSO gives a comprehensive safety briefing.



17.HEALTH AND SAFETY PROCEDURES FOR WORK NOT AT THE MAIN SITE

It is the policy of Native Energy and Technology at the AMF2 that all safety procedures that apply at the main site also apply to any auxiliary sites.

Inspection criteria by the SSO can be found in an earlier chapter of this manual; see Chapters 1-3.



18.EXIT SYSTEMS AND LIFE SAFETY

This chapter establishes minimum standards for exits, exit systems, and related exit equipment within buildings and/or facilities at AMF2 site. The requirements for this chapter come from the National Fire Protection Association (NFPA 101), commonly called Life Safety Code. Native Energy and Technology will follow all applicable Life Safety Codes.

Specific Requirements:

1. Aid the SSO in keeping in compliance with the Life Safety Codes.
2. Looking at issues such as:
 - Is the aisle width sufficient enough for egress (at least 28")?
 - Are any exits blocked in any way, and are they marked and easily identifiable?
 - Exit doors shall be of the single-hinged type and shall swing in the direction of exit when required by the Life Safety Code.
 - Exit doors must be easily operable by hand from the side of egress.
 - Escape Hatches
 - Escape hatches and egresses must be kept clear at all times.
 - Must be able to be opened in case of emergency.



19. PACKING AND TRANSPORTATION OF HAZARDOUS MATERIAL

This chapter addresses the manner in which Native Energy and Technology at the AMF2, transports its hazardous materials.

Specific Requirements:

1. The site on occasion receives and ships Hazardous Materials, this activity all though infrequent still must be in accordance with DOT¹⁸ Title 49 CFR 100-185 Transportation of Hazardous Materials and the ICAO/IATA Air Transportation of Hazardous Materials.
2. Deliveries of all cylinders are made by an authorized vendor.

Subject	Frequency
DOT Transportation of Hazardous Materials	3 Years
Air Transportation of Hazardous Materials	2 Years

¹⁸ DOT Department of Transportation



Appendix A: 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 telephone and 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?			



Item	YES	NO	N/A
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 grounds clear of weeds that could pose tripping hazard and harbor snakes and vermin?			
21. Is hearing protection being worn when exiting the building towards the flight line?			
22. Are only step stools or ladders used to retrieve or store anything above shoulder level?			
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 space heaters used as authorized?			
26. Are floors inside OPS and GP vans kept dry or covered with a rubberized rug?			
27. Is snow shoveled off deck and stairs attached to Ops van?			
28. Test battery in Smoke and Carbon Monoxide detectors.			
29. Fire Extinguishers: Is the needle in the green section and is pin installed?			
30. Inspect all portable ladders.			
31. Make sure tag lines are attached at each end of ladder.			
32. Is the CO2 cylinder in the AOS van leaking?			



Appendix C:

Controlled Substance Act Section 202 Schedules I-V.

Schedule I controlled substances

Main article: [List of Schedule I drugs \(US\)](#)

Schedule I substances are those that have the following findings:

- A. The drug or other substance has a high potential for abuse.
- B. The drug or other substance has no currently accepted medical use in treatment in the United States.
- C. There is a lack of accepted safety for use of the drug or other substance under medical supervision.^[23]

No prescriptions may be written for Schedule I substances, and such substances are subject to [production quotas](#) by the DEA.

Under the DEA's interpretation of the CSA, a drug does not necessarily have to have the same abuse potential as heroin or cocaine to merit placement in Schedule I (in fact, cocaine is currently a Schedule II drug due to limited medical use):

[W]hen it comes to a drug that is currently listed in schedule I, if it is undisputed that such drug has no currently accepted medical use in treatment in the United States and a lack of accepted safety for use under medical supervision, and it is further undisputed that the drug has at least some potential for abuse sufficient to warrant control under the CSA, the drug must remain in schedule I. In such circumstances, placement of the drug in schedules II through V would conflict with the CSA since such drug would not meet the criterion of "a currently accepted medical use in treatment in the United States." 21 USC]] 812(b).^[24]

Sentences for first-time, non-violent offenders convicted of trafficking in Schedule I drugs can easily turn into *de facto* [life sentences](#) when multiple sales are prosecuted in one proceeding.^[25] Sentences for violent offenders are much higher.

Drugs in this schedule include:

- [Gamma-hydroxybutyric acid](#) (GHB), which has been used as a general anaesthetic and for the treatment of narcolepsy and alcohol withdrawal with minimal side-effects^[26] and controlled action but a limited safe dosage range. It was placed in Schedule I in March 2000 after widespread recreational use led to increased [emergency room](#) visits, hospitalizations, and deaths.^[27] Uniquely, this drug is also listed in Schedule III for limited uses, under the trademark [Xyrem](#);



- 12-methoxyibogamine ([Ibogaine](#)), being reported to help in [heroin](#) and other substance addiction
- [Marijuana](#) including the [cannabis](#) plant and its [THC](#). Controversy exists about the placement of marijuana in Schedule I. Like some other drugs in Schedule I, there have been no reported cases of THC overdose. *Main article: [Removal of cannabis from Schedule I of the Controlled Substances Act](#).*
- [Heroin](#) (diacetylmorphine), which is used in some European countries as a potent pain reliever in terminal cancer patients, and as second option, after [morphine](#). (It is about twice as potent, by weight, as morphine.). In the United Kingdom it is also prescribed to intravenous heroin addicts who have not responded to, or are unable to tolerate [methadone](#) substitution therapy.
- Other strong opiates and opioids used in many other countries, or even in the USA in previous decades for palliation of moderate to severe pain such as [nicomorphine](#) (Vilan), [dextromoramide](#) (Palfium), [ketobemidone](#) (Ketalgin), [dihydromorphine](#) (Paramorfan), [pirtiramide](#) (Dipidolor), [diacetyldihydromorphine](#) (Paralaudin), [dipipanone](#) (Wellconal), [phenadoxone](#) (Heptalgin) and many others.
- Weak opioids used for relief of moderate pain, diarrhea, and coughing such as [benzylmorphine](#) (Peronine), [nicocodeine](#) (Tusscodin), [Dihydrocodeinone enol acetate](#), [tilidine](#) (Valoron), [meptazinol](#) (Meptid), [propiram](#) (Algeril), [acetyldihydrocodeine](#) and others.
- [Pholcodine](#), a weak opioid cough suppressant with negligible abuse potential^{[[citation needed](#)]} which is available over-the-counter in many other countries.
- [MDMA](#) (3,4-methylenedioxymethamphetamine, Ecstasy), which continues to be used medically, notably in the treatment of [post-traumatic stress disorder](#) (PTSD). The medical community originally agreed upon placing it as a Schedule III substance, but the government denied this suggestion, despite two court rulings by the DEA's administrative law judge that placing MDMA in Schedule I was illegal. It was temporarily unclassified after the first administrative hearing from December 22, 1987 – July 1, 1988.^[28]
- [Psilocybin](#), the active ingredient in [psychedelic mushrooms](#);
- [5-MeO-DIPT](#) (Foxy / Foxy Methoxy / 5-methoxy-N,N-diisopropyltryptamine)
- [Lysergic acid diethylamide](#) ("LSD" / "Acid"), formerly used in psychotherapy, and the best known treatment for alcoholism to date.^[29]
- [Peyote](#), a cactus growing in nature primarily in northeastern Mexico; one of the few plants specifically scheduled, with a narrow exception to its legal status for religious use by members of the [Native American Church](#);
- [Mescaline](#), the main psychoactive ingredients of the peyote, san pedro, achuma, and Peruvian torch cacti;
- [Methaqualone](#) (Quaalude, Sopor, Mandrax), a sedative that was previously used for similar purposes as barbiturates, until it was rescheduled;
- [2,5-dimethoxy-4-methylamphetamine](#) (STP / DOM), a psychotropic hallucinogen that rose to prominence in 1967 in San Francisco when it appeared in pill form (known as "STP," in doses as high as four times the amounts previously considered "safe") on the black market;
- [2C-T-7](#) (Blue Mystic / T7), a psychotropic [entheogen](#);



- [2C-B](#) (Nexus / Bees / Venus / Bromo Mescaline), a psychotropic hallucinogen and aphrodisiac;
- [Cathinone](#) (β -[ketoamphetamine](#)), a [monoamine alkaloid](#) found in the [shrub *Catha edulis*](#) ([Khat](#));
- [AMT](#) (alpha-methyltryptamine), an anti-depressant from the [tryptamine](#) family; first developed in the [Soviet Union](#) and marketed under the brand name Indopan;
- [Bufotenin](#) (5-OH-DMT), a naturally-occurring [tryptamine](#) with hallucinogenic and aphrodisiac properties; named for the [Bufo](#) genus of toads whose poison contains the chemical;^[30]
- [Benzylpiperazine](#) (BZP), a synthetic drug also known as "party pills" or "herbal highs" is nearly indistinguishable from [dexamphetamine](#) and similar to MDMA. It has been shown to be associated with an increase in seizures if taken alone.^[31] Although the effects of BZP are not as potent as MDMA, it can produce neuroadaptions that can cause an increase in the potential for abuse of this drug.^[32]
- Controlled Substance Analogs intended for human consumption (as defined by the [Federal Analog Act](#))

Schedule II controlled substances

Main article: [List of Schedule II drugs \(US\)](#)

Schedule II substances are those that have the following findings:

- A. The drug or other substances have a high potential for abuse
- B. The drug or other substances have currently accepted medical use in treatment in the United States, or currently accepted medical use with severe restrictions
- C. Abuse of the drug or other substances may lead to severe psychological or physical dependence.^[23]

Except when dispensed directly by a practitioner, other than a pharmacist, to an ultimate user, no controlled substance in Schedule II, which is a prescription drug as determined under the Federal Food, Drug, and Cosmetic Act (21 USC 301 *et seq.*), may be dispensed without the written prescription of a practitioner, except that in emergency situations, as prescribed by the Secretary by regulation after consultation with the Attorney General, such drug may be dispensed upon oral prescription in accordance with section 503(b) of that Act (21 USC 353 (b)). Prescriptions shall be retained in conformity with the requirements of section 827 of this title. No prescription for a controlled substance in schedule II may be refilled.^[33] Notably no emergency situation provisions exist outside the Controlled Substances Act's "closed system" although this closed system may be unavailable or nonfunctioning in the event of accidents in remote areas or disasters such as hurricanes and earthquakes. Acts which would widely be considered morally imperative^[citation needed] remain offenses subject to heavy penalties.^[34]



These drugs vary in potency: for example [fentanyl](#) is about 80 times as potent as [morphine](#). ([Heroin](#) is roughly four times as potent.) More significantly, they vary in nature. Pharmacology and CSA scheduling have a weak relationship.

Drugs in this schedule include:

- [Cocaine](#) (used as a [topical anesthetic](#));
- [Methylphenidate](#) ([Ritalin](#) and [Concerta](#)) and [dexmethylphenidate](#) ([Focalin](#)) (used in treatment of [attention deficit disorder](#));
- [Opium](#) and [opium tincture](#) ([laudanum](#)), which is used as a potent [antidiarrheal](#);
- [Methadone](#) (used in treatment of [heroin](#) addiction as well as for treatment of extreme chronic pain)
- [Oxycodone](#) (semi-synthetic opioid; active ingredient in [Percocet](#), [OxyContin](#), and [Percodan](#))
- [Fentanyl](#) and most other strong pure opioid agonists, *i.e.* [levorphanol](#), [opium](#), or [oxymorphone](#) like [Opana](#);
- [Morphine](#)
- [Mixed Amphetamine Salts](#) under brand name [Adderall](#)
- [Lisdexamfetamine](#) ([Vyvanse](#))
- [Dextroamphetamine](#) ([Dexedrine](#))
- [Dextromethamphetamine](#) ([Desoxyn](#))
- [Hydromorphone](#) ([Dilaudid](#))
- Pure [codeine](#) and any drug for non-[parenteral](#) administration containing the equivalent of more than 90 mg of codeine per dosage unit;
- Pure [hydrocodone](#) and any drug for non-[parenteral](#) administration containing no other active ingredients or more than 15 mg per dosage unit;
- [Secobarbital](#) ([Seconal](#))
- [Pethidine](#) ([USAN](#): [Meperidine](#); [Demerol](#))
- [Phencyclidine](#) ([PCP](#));
- Short-acting [barbiturates](#), such as [pentobarbital](#), [Nembutal](#);
- [Amphetamines](#) (originally placed on Schedule III, but moved to Schedule II in 1971; injectable [methamphetamine](#) has always been on Schedule II);
- [Nabilone](#) ([Cesamet](#)) A synthetic [cannabinoid](#). An analogue to [dronabinol](#) ([Marinol](#)) which is a Schedule III drug.
- [Tapentadol](#) ([Nucynta](#)) A drug with mixed opioid agonist and norepinephrine re-uptake inhibitor activity.

Schedule III controlled substances

Main article: [List of Schedule III drugs \(US\)](#)

Schedule III substances are those that have the following findings:



- A. The drug or other substance has a potential for abuse less than the drugs or other substances in schedules I and II.
- B. The drug or other substance has a currently accepted medical use in treatment in the United States.
- C. Abuse of the drug or other substance may lead to moderate or low physical dependence or high psychological dependence.^[23]

Except when dispensed directly by a practitioner, other than a pharmacist, to an ultimate user, no controlled substance in schedule III or IV, which is a prescription drug as determined under the [Federal Food, Drug, and Cosmetic Act](#) (21 USC 301 *et seq.*), may be dispensed without a written or oral prescription in conformity with section 503(b) of that Act (21 USC 353 (b)). Such prescriptions may not be filled or refilled more than six months after the date thereof or be refilled more than five times after the date of the prescription unless renewed by the practitioner.^[33] Control of wholesale distribution is somewhat less stringent than Schedule II drugs. Provisions for emergency situations are less restrictive within the "closed system" of the Controlled Substances Act than for Schedule II though no schedule has provisions to address circumstances where the closed system is unavailable, nonfunctioning or otherwise inadequate.

Drugs in this schedule include:

- [Anabolic steroids](#) (including [prohormones](#) such as androstenedione);
- Intermediate-acting [barbiturates](#), such as [talbutal](#) or [butalbital](#);
- [Buprenorphine](#);
- [Dihydrocodeine](#) when compounded with other substances, to a certain dosage and concentration.
- [Ketamine](#), a drug originally developed as a milder substitute for [PCP](#) (mainly to use as a human anesthetic) but has since become popular as a veterinary and pediatric anesthetic;
- [Xyrem](#), a preparation of [GHB](#) used to treat [narcolepsy](#). Xyrem is in Schedule III but with a restricted distribution system. All other forms of GHB are in Schedule I;
- [Hydrocodone](#) / [codeine](#), when compounded with an [NSAID](#) (e.g. Vicoprofen, when compounded with [ibuprofen](#)) or with acetaminophen ([paracetamol](#)) (e.g. [Vicodin](#) / [Tylenol 3](#));
- [Marinol](#), a synthetic form of [Tetrahydrocannabinol](#) (THC) used to treat [nausea](#) and [vomiting](#) caused by [chemotherapy](#), as well as [appetite loss](#) caused by [AIDS](#);
- [Paregoric](#), an [antidiarrheal](#) and [anti-tussive](#), which contains [opium](#) combined with [camphor](#) (which makes it less addiction-prone than [laudanum](#), which is in Schedule II);
- [Lysergic acid amide](#) ("LSA"), listed as a sedative but considered by some to be hallucinogenic.^{[35][36]} An inefficient precursor to a chemical relative of [LSD](#), LSA occurs naturally in *Rivea corymbosa*, morning glory seeds, and Hawaiian baby woodrose seeds. LSA is not biosynthesized by the ergot fungus (*Claviceps purpurea*), but can be biosynthesized by other *Claviceps* species. LSA can be present as an artifact in extracts of ergot.

Schedule IV controlled substances



Main article: [List of Schedule IV drugs \(US\)](#)

"Placement on schedules; findings required Schedule IV substances are those that have the following findings:

- A. The drug or other substance has a low potential for abuse relative to the drugs or other substances in schedule III
- B. The drug or other substance has a currently accepted medical use in treatment in the United States
- C. Abuse of the drug or other substance may lead to limited physical dependence or psychological dependence relative to the drugs or other substances in schedule III^[23]

Control measures are similar to Schedule III. Prescriptions for Schedule IV drugs may be refilled up to five times within a six month period.

Drugs in this schedule include:

- [Benzodiazepines](#), such as [alprazolam \(Xanax\)](#), [chlordiazepoxide \(Librium\)](#), [clonazepam \(Klonopin\)](#), [diazepam \(Valium\)](#)
 - [temazepam \(Restoril\)](#) (Note that some states require specially coded prescriptions for [temazepam](#))
 - [flunitrazepam \(Rohypnol\)](#) (Note that flunitrazepam is not used medically in the United States);
- The [benzodiazepine-like "Z-drugs"](#): [Zolpidem \(Ambien\)](#), [Zopiclone](#), [Eszopiclone](#), and [Zaleplon](#);
- Long-acting [barbiturates](#) such as [phenobarbital](#);
- Some partial [agonist](#) opioid analgesics, such as [pentazocine \(Talwin\)](#);
- The [stimulant-like drug modafinil](#) (sold in the U.S. as [Provigil](#)) as well as its (R)-enantiomer [armodafinil](#) (sold in the U.S. as [Nuvigil](#));
- [Antidiarrheal](#) drugs, such as [difenoxin](#), when combined with atropine (Motofen) (difenoxin is 2–3 times more potent than [diphenoxylate](#), the active ingredient in [Lomotil](#), which is in Schedule V);

Schedule V controlled substances

Main article: [List of Schedule V drugs \(US\)](#)

Schedule V substances are those that have the following findings:

- A. The drug or other substance has a low potential for abuse relative to the drugs or other substances in schedule IV
- B. The drug or other substance has a currently accepted medical use in treatment in the United States



- C. Abuse of the drug or other substance may lead to limited physical dependence or psychological dependence relative to the drugs or other substances in schedule IV.^[23]

No controlled substance in schedule V which is a drug may be distributed or dispensed other than for a medical purpose.^[33]

Drugs in this schedule include:

- Cough suppressants containing small amounts of codeine (e.g., [promethazine](#)+codeine);
- Preparations containing small amounts of opium or [diphenoxylate](#) (used to treat diarrhea);
- [Pregabalin](#) (Lyrica), an anticonvulsant and pain modulator.
- [Pyrovalerone](#)
- Some centrally-acting anti-diarrhoeals, such as [diphenoxylate](#) (Lomotil) when mixed with [atropine](#) to make it unpleasant for people to grind up, cook, and inject. [Difenoxin](#) with atropine (Motofen) has been moved to Schedule IV. Otherwise the drugs are in Schedule II.

Federal regulation of pseudoephedrine

Due to [pseudoephedrine](#) being widely used in the manufacture of [methamphetamine](#), the U.S. Congress passed the [Methamphetamine Precursor Control Act](#) which places restrictions on the sale of any medicine containing pseudoephedrine. That bill was then superseded by the [Combat Methamphetamine Epidemic Act of 2005](#), which was passed as an amendment to the [Patriot Act](#) renewal and included wider and more comprehensive restrictions on the sale of pseudoephedrine containing products. This law requires^[37] customer signature of a "log-book" and presentation of valid photo ID to purchase of pseudoephedrine (PSE) containing products from all retailers.^[38]

The law restricts an individual to the retail sale of such products to no more than three packages or no more than 3.6 grams in a single transaction. Additionally, there is a limit of no more than 9 grams in one month. A violation of this statute constitutes a misdemeanor. In states where OTC medications which contain pseudoephedrine are not regulated, many retailers, notably [Target](#) and [Wal-Mart](#) have restricted their purchase by requiring it to be sold behind the pharmacy or service counter and/or placing an age restriction on purchase. Additionally, pharmacies such as [CVS](#) and [Walgreens](#) also require photo ID and log-book signatures for sales of PSE containing products in compliance with federal law.

Prior to this, the state of Oregon passed a law requiring a prescription for pharmacies to dispense any cold remedy containing pseudoephedrine. Likewise, the states of Alabama, Arizona, Colorado, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, New Mexico, New Jersey, North Carolina, Oklahoma, Pennsylvania, Tennessee, Texas, Virginia, Washington, Wisconsin and Wyoming restrict sales of pseudoephedrine-containing products to licensed pharmacies and require customers to show photo ID and sign a log book.^[citation needed]



California, Maryland and Maine have also enacted degrees of controlled access to over the counter drugs that contain pseudoephedrine. This affects many preparations which were previously available over-the-counter without restriction, such as [Actifed](#), their generic equivalents, etc. [California Health and Safety Code](#) sections 11100 and 11106 specify the new restrictions regarding [over the counter](#) (OTC) sale of ephedrine or pseudoephedrine containing products (PSE)



Appendix D: OSHA 29 CFR 1910.1450 Occupational Exposure of Hazardous Chemicals in the Laboratories

1910.1450(a)

Scope and application.

1910.1450(a)(1)

This section shall apply to all employers engaged in the laboratory use of hazardous chemicals as defined below.

1910.1450(a)(2)

Where this section applies, it shall supersede, for laboratories, the requirements of all other OSHA health standards in 29 CFR part 1910, subpart Z, except as follows:

1910.1450(a)(2)(i)

For any OSHA health standard, only the requirement to limit employee exposure to the specific permissible exposure limit shall apply for laboratories, unless that particular standard states otherwise or unless the conditions of paragraph (a)(2)(iii) of this section apply.

1910.1450(a)(2)(ii)

Prohibition of eye and skin contact where specified by any OSHA health standard shall be observed.

1910.1450(a)(2)(iii)

Where the action level (or in the absence of an action level, the permissible exposure limit) is routinely exceeded for an OSHA regulated substance with exposure monitoring and medical surveillance requirements paragraphs (d) and (g)(1)(ii) of this section shall apply.

1910.1450(a)(3)

This section shall not apply to:

1910.1450(a)(3)(i)

Uses of hazardous chemicals which do not meet the definition of laboratory use, and in such cases, the employer shall comply with the relevant standard in 29 CFR part 1910, subpart Z, even if such use occurs in a laboratory.

1910.1450(a)(3)(ii)

Laboratory uses of hazardous chemicals which provide no potential for employee exposure. Examples of such conditions might include:

1910.1450(a)(3)(ii)(A)

Procedures using chemically-impregnated test media such as Dip-and-Read tests where a reagent strip is dipped into the specimen to be tested and the results are interpreted by comparing the color reaction to a color chart supplied by the manufacturer of the test strip; and

1910.1450(a)(3)(ii)(B)

Commercially prepared kits such as those used in performing pregnancy tests in which all of the reagents needed to conduct the test are contained in the kit.

1910.1450(b)

Definitions —



Action level means a concentration designated in 29 CFR part 1910 for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Carcinogen (see *select carcinogen*).

Chemical Hygiene Officer means an employee who is designated by the employer, and who is qualified by training or experience, to provide technical guidance in the development and implementation of the provisions of the Chemical Hygiene Plan. This definition is not intended to place limitations on the position description or job classification that the designated individual shall hold within the employer's organizational structure.

Chemical Hygiene Plan means a written program developed and implemented by the employer which sets forth procedures, equipment, personal protective equipment and work practices that (i) are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace and (ii) meets the requirements of paragraph (e) of this section.

Emergency means any occurrence such as, but not limited to, equipment failure, rupture of containers or failure of control equipment which results in an uncontrolled release of a hazardous chemical into the workplace.

Employee means an individual employed in a laboratory workplace who may be exposed to hazardous chemicals in the course of his or her assignments.

Hazardous chemical means any chemical which is classified as health hazard or simple asphyxiant in accordance with the Hazard Communication Standard (§1910.1200).

Health hazard means a chemical that is classified as posing one of the following hazardous effects: Acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration hazard. The criteria for determining whether a chemical is classified as a health hazard are detailed in appendix A of the Hazard Communication Standard (§1910.1200) and §1910.1200(c) (definition of "simple asphyxiant").

Laboratory means a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory scale means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by



one person. "Laboratory scale" excludes those workplaces whose function is to produce commercial quantities of materials.

Laboratory-type hood means a device located in a laboratory, enclosure on five sides with a moveable sash or fixed partial enclosed on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.

Walk-in hoods with adjustable sashes meet the above definition provided that the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazardous chemicals.

Laboratory use of hazardous chemicals means handling or use of such chemicals in which all of the following conditions are met:

- (i) Chemical manipulations are carried out on a "laboratory scale;"
- (ii) Multiple chemical procedures or chemicals are used;
- (iii) The procedures involved are not part of a production process, nor in any way simulate a production process; and
- (iv) "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Medical consultation means a consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

Mutagen means chemicals that cause permanent changes in the amount or structure of the genetic material in a cell. Chemicals classified as mutagens in accordance with the Hazard Communication Standard (§1910.1200) shall be considered mutagens for purposes of this section.

Physical hazard means a chemical that is classified as posing one of the following hazardous effects: Explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid, or gas); self reactive; pyrophoric (gas, liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; in contact with water emits flammable gas; or combustible dust. The criteria for determining whether a chemical is classified as a physical hazard are in appendix B of the Hazard Communication Standard (§1910.1200) and §1910.1200(c) (definitions of "combustible dust" and "pyrophoric gas").



Protective laboratory practices and equipment means those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Reproductive toxins mean chemicals that affect the reproductive capabilities including adverse effects on sexual function and fertility in adult males and females, as well as adverse effects on the development of the offspring. Chemicals classified as reproductive toxins in accordance with the Hazard Communication Standard (§1910.1200) shall be considered reproductive toxins for purposes of this section.

Select carcinogen means any substance which meets one of the following criteria:

- (i) It is regulated by OSHA as a carcinogen; or
- (ii) It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or
- (iii) It is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs (IARC) (latest editions); or
- (iv) It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
 - (A) After inhalation exposure of 6–7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m³;
 - (B) After repeated skin application of less than 300 (mg/kg of body weight) per week; or
 - (C) After oral dosages of less than 50 mg/kg of body weight per day.

1910.1450(c)

Permissible exposure limits. For laboratory uses of OSHA regulated substances, the employer shall assure that laboratory employees' exposures to such substances do not exceed the permissible exposure limits specified in 29 CFR part 1910, subpart Z.

1910.1450(d)

Employee exposure determination --

1910.1450(d)(1)

Initial monitoring. The employer shall measure the employee's exposure to any substance regulated by a standard which requires monitoring if there is reason to believe that exposure levels for that substance routinely exceed the action level (or in the absence of an action level, the PEL).

1910.1450(d)(2)

Periodic monitoring. If the initial monitoring prescribed by paragraph (d)(1) of this section discloses employee exposure over the action level (or in the absence of an action level, the PEL),



the employer shall immediately comply with the exposure monitoring provisions of the relevant standard.

1910.1450(d)(3)

Termination of monitoring. Monitoring may be terminated in accordance with the relevant standard.

1910.1450(d)(4)

Employee notification of monitoring results. The employer shall, within 15 working days after the receipt of any monitoring results, notify the employee of these results in writing either individually or by posting results in an appropriate location that is accessible to employees.

1910.1450(e)

Chemical hygiene plan -- General. (Appendix A of this section is non-mandatory but provides guidance to assist employers in the development of the Chemical Hygiene Plan).

1910.1450(e)(1)

Where hazardous chemicals as defined by this standard are used in the workplace, the employer shall develop and carry out the provisions of a written Chemical Hygiene Plan which is:

1910.1450(e)(1)(i)

Capable of protecting employees from health hazards associated with hazardous chemicals in that laboratory and

1910.1450(e)(1)(ii)

Capable of keeping exposures below the limits specified in paragraph (c) of this section.

1910.1450(e)(2)

The Chemical Hygiene Plan shall be readily available to employees, employee representatives and, upon request, to the Assistant Secretary.

1910.1450(e)(3)

The Chemical Hygiene Plan shall include each of the following elements and shall indicate specific measures that the employer will take to ensure laboratory employee protection;

1910.1450(e)(3)(i)

Standard operating procedures relevant to safety and health considerations to be followed when laboratory work involves the use of hazardous chemicals;

1910.1450(e)(3)(ii)

Criteria that the employer will use to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices; particular attention shall be given to the selection of control measures for chemicals that are known to be extremely hazardous;

1910.1450(e)(3)(iii)

A requirement that fume hoods and other protective equipment are functioning properly and specific measures that shall be taken to ensure proper and adequate performance of such equipment;

1910.1450(e)(3)(iv)

Provisions for employee information and training as prescribed in paragraph (f) of this section;

1910.1450(e)(3)(v)

The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from the employer or the employer's designee before implementation;

1910.1450(e)(3)(vi)



Provisions for medical consultation and medical examinations in accordance with paragraph (g) of this section;

1910.1450(e)(3)(vii)

Designation of personnel responsible for implementation of the Chemical Hygiene Plan including the assignment of a Chemical Hygiene Officer, and, if appropriate, establishment of a Chemical Hygiene Committee; and

1910.1450(e)(3)(viii)

Provisions for additional employee protection for work with particularly hazardous substances. These include "select carcinogens," reproductive toxins and substances which have a high degree of acute toxicity. Specific consideration shall be given to the following provisions which shall be included where appropriate:

1910.1450(e)(3)(viii)(A)

Establishment of a designated area;

1910.1450(e)(3)(viii)(B)

Use of containment devices such as fume hoods or glove boxes;

1910.1450(e)(3)(viii)(C)

Procedures for safe removal of contaminated waste; and

1910.1450(e)(3)(viii)(D)

Decontamination procedures.

1910.1450(e)(4)

The employer shall review and evaluate the effectiveness of the Chemical Hygiene Plan at least annually and update it as necessary.

1910.1450(f)

Employee information and training.

1910.1450(f)(1)

The employer shall provide employees with information and training to ensure that they are apprised of the hazards of chemicals present in their work area.

1910.1450(f)(2)

Such information shall be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. The frequency of refresher information and training shall be determined by the employer.

1910.1450(f)(3)

Information. Employees shall be informed of:

1910.1450(f)(3)(i)

The contents of this standard and its appendices which shall be made available to employees;

1910.1450(f)(3)(ii)

the location and availability of the employer's Chemical Hygiene Plan;

1910.1450(f)(3)(iii)

The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard;

1910.1450(f)(3)(iv)

Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory; and

1910.1450(f)(3)(v)



The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, safety data sheets received from the chemical supplier.

1910.1450(f)(4)

Training.

1910.1450(f)(4)(i)

Employee training shall include:

1910.1450(f)(4)(i)(A)

Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

1910.1450(f)(4)(i)(B)

The physical and health hazards of chemicals in the work area; and

1910.1450(f)(4)(i)(C)

The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.

1910.1450(f)(4)(ii)

The employee shall be trained on the applicable details of the employer's written Chemical Hygiene Plan.

1910.1450(g)

Medical consultation and medical examinations.

1910.1450(g)(1)

The employer shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

1910.1450(g)(1)(i)

Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination.

1910.1450(g)(1)(ii)

Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard.

1910.1450(g)(1)(iii)

Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination.

1910.1450(g)(2)

All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.



1910.1450(g)(3)

Information provided to the physician. The employer shall provide the following information to the physician:

1910.1450(g)(3)(i)

The identity of the hazardous chemical(s) to which the employee may have been exposed;

1910.1450(g)(3)(ii)

A description of the conditions under which the exposure occurred including quantitative exposure data, if available; and

1910.1450(g)(3)(iii)

A description of the signs and symptoms of exposure that the employee is experiencing, if any.

1910.1450(g)(4)

Physician's written opinion.

1910.1450(g)(4)(i)

For examination or consultation required under this standard, the employer shall obtain a written opinion from the examining physician which shall include the following:

1910.1450(g)(4)(i)(A)

Any recommendation for further medical follow-up;

1910.1450(g)(4)(i)(B)

The results of the medical examination and any associated tests;

1910.1450(g)(4)(i)(C)

Any medical condition which may be revealed in the course of the examination which may place the employee at increased risk as a result of exposure to a hazardous workplace; and

1910.1450(g)(4)(i)(D)

A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

1910.1450(g)(4)(ii)

The written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure.

1910.1450(h)

Hazard identification.

1910.1450(h)(1)

With respect to labels and safety data sheets:

1910.1450(h)(1)(i)

Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced.

1910.1450(h)(1)(ii)

Employers shall maintain any safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees.

1910.1450(h)(2)

The following provisions shall apply to chemical substances developed in the laboratory:

1910.1450(h)(2)(i)

If the composition of the chemical substance which is produced exclusively for the laboratory's use is known, the employer shall determine if it is a hazardous chemical as defined in paragraph



(b) of this section. If the chemical is determined to be hazardous, the employer shall provide appropriate training as required under paragraph (f) of this section.

1910.1450(h)(2)(ii)

If the chemical produced is a byproduct whose composition is not known, the employer shall assume that the substance is hazardous and shall implement paragraph (e) of this section.

1910.1450(h)(2)(iii)

If the chemical substance is produced for another user outside of the laboratory, the employer shall comply with the Hazard Communication Standard (29 CFR 1910.1200) including the requirements for preparation of safety data sheets and labeling.

1910.1450(i)

Use of respirators. Where the use of respirators is necessary to maintain exposure below permissible exposure limits, the employer shall provide, at no cost to the employee, the proper respiratory equipment. Respirators shall be selected and used in accordance with the requirements of 29 CFR 1910.134.

1910.1450(j)

Recordkeeping.

1910.1450(j)(1)

The employer shall establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required by this standard.

1910.1450(j)(2)

The employer shall assure that such records are kept, transferred, and made available in accordance with 29 CFR 1910.1020.

1910.1450(k)

[Reserved]

1910.1450(l)

Appendices. The information contained in the appendices is not intended, by itself, to create any additional obligations not otherwise imposed or to detract from any existing obligation.

[55 FR 3327, Jan. 31, 1990; 55 FR 7967, March, 6, 1990; 55 FR 12777, March 30, 1990; 61 FR 5507, Feb. 13, 1996; 71 FR 16674, April 3, 2006; 77 FR 17887, March 26, 2012]



DISTRIBUTION

Argonne National Laboratory
Attn: Ms. Nicki Hickmon
9700 S. Cass Ave., Bldg. 203
Argonne, IL 60439

Argonne National Laboratory
Attn: Michael T. Ritsche
9700 S. Cass Ave., Bldg. 203
Argonne, IL 60439

Argonne National Laboratory
Attn: LaMonte Brandner
9700 S. Cass Ave., Bldg.
Argonne, IL 60439

Argonne National Laboratory
Attn: William Gasper
9700 S. Cass Ave., Bldg.
Argonne, IL 60439

Native Energy and Technology, Inc.
Attn: John Morris, President
110 Broadway, Suite 690
San Antonio, TX 78205

Native Energy and Technology, Inc.
Attn: Diana Davis, VP/Project Manager
110 Broadway, Suite 690
San Antonio, TX 78205