

SAFETY PRECAUTIONS

Personnel safety and warning devices are designed to indicate safe conditions, dangerous conditions, and degrees of danger. Areas and equipment that might be dangerous to personnel are clearly posted.

At all bases, each person will be familiar with the safety program. This program consists of training classes, posters, protective enclosures around dangerous areas, and planned procedures for the performance of hazardous operations. Job and function manuals contain safety precautions that supplement the safety program, listing safety precautions applicable to specific areas and jobs. Warnings and cautions are inserted as necessary throughout the manuals and have the following significance:

WARNING

- * Indicates a hazardous condition that could result in injury or death.

CAUTION

- * Indicates a hazardous condition that could result in damage to equipment.

There are basically three types of fires (class A, B, and C) that can be encountered within a launch complex. If personnel should detect a fire, notify the control center immediately, then proceed to combat the fire as follows:

Class A: The burning of any combustible fiber is to be combated with water or portable CO₂ fire extinguishers.

WARNING

- * Water is not to be used to combat class B or class C fires. Water will not extinguish these fires and aid in the spreading of them.

Class B: The burning of any petroleum product is to be combated with foam or CO₂ fire extinguishers.

Class C: A fire within any electrically charged device or equipment will be combated with CO₂ fire extinguishers only.

Various type of color coding are utilized throughout the launch complex for safety purposes with the following significance:

RED: Red is the basic color used to denote danger or to indicate immediate stops.

ORANGE: Orange is the basic color used for marking dangerous parts of machines or electrical equipment.

YELLOW: Yellow is the basic color used to indicate the need for caution.

GREEN: Green is the basic color used to denote safety, first aid equipment, safety devices, and facilities directly related to safety.

General hazards associated with the operation and maintenance of the weapon system are listed in the following table of safety precautions.

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ITEM	HAZARD		CORRECTIVE ACTION
	CONDITION	RESULT	
Electrical circuits	Personal contact	Burns, shocks, or electrocution of personnel.	<p>Remove power. Remove injured personnel from conductor. Administer first aid. Obtain medical care for the injured.</p>
		Use protective and safety approved test equipment or tools. Remove all personal jewelry or other metal objects prior to working on electrical circuitry. Do not touch personnel in contact with electrical equipment.	
		Remove power. Remove injured personnel from conductor. Administer first aid. Obtain medical care for the injured.	
Sulfuric acid (H ₂ SO ₄)	Handling and storage.	Severe irritant to all skin tissues.	Wash affected area with bicarbonate of soda solution.
		Use protective clothing. Use caution at all times.	
Sodium hydroxide (NaOH) and potassium hydroxide (KOH)	Handling and storage	Severe irritant to all skin tissue.	Wash affected area with vinegar or any other acetic acid solution. Flush with copious amounts of water.
		Use protective clothing. Use caution at all times.	
Refrigerants R11 and R12	Handling and storage	Irritant to skin and eyes.	Treat affected area for frost bite. Flush eyes with copious amounts of water.

ITEM	HAZARD		SAFEGUARDS	CORRECTIVE ACTION
	CONDITION	RESULT		
Cleaning solvents	Handling and storage.	Skin irritant.	<p>CHEMICAL (CONT.)</p> <p>Wear protective clothing. Do not enter a heavily vapored area without using a self-contained breathing apparatus, wearing a safety harness, and having an outside attendant. Do not allow trichloroethylene to come in contact with strong alkalis. Trichloroethylene reacts with strong alkalis to form explosive mixtures. Treat all cleaning solvents as flammable agents.</p>	<p>Use water to flush affected areas. Administer first aid. Secure medical attention. Isolate the area.</p>
Fuels and lubricants	Storage and handling.	Injury to personnel. Damage to equipment.	<p>Do not smoke, weld, or generate sparks in the vicinity. Maintain area in a clean, combustion-free condition. Do not vent fumes into a closed area.</p> <p>Prevent contact with any oxidizer.</p> <p>Do not allow spills to remain unattended.</p>	<p>Use water to flush fuel spills and absorbent compounds or rags for lubricant spills.</p> <p>Use dry chemical or carbon dioxide fire extinguishers to combat fires.</p>
Tricresyl phosphate	Ingestion or inhaling fumes.	Illness or death.	<p>Wear the prescribed protective clothing. Respirator required when vapor present.</p>	<p>Apply first aid and secure medical attention.</p>

ITEM	HAZARD		SAFEGUARDS	CORRECTIVE ACTION
	CONDITION	RESULT		
Operation of maintenance equipment	Entanglement and structural failure. Falling objects. Swinging load hooks.	Injury to personnel.	<p>MECHANICAL</p> <p>Wear appropriate protective equipment such as hard hats, safety-toe shoes, and goggles or face shields when required. Stay clear of hoisting and loading operations. Do not remove protective covers or guards while equipment is operating.</p> <p>Do not wear loose clothing or jewelry when working around operating machinery and electrical equipment.</p> <p>Observe all safety precautions pertaining to the proper operation and maintenance of equipment.</p>	Administer first aid; secure medical attention.
Environmental pressures	Pressure differential between rooms, and/or areas.	Doors slam or will not open.	Use extreme caution when opening or closing all doors.	If possible, shut down equipment to equalize pressures.

ITEM	HAZARD		SAFEGUARDS	CORRECTIVE ACTION
	CONDITION	RESULT		
Pneumatics	High pressures.	Sudden release of pressure from containers may cause serious injury to personnel and/or damage to equipment.	MECHANICAL (CONT.) Do not perform maintenance on pressurized lines prior to relieving pressure.	Administer first aid to injured personnel.
Equipment in a maintenance status	Improper handling.	Damage to equipment and/or injury to personnel.	Use AF Form 267 and locking devices, if applicable.	Do not attempt to operate or tamper with tagged devices without proper clearance.
High frequency vibrations and noises	Performance of duty in power house and other high level noise areas.	Pain, a feeling of fullness, and/or ringing or burning of the ears. Dizziness, impairment of mental concentration, and/or occasional nausea.	PHYSIOLOGICAL The use of approved ear muffs and/or ear plugs. Post hazard areas with warning signs.	Remove affected individual from the noise area immediately, and obtain medical attention.
High humidity and temperatures	Improper air-conditioning.	Adverse attitude, poor manual dexterity, and exhaustion.	Limit the length of tours of duty in areas of this nature.	Maintain proper temperature and humidity.

ITEM	HAZARD		SAFEGUARDS	CORRECTIVE ACTION
	CONDITION	RESULT		
Helium and gaseous nitrogen (He, GN ₂)	Leakage, high pressure lines and containers, concentrated vapors.	Personnel injuries.	<p>GASES</p> <p>Do not vent into closed areas (Gases will displace oxygen in the air).</p> <p>Do not enter areas likely to contain vapor concentration without using a self-contained breathing apparatus, wearing a safety harness, and having an outside attendant.</p> <p>Do not pressurize tanks and lines in excess of recommended pressures.</p> <p>Open valves with caution. Vent pressures from system before performing maintenance.</p>	Isolate area, administer first aid and secure medical attention.
Hydrogen (H ₂)	Caused by excessive charging of lead acid batteries.	Explosion, asphyxiation.	<p>No flaming or sparking devices near battery banks. Adhere to all warning signs. Keep area well ventilated.</p>	Administer first aid. Secure medical attention.

ITEM	HAZARD		CORRECTIVE ACTION
	CONDITION	RESULT	
Phosgene Gas (COCl ₂)	Created by heating freon, R-11 refrigerant, and R-12 liquids.	Respiratory irritation.	Remove personnel from affected area and administer first aid. Obtain medical attention.
	Liquid Oxygen (lox) handling and storage.	Injury or death to personnel.	
Liquids.	Low temperature		<p>If lox should come in contact with the skin or eyes, use safety shower or eyewash fountain to flush with running water. Obtain medical aid immediately.</p> <p>Isolate the area and allow lox to boil off. Use only water, dry chemical, or carbon dioxide fire extinguishers on lox fires.</p>
CRYOGENICS			<p>Treat affected part of body for frost bite.</p>

ITEM	HAZARD		SAFEGUARDS	CORRECTIVE ACTION
	CONDITION	RESULT		
Liquid nitrogen (LN ₂)	Low temperature.	Serious injury to personnel.	<p>CRYOGENICS (CONT.)</p> <p>Do not allow organic substances particularly oil or grease, to contact lox. Use only lox-compatible lubricants, valve packing, and gasket material when assembling equipment for use with lox. Do not store lox equipment until it has been cleaned.</p> <p>Avoid contaminating clothing with lox. If contamination occurs, remove all such clothing immediately.</p> <p>Wear clean cotton clothing, asbestos or neoprene gloves, face shield, apron, and rubber boots or cotton shoe socks.</p> <p>Do not smoke, weld, or generate sparks in the vicinity of liquid nitrogen. (Because of its low temperature, liquid nitrogen will liquify oxygen from the ambient air creating a lox hazard.)</p> <p>Maintain area in a clean, combustion-free condition.</p>	<p>If liquid nitrogen should come in contact with the skin or eyes, use safety shower or eyewash fountain to flush contaminated skin areas or eyes with running water. Obtain medical aid immediately.</p> <p>Isolate area and allow lox to boil off. Use only water, dry chemical, or CO₂ fire extinguishers on lox fires.</p>
	Fire.	Serious injury to personnel.		

ITEM	HAZARD		CORRECTIVE ACTION
	CONDITION	RESULT	
Separation bolts, hold down bolts, engine igniters	Displaced oxygen.	Asphyxiation of personnel.	Remove personnel from affected area and administer first aid. Secure medical attention.
	Inadvertent activation.	Injury to personnel. Damage to equipment.	
<p>CRYOGENICS (CONT.)</p> <p>Allow nitrogen-cooled equipment to warm up to near ambient temperature before performing maintenance on malfunctioning components. Avoid contact with lines carrying liquid nitrogen. Do not store or use liquid nitrogen in unvented tanks or systems.</p> <p>Do not vent liquid nitrogen into closed areas.</p> <p>When entering a tank that has contained nitrogen, use a self-contained breathing apparatus, a safety harness, and have an outside attendant.</p> <p style="text-align: center;">ORDNANCE</p> <p>Do not smoke, weld, or generate sparks in the vicinity of ordnance items.</p> <p>Do not place ordnance items near an open flame, electrical circuits, or ground cables.</p> <p>Do not subject ordnance items to impact, excessive heat, or radio frequency radiation.</p>			Evacuate victims to hazard free area, and apply first aid. Summon medical assistance and fire fighting equipment.

ITEM	HAZARD		CORRECTIVE ACTION
	CONDITION	RESULT	

CORRECTIVE ACTION

SAFEGUARDS

ORDNANCE (CONT.)

Do not handle ordnance items unless authorized to do so.

Do not enter the affected area without breathing apparatus.

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