



**FREEPORT-
McMORAN**

STUDENT GUIDE



SFT FCX1017C SULFURIC ACID BULK HANDLING

APRIL / 2019
VERSION 1

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LEARNING OBJECTIVES

The provided learning objectives establish guidance and focus throughout the course.

MODULE 1: RISKS AND HAZARDS

Upon completion of this module, students will be able to:

- Identify potential hazards associated with acid handling

MODULE 2: CONTROLS

Upon completion of this module, students will be able to:

- Determine appropriate Critical Controls
- Summarize “Actions to Stay Safe”

MODULE 3: COMMUNICATION

Upon completion of this module, students will be able to:

- Explain the communication process while on Freeport-McMoRan property

MODULE 4: OPERATIONS

Upon completion of this module, students will be able to:

- Discuss the different types of loading and unloading
- Outline procedures for entry

MODULE 5: INSPECTIONS AND AUDITS

Upon completion of this module, students will be able to:

- List various inspection processes

MODULE 6: EMERGENCY RESPONSES

Upon completion of this module, students will be able to:

- Discuss action plan for an emergency situation

FATAL RISKS AND CRITICAL CONTROLS

Fatal Risk Management is a continuation of the Fatality Prevention Program. Focus is placed on identifying Fatal Risks and Critical Controls in an attempt to safeguard all employees within the Company. The Fatal Risk Management Program standardizes communication for twenty-three Fatal Risks by implementing icons, definitions, and Critical Controls.

Fatal Risks are based on safety issues that have resulted in catastrophic events such as severe injury or death. While all risks have a degree of danger, Fatal Risks are those risks that, when left uncontrolled, will kill you.

For each identified Fatal Risk a list of necessary Critical Controls was developed to prevent or mitigate the most serious consequences of these risks. Once the Fatal Risk is identified, applying the most effective Critical Control is crucial. A Critical Control is a device, system, or process implemented to eliminate or reduce the risk for a task/job, and if missing or overlooked has the potential to lead to catastrophic outcomes such as serious injury or death. These Critical Controls are considered the most impactful on preventing a fatality or injury and have been previously established based on data. The absence or failure of a Critical Control significantly increases the risk of severe injury or death despite the existence of other controls. The Fatal Risk(s) and Critical Controls relevant to this course are provided below.

EXPOSURE TO HAZARDOUS SUBSTANCES - ACUTE



The Exposure to Hazardous Substances Acute Fatal Risk is defined as workplace exposure to substances that are immediately toxic, asphyxiating, or corrosive (e.g., H₂S gas, NO₂ gas, CO gas, concentrated acids, caustics, etc.).

CRITICAL CONTROLS

- Access Control
- Alarm Systems
- Engineered Controls
- Handling Requirements
- Loading and Unloading Protection
- Mechanical Integrity of Storage and Distribution
- PPE

RAIL IMPACT ON PERSON



The Rail Impact on Person Fatal Risk is defined as locomotive, rolling stock, or other rail equipment coming into contact with a person.

CRITICAL CONTROLS

- Access Control
- Equipment Maintenance
- Positive Communication System
- Securing Rolling Stock
- Segregation
- Signaling and Signage

UNCONTROLLED RELEASE OF ENERGY



The Uncontrolled Release of Energy Fatal Risk is defined as exposure to stored energy from pressure (e.g., pneumatic systems, hydraulic systems, steam, tires, etc.); Items under tension or compression (e.g., mooring lines, springs, counterweights, etc.).

CRITICAL CONTROLS

- Energy Isolation/LOTOTO
- Guards, Barriers, and Barricades
- Hose Coupling Lock System
- Pipe Management
- Piping Hoses and Equipment Mechanical Integrity
- Relief Valves
- Tensioned Lines Management
- Tire Management

VEHICLE IMPACT ON PERSON



The Vehicle Impact on Person Fatal Risk is defined as person struck by vehicle/mobile equipment.

CRITICAL CONTROLS

- Fundamentally Stable Parking
- Positive Communication System
- Segregation
- Signage and Demarcation
- Vehicle Preoperational Inspection

INTRODUCTION

This course is intended to educate personnel on standardized operating and safety procedures for loading, unloading, and transporting bulk concentrated sulfuric acid.



HANDLING REQUIREMENTS

Operators should always be familiar with site Standard Operating Procedures (SOPs) when carrying out routine or complex operations. An SOP describes activities necessary to complete tasks in accordance with company standards. Contractors should get each site's SOP from their employer. If you do not have an SOP, ask for one at site security.

In addition to this course, operators may be required to take additional site-specific courses and operator technical training such as Hazardous Materials Handling training, Driver/Carrier training, etc. Please contact the site training department for additional requirements.

AUDITS

A safety audit involves measuring and collecting information about the reliability and effectiveness of the safety inspections, programs, training, plans, and systems within a workplace. The relationship between a safety inspection and a safety audit is that a safety audit is used to determine whether the safety inspection is returning accurate, reliable, and complete results. A safety audit is a verification that the safety programs are working. All audits should be documented with action items and tracked as required.

During loading or unloading activities, site personnel such as a safety pro, operation personnel, or supervisor may be present to observe the process. Site personnel is responsible for following all site requirements.

Risks and Hazards



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MODULE 1 LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Identify potential hazards associated with acid handling

INTRODUCTION

Hazards are any aspect of work that may cause a health or safety risk. To manage hazards and to prevent accidents, it is crucial to reduce the risks associated with workplace hazards.

HAZARD IDENTIFICATION

Hazard control begins with recognition. A hazard is “any source of potential damage, harm, or adverse health effects on something or someone under certain conditions at work.”¹ Throughout this training, different hazards encountered in the workplace are addressed. Even though there are specific processes in place for risk analysis, every employee must be able to evaluate the risks associated with any given hazard.

Some risks such as slips, trips, and falls are easily recognized. However, other hazards such as some chemical exposures are not as easy to identify. Therefore, being able to recognize hazards helps determine and implement controls to reduce risk. With so many hazards in each workplace, it is difficult to be knowledgeable of them all, so ask questions of your coworkers, supervisors, health and safety representative, and other area experts.

RISK ASSESSMENT

Using Hazard Identification, Risk Assessment, and Determination of Controls (HIRDAC), project managers and contract management work with site supervision and Health and Safety to identify fatal risks associated with the work and tasks being performed.

RISKS ASSOCIATED WITH ACID HANDLING

Safety is of utmost importance when handling a chemical like sulfuric acid. The acid itself is highly corrosive and can cause irreversible damage if the acid comes into contact with skin or eyes or if ingested.

CONTACT WITH SULFURIC ACID

Sulfuric acid is a colorless to light brown oily liquid. It is corrosive to metals and all body tissues. Long-term exposure to low concentrations or short-term exposure to high concentrations can result in adverse health effects. Effects of contact with sulfuric acid can be moderate to severe and, in some instances, can even be fatal.

¹ Canadian Centre for Occupational Health and Safety, “Hazard and Risk,” (*Ccohs.ca*: 2006), Accessed October 12, 2015. http://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html

EFFECTS OF SULFURIC ACID ON THE HUMAN BODY				
	Acute Exposure Effects	Severe Effects	Chronic Exposure Effects	First Aid Measures
Inhalation of Vapor (Mists)	Cough, sore throat, prickling or burning sensation, shortness of breath, and labored breathing	Serious lung damage, can be fatal if inhaled	Tracheobronchitis: Inflammation of the trachea and bronchial airways, harm to the respiratory system	Remove person to fresh air and keep comfortable for breathing, provide oxygen if difficulty breathing
Contact with Skin	Redness, pain, blisters, serious skin burns	Severe necrosis, permanent scarring, death	Dermatitis, corrosion, burns, ulcers	Immediately take off all contaminated clothing and rinse skin for a minimum of 15 minutes
Contact with Eyes	Redness, pain, severe burns, irritation	Corneal burns, total loss of vision	Conjunctivitis: Inflammation of parts of the eye	Rinse with water, remove contact lenses if easy to do, continue rinsing
Ingestion	Burns in mouth and throat, burning sensation behind the breastbone, abdominal pain, vomiting, shock, or collapse	Even small doses (1 teaspoon) may be fatal	Stomatitis: Soreness or inflammation of the mouth Gastritis: Inflammation of the stomach lining	Rinse mouth, do not induce vomiting
After any exposure with eyes, skin, inhalation, or ingestion, immediately obtain medical attention.				

Table 1.1 Effects of Sulfuric Acid

FATIGUE

Fatigue is commonly described as feeling tired, worn out, run down, or lacking energy. Fatigue is a common reaction to exertion, lack of sleep, boredom, or stress and often results in less than optimal performance on the job. Fatigue is a workplace hazard that can jeopardize the health and safety of a worker. Each is affected by fatigue in different ways. Some of these effects include the following:

- Reduced performance
- Decreased alertness levels
- Lack of judgment
- Impaired motor skills and coordination
- Reduced reaction time
- Reduced ability to process communications effectively

Acid handling may be a task that is prone to fatigue. The physical nature of the task coupled with environmental factors such as extreme temperatures from working outside contribute to workplace fatigue. Follow Freeport-McMoRan or your regulatory agency or company fatigue management policies to ensure adequate rest between shifts.

A fatigued worker is a potential danger because of the increased risk of illness or injury. A worker can take actions to help manage fatigue:

- Bring healthy meals and snacks
- Drink plenty of fluids throughout the day
- Take frequent breaks
- Seek medical treatment for persistent fatigue

HEAT-RELATED ISSUES

The best way to prevent heat-related issues is to avoid one in the first place. Immediately contact your supervisor or site contact if you or a coworker is experiencing any heat-related symptoms. Listed below are a few measures for heat-related issues that may occur on the job.

Heat-related Issues	Factors that increase the likelihood	Prevention of Heat-Related Issues
Dehydration	<ul style="list-style-type: none"> • Failure to drink enough water 	<ul style="list-style-type: none"> • Drink lots of water to replenish the fluid lost through sweating.
Loss of electrolytes	<ul style="list-style-type: none"> • Salts, potassium, calcium, etc. lost when you sweat 	<ul style="list-style-type: none"> • Drink about 8 ounces of water for every 20 minutes of activity. • For prolonged activity, drink a sports drink with balanced electrolytes.
Acclimatization	<ul style="list-style-type: none"> • Adjustment to the heat 	<ul style="list-style-type: none"> • Adjust to the heat through short exposure periods followed by longer periods until you are accustomed to the heat. It may take 5-7 days before heat becomes bearable.
Personal fitness	<ul style="list-style-type: none"> • Age, weight, etc. 	<ul style="list-style-type: none"> • Know the signs of heat stress disorders, and monitor yourself and coworkers.
Past heat-related illness	<ul style="list-style-type: none"> • Previous occurrences lower your resistance 	<ul style="list-style-type: none"> • Take plenty of breaks and use a shaded area if you need it. Plan to work in the cooler parts of the day.
Medical conditions	<ul style="list-style-type: none"> • Heart conditions • Diabetes • Illness/fever • Medications • Allergies • Epilepsy 	<ul style="list-style-type: none"> • Do not overwork yourself. Work at a steady pace.

HEAT STRESS DISORDER

Heat stress disorders are serious, can manifest in different ways, and become progressively worse if not addressed. If you or a coworker experience signs of heat stress, initiate your site emergency response protocol.

Heat cramps are the earliest sign of heat stress. If precautions to cool off and rehydrate at this point are not made, the more severe stages of heat-related illness can occur in a rapid progression. The progression from heat exhaustion, and subsequently to heat stroke, can be rapid and can result in a potentially life-threatening situation.

CAUSES, SYMPTOMS, AND TREATMENT OF HEAT-RELATED ILLNESSES²

Heat-related Illness	Cause(s)	Symptoms	First Aid
Heat rash	<ul style="list-style-type: none"> Sweat that does not evaporate and irritates skin 	<ul style="list-style-type: none"> Clusters of red bumps on skin Often appear on neck, upper chest, folds of skin 	<ul style="list-style-type: none"> Try to work in a cooler, less humid environment if possible Keep the affected area dry
Heat cramps	<ul style="list-style-type: none"> Loss of body salts and fluid during sweating 	<ul style="list-style-type: none"> Muscle spasms Pain Usually in abdomen, arms, or legs 	<ul style="list-style-type: none"> Have worker rest in a cool, shady area Provide water or other cool beverage Wait a few hours before allowing worker to return to strenuous work Have worker seek medical attention if cramps do not go away
Heat exhaustion	<ul style="list-style-type: none"> Loss of water and salt from heavy sweating 	<ul style="list-style-type: none"> Cool, moist skin Heavy sweating Headache Nausea or vomiting Dizziness or Lightheadedness Weakness Thirst Irritability Fast heartbeat 	<ul style="list-style-type: none"> Have worker sit or lie down in a cool, shady area Provide water or other cool non-caffeinated beverage Cool worker with cold compresses/ice packs Take to clinic or emergency room for medical evaluation or treatment if signs or symptoms worsen or do not improve within 60 minutes Do not return to work that day
Heat stroke	<ul style="list-style-type: none"> Body is unable to regulate its core temperature Sweating stops and body can no longer rid itself of excess heat 	<ul style="list-style-type: none"> Confusion Fainting Seizures Excessive sweating or red, hot, dry skin Very high body temperature 	<ul style="list-style-type: none"> Call 911 <p>While waiting for help</p> <ul style="list-style-type: none"> Place worker in cool, shady area Loosen clothing; remove outer clothing Fan air on worker; apply cold packs in armpits Wet worker with cool water; apply ice packs, cool compresses, or ice if available Provide fluids (preferably water) ASAP Stay with worker until help arrives Do not provide fluids to an unconscious person

² US Dept. of Labor, “Heat-related Illnesses and First Aid”, *Osha.gov*, Accessed June 10, 2016. https://www.osha.gov/SLTC/heatstress/heat_illnesses.html

UNSAFE WORKING CONDITIONS

Unsafe working conditions come in many forms. Workers need to be aware of hazardous conditions that can occur while doing the job and need to make good choices about what actions to take to remain safe.

RED ALERTS/WEATHER

Sulfuric acid unloading stations are located outdoors where workers are exposed to the elements and adverse weather conditions such as ice, snow, wind, rain, heat, etc. These weather events can create a potentially hazardous condition such as death from a lightning strike, slips, and falls from precipitation, or balance and footing issues from the wind. Seek shelter in a truck or enclosed building if you feel your safety is at risk.

Alerts and warning systems can vary from site to site, so it is important to familiarize yourself with each site's warning systems such as lightning detection systems. Typically, communication for red alerts on sites will be via radio or GAI-Tronics. Drivers need to be familiar with the red alert procedures at each site.

GAS HAZARDS

Hazardous gases may be present while loading or unloading sulfuric acid. Depending on the task, there is a potential risk of exposure to Chlorine (Cl), Sulfur Dioxide (SO₂), Hydrogen Sulfide (H₂S), and Nitrogen Dioxide (NO₂). Inhalation of gases can result in chronic injuries or illnesses and in extreme situations can be Immediately Dangerous to Life and Health (IDLH).

A windsock signals the direction and strength of the wind. In the event of hazardous gas leakage, windsocks can be used to determine how far the contaminants may travel and the direction of travel. A windsock is required and is visible to operators working in the area for evacuation guidance. If evacuation is necessary, the windsock gives guidance on the direction of evacuation.

Familiarize yourself with the evacuation plan for each site you visit.

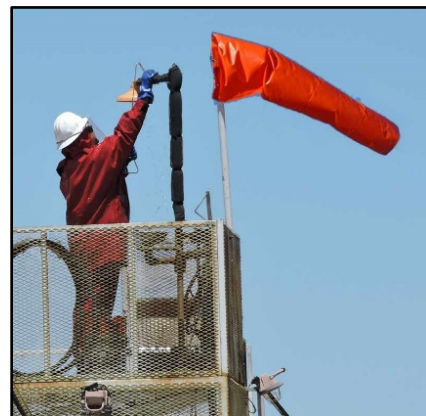


Figure 1.1 Windsock at Port of Tucson

LEAKS

Be vigilant for leaking acid. Operators need to secure fittings while making connections to ensure that no leaks develop. If a leak is present on hoses, piping, tanks, or pumps, contact the control room operator immediately. Use caution to avoid contact with acid. Soak up small spills with dry sand or clay.



Figure 1.2 Bagdad Spill Kit

HOUSEKEEPING

Housekeeping is crucial to maintaining a safe workplace. Poor housekeeping practices may contribute to workplace incidents while proper attention to housekeeping helps prevent unsafe situations. Keeping the work area orderly is a fundamental part of hazard prevention.



Figure 1.3 Obstructed eyewash station

DEFECTIVE EQUIPMENT

Accidents involving faulty or damaged equipment are a common cause of injury in the workplace. Before loading or unloading acid, check that safety showers and eyewashes are operational. If any problems are noted, communicate with the control room, and all work must be stopped until the showers and eyewashes are fully operational.

Personal protective equipment or PPE is worn to help minimize exposure to hazards. If PPE is defective or damaged, all work must be stopped until proper PPE can be worn.

FIT FOR DUTY

Individuals need to be able to perform their assigned duties safely. Individuals that are not fit for duty may present a safety risk to themselves and others. Follow your company or regulatory agency's requirements for fatigue management.

STOPPING WORK

Everyone has the responsibility to stop the job when conditions are unsafe. Taking the time to stop work is a critical component of stopping incidents. Many of our past incidents could have had a much safer outcome if someone had taken the time to stop work and discuss what the hazards are and how to control them. Stopping the job may be uncomfortable, but it keeps employees safe. It allows us to take a step back, evaluate the situation calmly, and focus our full attention on the job and task. We all are empowered to stop the job when conditions are unsafe or if Critical Controls are not in place.

When work is stopped because of unsafe conditions, report your findings to the control room, FMI employee, Health and Safety, or site security if the situation cannot be immediately corrected.

MODULE 1 QUIZ

Complete the following quiz.

1. During an inspection of an eye washing station, you determine one of the sprayers is not working. What is the first thing you should do?
 - a. In an emergency, use the side that is working
 - b. Stop the job and report the problem to the control room or security
 - c. Report the problem to security when you exit the property
 - d. Use care when unloading

2. Put the heat-related illnesses in order from least severe to most severe.

Heat exhaustion	Least Severe: _____
Heat stroke	_____
Heat cramps	_____
Heat rash	Most Severe: _____

3. What is one function of a windssock?
 - a. Alerts workers of dangerous wind events
 - b. Gives guidance on the direction to take during an evacuation
 - c. Alerts workers when hazardous gases are present
4. What are some hazards that may be associated with acid handling? Circle all that apply.
 - a. Fatigue
 - b. Heat rash
 - c. Red alerts/Weather
 - d. Gas Hazards
 - e. Inhalation of vapor
 - f. Contact with eyes or skin

Controls



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MODULE 2 LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Determine appropriate Critical Controls
- Summarize “Actions to Stay Safe”

INTRODUCTION

Hazard control is a set of measures used to prevent workers from being exposed to occupational hazards. The most effective method of hazard control is to remove or eliminate a hazard, but this is not always possible. When no single method is available to control hazards, use a combination of control options.

HIERARCHY OF CONTROLS

Once you have identified a hazard, you must determine the best way to control it. The levels of controls used to minimize risk are sometimes known as the Hierarchy of Controls. The following pages explain how to use these levels of controls with hazards found in your work areas, but it is beneficial first to consider the effectiveness of each when working to control an identified risk. In general, controls are most effective when they do not rely on individual worker behaviors since behavior may vary from worker to worker. Controls at the bottom (such as PPE and Administrative) are less reliable because worker behavior plays a larger role than the controls at the top. The five types below are shown in order from most effective (Elimination) to least effective (PPE).³

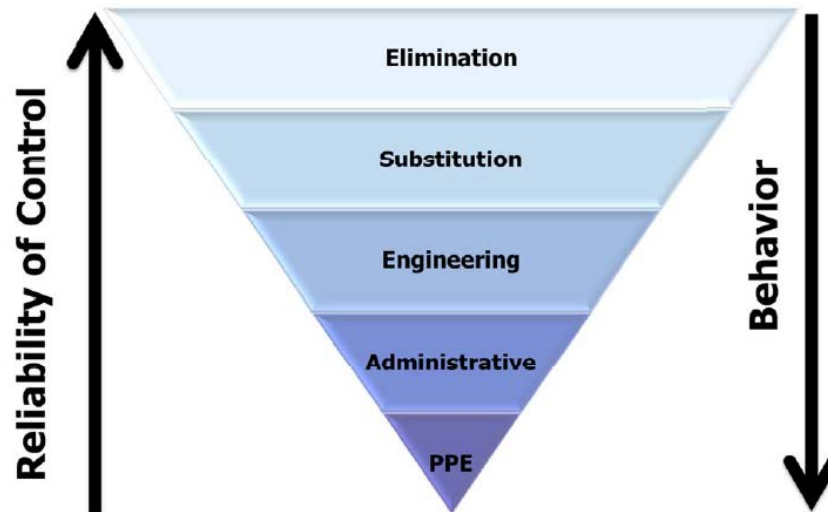


Figure 2.1 Hierarchy of Controls

³ The National Institute for Occupational Safety and Health, “Hierarchy of Controls”, *Cdc.gov*, Accessed October 12, 2015. <http://www.cdc.gov/niosh/topics/hierarchy/>

ELIMINATION

Elimination is the process of physically removing the hazard from the workplace. It is the most effective way to reduce a hazard but can sometimes be challenging to implement.

ELIMINATION EXAMPLE

Vent valves are an example of an elimination control used in acid handling. The vent valves are utilized to eliminate the need to climb on the tanker platform to open the lid.



Figure 2.2 Vent Valve

SUBSTITUTION

The goal of substitution is to replace a chemical, substance, material, or practice with something less hazardous. Replacing the original hazard or source of the hazard with a safe alternative mitigates the risk from the workplace. Because both elimination and substitution can ultimately remove the identified hazard, these controls are sometimes grouped together.

SUBSTITUTION EXAMPLE

At Atlantic Copper, the visual tank level indicator has been substituted with a flow control valve for acid unloading to reduce exposure to acid.



Figure 2.3 Flow Control Valve

ENGINEERING

Engineering controls focus on an employee's exposure to risk by blocking access to a hazard with a barrier thus preventing the hazard from coming into contact with the affected individuals. These controls do not have to be expensive or complicated.

Engineering controls are based on the following:

- Enclose the hazard with protection such as guarding to prevent exposure.
- If complete enclosure is not feasible, reduce exposure to the hazard with a barrier (handrail) or ventilation.⁴

ENGINEERING EXAMPLE

There are many examples of engineering controls that have been utilized in acid handling. Some examples of engineered controls used in acid handling include the following:



Wheel Chocks



Hose Coupling Lock System



Sight Glass and Flange Covers (Diapers)



Splash Guard



Emergency Stop Button



Gangway

Figure 2.4 Engineering Examples

⁴ The National Institute for Occupational Safety and Health, "Engineering Controls", *Cdc.gov*, Accessed October 12, 2015. <http://www.cdc.gov/niosh/engcontrols/>

ADMINISTRATIVE

Administrative controls decrease exposure to hazards by implementing rules that change the way employees and contractors do their jobs. Administrative controls include the following:

- Policies and procedures
- SOPs
- Signage
- Training
- Restricted access
- Equipment maintenance
- Housekeeping
- Personal hygiene practices

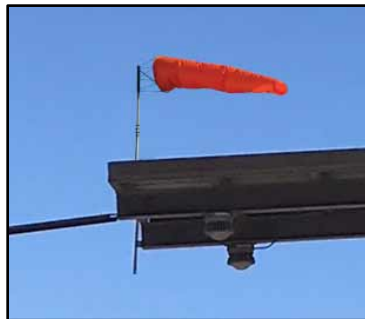
Administrative controls have limitations because the hazard itself is not removed or reduced. Instead, individuals must choose to follow the rules. It is not the rules, but each person's choice to follow the rules, that protect employees.

ADMINISTRATIVE EXAMPLES

There are many examples of administrative controls that have been utilized in acid handling. Some examples of administrative controls used in acid handling include the following:



Access Control Signage



Windssocks



Restricted Access



Permanent Gas Monitor



Curtain



Flashing Lights

Figure 2.5 Administrative Examples

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) is designed to offer the wearer's body a layer of protection from hazards in the work environment. PPE includes, but is not limited to:

- Hard hats
- Protective clothing
- Gloves
- Face shields
- Safety glasses
- Safety boots
- Respirators

While PPE seems like a simple solution to a hazard and can offer protection, its effectiveness depends on individuals choosing to wear the appropriate PPE correctly. Any system dependent on an individual's behavior is inherently unreliable. Both administrative controls and PPE methods have proven to be less effective than other controls as they require effort by everyone involved.⁵ When a hazard is identified, steps should be taken to use more reliable levels of control before resorting to the use of PPE.

PPE EXAMPLE

When loading and unloading sulfuric acid, wearing the appropriate personal protective equipment, such as an acid suit, will help decrease the severity of exposure due to an acid spray.



Figure 2.6 Acid Suit

⁵ The National Institute for Occupational Safety and Health, "Engineering Controls", *Cdc.gov*, Accessed October 12, 2015. <http://www.cdc.gov/niosh/topics/hierarchy/>

ACID PROTECTIVE GARMENT

Acid loading and unloading requires the use of protective clothing to help reduce exposure to the hazards of acid.

For a list of garment brands currently approved please review the Sulfuric Acid Bulk Handling Technical Supplement FCX-HS28—Personal Protective Equipment.

ACID PROTECTIVE GARMENT REQUIREMENTS	
Acid Protective Garment	<ul style="list-style-type: none">• Acid protective garment shall cover the entire body (coveralls or overalls with jacket), have closures (Velcro, elastic, etc.) for wrists and ankles, and have an attached hood.• The garments shall be resistant to sulfuric acid of $\geq 93\%$ concentration for >60 minutes per the ASTM F 903 testing method or equivalent.• The style of protective garment will be purchased in a configuration that is suitable for strong acids (i.e. taped or heat sealed seams instead of stitched, acid resistant drawstrings, etc.).• Alterations to garments is not permitted. Homemade accessories such as helmet mounted neck guards, re-purposed face shields are not permitted.
Gloves	<ul style="list-style-type: none">• Must be impermeable and resistant to sulfuric acid of $\geq 93\%$ concentration for >30 minutes per the ASTM F 739 or equivalent testing method.• Be gauntlet style and extend beyond at least 4” of protective garment and worn inside the garment sleeves.• When acid resistant garment has a dual sleeve, the gloves are to be worn between the two layers of sleeve.
Boots	<ul style="list-style-type: none">• Must be impermeable and resistant to sulfuric acid of $\geq 93\%$ concentration for >480 minutes per the ASTM F 903 testing method or equivalent.• Be at least mid-calf high, with a minimum of 4” overlap with protective garment pant leg.• Pants should be worn over the boots.• Meet ANSI or equivalent approved safety boot with safety toe and non-slip sole, of the pull-over type.

ACID PROTECTIVE GARMENT REQUIREMENTS CON'T

Head, Eye, and Face Protection	<ul style="list-style-type: none"> • All eye and face protection shall comply with ANSI Z87.1, 2010. All head protection shall comply with ANSI Z89.1, 2003 or equivalent. • A hood shall be worn that is either integrated into the protective garments, or that has been designed to layer under face shield and over protective garments. Hood is to be worn over a full-face respirator, and snug to the skin. • The hood shall fit closely enough to prevent flaring or create pockets that trap acid. • Hoods are worn under the hard hat. • At a minimum to ensure that no skin is exposed, the following head, eye, and face protection will include: <ul style="list-style-type: none"> <u>Option 1:</u> <ul style="list-style-type: none"> ○ A clear face shield that is non-reactive to strong acid and completely covers the face and exposed skin on the neck and ○ Chemical resistant splash goggles and ○ Half-face respirator <u>Option 2:</u> <ul style="list-style-type: none"> ○ Full-face respirator <u>Option 3:</u> <ul style="list-style-type: none"> ○ Helmet style PAPR with chemical resistant shroud or hood and ○ Chemical resistant safety glasses or goggles
Respirator	<ul style="list-style-type: none"> • Respirators shall be worn at all times during loading and unloading processes. • Acid gas P100 cartridges or equivalent must be used with all respiratory protection. • Respirators must be maintained according to manufacturer recommendations. <p><i>Note: Respiratory protection regulations require affected workers be enrolled in a Respiratory Protection Program that complies with 29CFR 1910.134. Employees or contractors wearing tight fitting respirators with a seal must be clean-shaven (in that facial hair will not interfere with the seal of a respirator) per the requirement of the program. Carriers must have a written program, provide medical evaluation, annual fit testing; and ensure issued respirators are maintained in a sanitary manner.</i></p>

All personal protective equipment must be cleaned and stored per manufacturer recommendations.

Table 2.1 Acid Protective Garment Requirements

ACTIONS TO STAY SAFE

Sulfuric acid can be handled safely if proper precautionary measures are observed.

- Hot Zone and Warm Zone areas shall be signed and demarcated.
- A pre-task review, workplace exam, and equipment inspection must be completed prior to loading/unloading bulk concentrated acid.
- Ensure communication device(s) are working.
- Test safety showers and eyewashes prior to performing work.
- Maintain unobstructed access between the task and shower/eyewash.
- Verify location of emergency stop button for acid transfer pumps.
- Maintain unobstructed access between task and emergency stop.
- Ensure tanks have storage capacity before offloading.
- Acid resistant PPE is to be inspected and properly worn prior to entering the Hot or Warm Zones. Reference the PPE Technical Supplement for additional details.
- Employees and contractors will wear personal gas monitors in designated areas and be trained in their use.
- Offloading of acid by gravity should be used whenever possible.
- Visually inspect all hoses and fittings prior to unloading.
- Ensure all lines are drained after loading/unloading.
- Be vigilant for leaking acid. Contact appropriate personnel immediately.
- Ensure chocks, blocks, or stops are in place for all railcars and trucks as required.
- Isolate loading/unloading rail sections from other sections of rail to prevent incoming cars as required.
- Always review site-specific processes and procedures prior to starting work.
- Ensure camlock splash-guards are in place and serviceable for truck offloading.

ACTIVITY 2: ACTIONS TO STAY SAFE

Review the fatal risks and actions to stay safe on the Sulfuric Acid Bulk Handling Policy (FCX-HS28). For each scenario, identify a potential fatal risk that may occur based in the given situation. Next, identify what actions to stay safe may have been missed. Be prepared to share out.

1. A carrier arrives to a Freeport-McMoRan property to unload his tanker. Security personnel advises the carrier to unload at a specific location. The carrier proceeds to the assigned location and begins the procedures to safely unload the acid. The driver hooks up the acid hose and pressurizes the line. Control room contacts the driver to let them know that the acid tank is full.

Fatal Risk(s): _____

Actions to Stay Safe: _____

2. During an area inspection, an operator notices a missing camlock and makes note of it on the area inspection form. The operator proceeds to connect the hose and offload the tanker. During the unloading process, acid is dripping from the connection. After the unloading is complete, the operator reports the camlock to site security upon exiting the property.

Fatal Risk(s): _____

Actions to Stay Safe: _____

3. An authorized individual is offloading acid from a rail car. The individual removed the acid discharge hose before ensuring the Acid Tanker was at atmospheric pressure.

Fatal Risk(s): _____

Actions to Stay Safe: _____

Communication



MODULE 3: COMMUNICATION

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MODULE 3 LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Explain the communication process while on Freeport-McMoRan property

INTRODUCTION

Effective communication ties all components of safety together and plays a critical role in disaster prevention. A method for communication is to be provided for the carrier, contractor, or FMI employees working in concentrated acid transport and handling areas. Communication methods vary from site to site, so a carrier needs to be aware of the various methods of communication used by each site.

SHARED AND BACKUP COMMUNICATION

A positive communication system allows for two-way dialogue. Each site is required to have a positive communication system with clear and obvious signage in an acid loading/unloading area. In addition, each site is required to maintain a backup form of communication in the event of a failure of one type of communication method. Review site's SOP for more information.

Any fixed communication device in the loading/unloading area is to have conspicuous signage. All loading/unloading areas are to include posted local emergency number, responsible area designee, and site radio channel to be used to facilitate immediate contact with appropriate site personnel.

SITE CONTACTS

Each site is required to have a positive communication system in an acid loading/unloading area with clear and obvious signage. Signage must include an emergency contact number, name of responsible person, and site radio channel information.

If the primary form of positive communication is down, use the backup form of communication. The form of backup communication may vary from site to site.

POSITIVE COMMUNICATION

Mobile phones and other portable handheld communication devices are one of the most convenient ways to communicate when we are away from our workstations. The portability of handheld communication devices makes their use increasingly common; however, with that convenience the need to exercise caution and demonstrate responsible use for both personal safety and business reasons is essential.

Based on local operating concerns and hazards, sites may develop guidelines or procedures more stringent than those listed below.

Handheld Device Guidelines:

- Never allow handheld communication devices to distract your concentration while operating a vehicle or mobile equipment.
- Always give full attention to driving and road conditions and never place or receive a call while driving.
- Sending/receiving text messages or emails or conducting web searches is prohibited while operating equipment or vehicles.
- Outgoing calls are made only while equipment or vehicles are stationary.
- Incoming calls are taken while equipment or vehicles are stationary or when using hands-free devices.
- If you work in operations of a surface or underground mine operations, do not stop on haulage travel roads.
- Handheld communication devices are a quick means for communicating in an emergency. In the event of an emergency, always pull off the road before placing an emergency call.
- The use of display screens for GPS navigation devices, tracking systems, collision avoidance systems, instruments, gauges and systems providing information about the status of mobile equipment is permissible.

TWO-WAY RADIO

A two-way radio is a hand-held communication device that can both transmit and receive voice communication. A two-way radio refers to a system that is used for shared communication. The service operates on a single, shared frequency or channel where groups of individuals can communicate by transmitting over the channel.



Figure 3.1 Two-Way Radio

GAI-TRONICS

GAI-Tronics is an intercom communication system used at some sites. Typically, the system used is a Page/Party system that includes a handset and associated controls along with paging speakers. The page function provides speaker placement where announcements can be made over the intercom speakers. The party line function allows two or more individuals to converse privately without using the paging speakers. This communication system is used to report any issues employees or carriers may encounter, such as pump leaks, pipe leaks, or low flow.



Figure 3.2 GAI-Tronics Intercom and Handset

SITE-SPECIFIC COMMUNICATION PROCESSES

Sites are required to implement a hazard communication process. The process may vary from site to site, and individuals need to be aware of the process taken at each site. If you are unsure of the proper procedures, talk to site security or Health and Safety.

CRITICAL CONTROL IMPROVEMENTS

A Critical Control is a device, system, or process implemented to eliminate or reduce the risk for a task/job, and if missing or overlooked has the potential to lead to catastrophic outcomes such as serious injury or death. Critical Controls are only a subset of the many safety controls that exist in our operations. The intent is to focus attention on these most important controls in our day-to-day activities.

Acid handling is inherently dangerous because of the nature of the substance. If an operator has a suggestion for a Critical Control improvement, Freeport-McMoRan is open for recommendations on how to improve the process. In some cases, recommendations for Critical Control improvements were not directly applied but generated ideas for similar controls.

One example of a Critical Control improvement for acid handling is the use of sight glass.



Critical Control Improvement		FREEPORT-McMoRAN	
 <p>Safford Acid Unloading Sight Glasses</p>	CCI #	CCI - 2017 - 17	
	OPERATION:	Safford	
	AREA:	Hydromet	
	DATE:	3/27/2017	
Issued By: Pip Killian	Contact For Additional Details: Pip Killian		
<p>This Advisory is a NOTIFICATION of a critical control upgrade at one or more FCX locations. The purpose is to share the information so that others with similar risks can utilize the information to improve the reliability of critical controls where applicable. In some cases the control may not be directly applied but may generate an idea for other to pursue a similar control and thereby reduce risk.</p>			
DESCRIPTION / DETAILS OF IMPROVEMENT			
<p>Safford unloads several trucks of acid per day. The HIRDAC pure risk is 16 (the highest level). Most of the controls are administrative and rely heavily on PPE, SOPs, and auditing. Historically the drivers feel the weight of the acid hose and judge when it is empty or full or climb on the tanker ladder to look inside the tanker. This exposes them to increased fall hazards and gases from inside the tanker. Based on these methods they would disconnect the hose when they believe the tanker is empty. Several incidents have occurred at FMI sites when a driver disconnected their hose with acid in it.</p> <p>Safford has purchased and installed sight glasses as an engineering control to enable the driver to see when acid stops flowing down the hose which indicates the tanker is empty. This is a much better method to ensure that the tanker and hose are drained. Each of the 6 unloading stations at Safford now has the sight glasses installed. Feedback from the drivers is positive and during audits we see them using them.</p>			
			

Figure 3.3 Excerpt from a Critical Control Improvement Advisory

Operations



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MODULE 4 LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Discuss the different types of loading and unloading
- Outline procedures for entry

INTRODUCTION

Sulfuric acid is a highly corrosive substance that can pose a serious threat to the health and safety of personnel associated with the process. All operations involving acid handling must be carried out according to all standards, requirements, and policies.

EXPECTATIONS OF DRIVERS

Drivers/operators must comply with all FMI driving standards and policies and obey all traffic signage. Drivers/operators are expected to drive to road conditions at all times and yield to heavy mine equipment. Drivers/operators are authorized to travel to and from the designated load/unload facility only; travel to any other location is not authorized.

Travel in the mine areas where mixing with heavy off-road mine equipment is possible and requires a valid Pit Driver license. Left hand driving may be required at some sites.

In mine areas, acid delivery trucks will use any identified roads. When necessary to drive on established haul truck routes, passing of an operating haul truck is strictly prohibited, even if the haul truck is stopped. If a piece of mine equipment is mechanically down on a traveled route, drivers/operators are expected to follow proper passing protocols including proper radio clearance.

Drivers/operators are expected to:

- Be fit for duty and trained for the task
- Report any safety or environmental concerns/issues
- Return any equipment picked up on entry
- Return completed inspection form(s)
- Secure transport vehicle to prevent leaks to the environment

ENTRY PROCEDURES

Operators must have participated in all on-boarding training and specialized acid handling training. They must follow the Contractor Health & Safety Manual and any FMI procedures about the work activities to be performed, including, but not limited to, this policy.

Upon arrival at the site gate, operators will do the following:

- Present all documents requested by security attendant
- Be given an area inspection document
- Drive across the scale to document tare weight
- Take possession of any specific FMI equipment as determined by each specific site

DIFFERENT TYPES OF LOADING AND UNLOADING

The safe handling of sulfuric acid from tanker trucks and rail cars by the application of air pressure, gravity feed, or pumps requires careful attention to proper procedures and should be conducted by trained personnel wearing proper protective clothing.⁶

Truck tanks are loaded through an open fill hole on the top of the truck, but unloading may vary due to design or piping arrangement.

PUMP

Acid truck tanks are unloaded from the bottom using a pump.

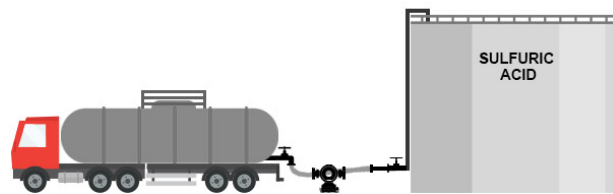


Figure 4.1 Acid Truck Unloading by Pump

GRAVITY

When tanker unloading stations are located at an area above the storage tanks, acid may be unloaded using gravity.

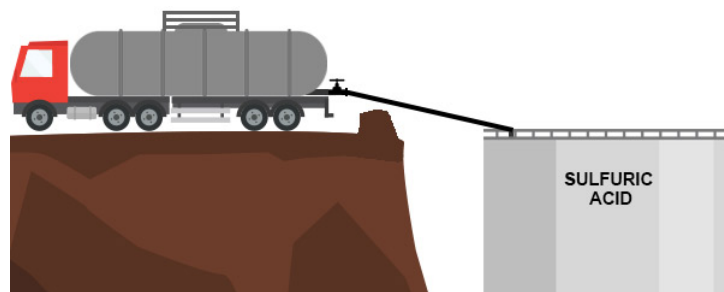


Figure 4.2 Acid Truck Unloading by Gravity

⁶ NorFalco, "General Precautions", *Norfalco.com*, Accessed December 17, 2015.
<http://www.norfalco.com/en/safety-handling/storage-handling/Pages/general-precautions.aspx>

PRESSURE

Acid may be offloaded using air pressure if the storage tank is at level with the tanker. Pressure is used when unloading acid from a railcar.

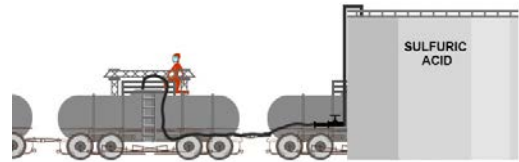


Figure 4.3 Acid Tanker Unloading by Pressure

HOT AND WARM ZONES

A hot zone is an area where all specialized acid PPE must be correctly worn at all times. Risk of acid exposure to personnel is high. The warm zone is less hazardous than the hot zone, and personnel can wear lower levels of PPE. Drivers must follow the minimum PPE requirements for hot and warm zones while loading or unloading acid.

All zone boundaries will be demarcated and signage will be present. Zone requirements will be adhered to during all loading and unloading operations. No person will be permitted in any zone without the appropriate acid handling PPE.

HOT ZONE MINIMUM PPE REQUIREMENTS

- The following minimum PPE requirements must be **properly worn** in Hot Zones:
 - Acid Protective Garment
 - Chemical Resistant Boots and Gloves
 - Head, Eye, and Face Protection
 - Respiratory protection meeting the requirements
- Protective garments will be worn with all closures fastened, hood donned, and wrist and ankle openings cinched.

WARM ZONE MINIMUM PPE REQUIREMENTS

- The following minimum PPE requirements must be **properly worn** in Warm Zones:
 - Acid Protective Garment (jacket may be removed, or overalls/coveralls unzipped and open to waist)
 - Chemical Resistant Boots
 - Hard hat
 - Safety glasses
- The following minimum PPE requirements must be readily available in Warm Zones:
 - Chemical Resistant Gloves
 - Head, Eye, and Face Protection
 - Respiratory protection

LOADING AND UNLOADING

Where ground personnel are assigned the duties to load/unload all transport vehicles:

- Ground personnel must properly wear all specialized PPE in addition to all other required PPE.
- Drivers/operators may exit the Hot Zone during the unloading process but must maintain a line of sight and be attentive to the task and ensure that before re-entry to the Hot Zone all specialized PPE is properly donned.
- Follow site-specific training.

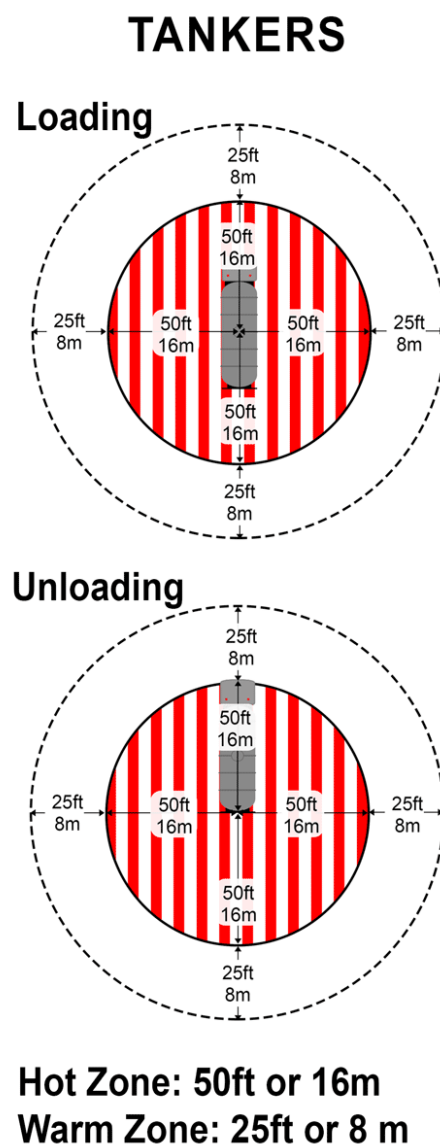
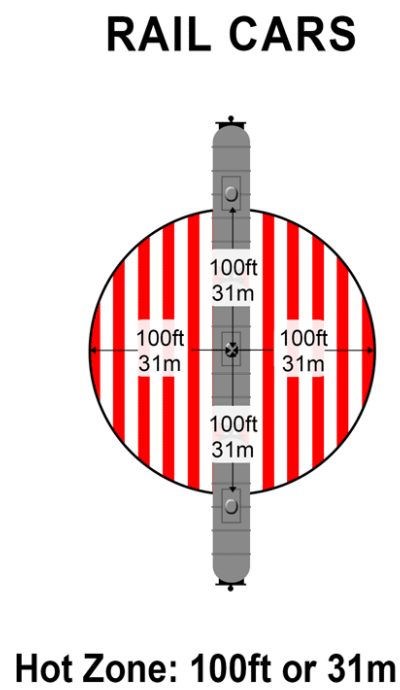
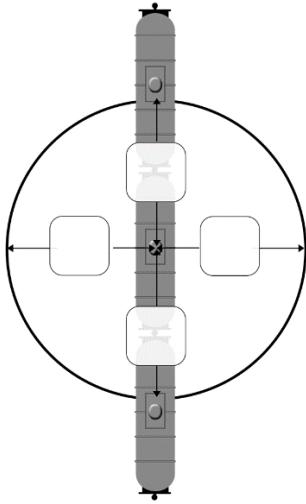


Figure 4.4 Hot and Warm Zone Diagrams from Policy

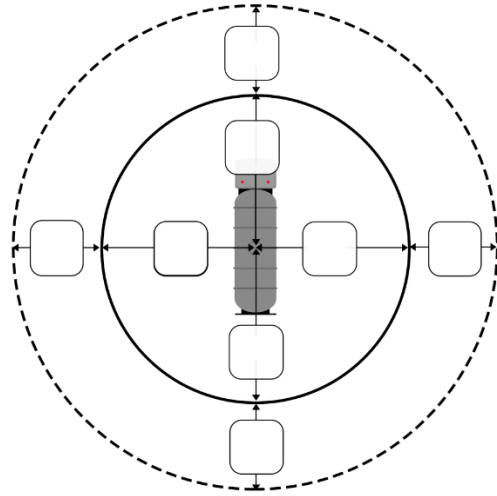
ACTIVITY 4: HOT AND WARM ZONES

For each diagram, fill in each box with the correct hot zone and warm zone measurements using both feet and meters.

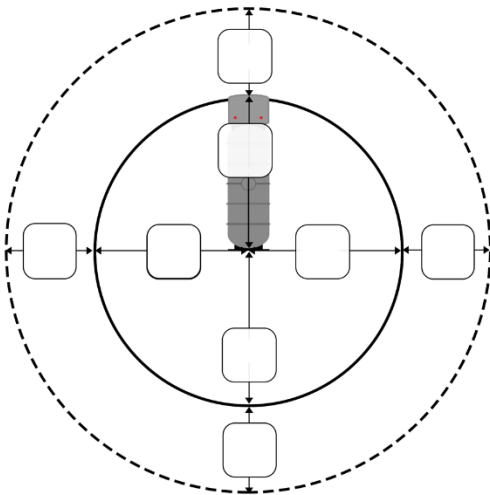
1. Rail



2. Tanker Loading



3. Tanker Unloading



Activity continued on next page

- Using your own words, explain the requirements for PPE in a Warm Zone and a Hot Zone.

Warm Zone:

Hot Zone:

Inspections and Audits



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MODULE 5 LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- List various inspection processes

INTRODUCTION

Audits and inspections must be conducted to identify deficiencies and positive elements in health and safety performance to build and maintain a positive safety culture. They must be documented and corrective actions assigned to correct deficiencies.

EFFECTS OF ACID ON EQUIPMENT AND STRUCTURE

Sulfuric acid is highly corrosive and deteriorates many materials such as metal, rubber, concrete, and tissue. Always perform a workplace inspection when loading or unloading sulfuric acid.

INSPECTIONS

A safety inspection looks at the physical conditions and work practices in a workplace. Equipment is examined to determine whether all safeguards are in place and whether its operation presents any hazards. Air, water, and other samples may be obtained to test for hazardous substances. Work practices are observed to identify unsafe actions. The overall goal of a safety inspection is to identify hazards so they can be eliminated, guarded, or protected against.

A workplace examination may also be referred to as an area inspection, pre-shift inspection, and workplace inspection. These procedures or processes are created by each site to identify and immediately control any hazards prior to beginning and throughout the shift. Make sure that the workplace is adequate for you to perform your regular job duties. Workplace examinations are the first line of defense in protecting yourself and others.

The backbone of an effective workplace examination is hazard recognition. Hazards generally fall under one of three categories:

- Chemical (e.g., H₂S, lime, solvents)
- Biological (e.g., bacteria, animal waste, venom)
- Physical (e.g., noise, radiation, impact injuries)

Depending on your work area, the hazards to which you are exposed can fall under one or all three of these categories. Being skilled at recognizing hazards associated with your work area is a lifelong pursuit.

Never assume that you are automatically aware of all the hazards around you. Changing environmental conditions can affect existing workplace hazards. Temperature changes, noise levels, illumination, and weather conditions are all environmental factors that can significantly alter your work area and, in turn, the associated hazards.



Figure 5.1 Improper installation of flange cover leading to damaged flange cover (diaper)

WORKPLACE INSPECTION

It is a requirement to complete a workplace inspection to identify hazards, mitigate hazards to the extent that you are qualified, and to communicate to authorized FMI employees as required by the policy.

Do not proceed if equipment is not operable. Notify Control Room, Security, or Area Supervisor immediately.

Where personnel are assigned:

- It is expected that the workplace (area) will be inspected where work is being performed.
- Every driver/operator is expected to perform a work area inspection prior to beginning work.

Common inspection items include the following:

- Safety Showers and Eye Wash Stations

IMPORTANT NOTE FOR THE ABOVE TASK: Locate and test emergency showers and eye wash stations in the immediate area prior to work being performed and with every task.

- Hose fittings - C-clamp, 4-bolt flange, or other
- Safe Access & Egress
- Travel Ways
- Handrails
- Tie-off Points
- Lighting
- Cables/hoses

- Housekeeping Hazards
- Environmental Conditions
- Fire Extinguishers
- Level indicator lights and Digital displays function
- Deraileur and Chocks for rail systems
- Ensure that De-icing Salt is not present

Note: This is not all-inclusive list. Remember, any hazard or condition that can cause personal injury must be noted and corrected/controlled before work begins. Notify the control room or security of any sub-standard conditions or other safety hazards BEFORE proceeding with any activities.

POST WORKPLACE INSPECTION

Unloading complete:

- Bleed off residuals which include the tank, hose, and connecting equipment
- Wash down fittings and connections

Loading complete:

- Follow site protocols to check tanker for leaks
- Bleed off residuals
- If a leak is found – stop, contact the control room
- If no leak is found – wash down fittings and connections

NOTE: Drivers/operators must NEVER enter the tank of an acid truck or a rail car.

CHECKLIST MONITORING

The purpose of a checklist is to reduce or eliminate the potential safety hazards associated with sulfuric acid handling. A checklist is not intended to replace any other area work inspection or procedure. Site-specific checklists may vary from site to site. Always follow site-specific processes.


 FREEPORT-McMORAN COPPER & GOLD			
SULFURIC ACID LOADING/UNLOADING CHECK LIST			
Driver Name:		Date:	FMI Bill of Lading # :
Carrier:		Truck #	
BULK CECIL CTI CHEM TRANS BARNEY		Trailer No #	
		Scale Ticket #	
The truck driver <u>must</u> initial where indicated after each step			
Prior to Loading	Initials	Unloading	
1. Check in at Front Gate.			
2. Get empty weight at Scale.			
Pre-Loading			
1. Chock wheels.			
2. Put on required safety PPE.			
3. Check that eyewash & shower are in working condition.			
Acid Loading Final Check before leaving FMI property			
1. Platform raised.			
2. Check dome lid and gasket.			
3. Run fingers along the underside of the dome lid perimeter, ensuring that it is seated properly and free of obstructions			
4. Check Air Inlet Valve.			
5. Check Chicago Valve cap.			
6. Check Internal Valve – closed.			
7. Check External Valve – closed.			
8. Check if Road Cap with Gasket is in place.			
9. Check Pressure Relieve Valve.			
Comments: _____			

Figure 5.2 Sample Checklist

MODULE 5 QUIZ

Complete the following quiz.

1. During a safety inspection, hazards generally fall into one of three categories. Name the three categories and give an example for each.

Categories:

Example:

_____	_____
_____	_____
_____	_____

2. Circle items that need to be inspected during a workplace exam. This is not an all-inclusive list.
 - a. Showers
 - b. Tire pressure
 - c. Housekeeping hazards
 - d. Fire extinguisher
 - e. Eye wash
 - f. Weather conditions
 - g. Handwashing stations

Emergency Responses



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MODULE 6 LEARNING OBJECTIVES

Upon completion of this module, students will be able to:

- Discuss action plan for an emergency situation

INTRODUCTION

Crisis/emergency preparedness involves a plan on how to respond to incidents at varying levels, such as using a safety shower or eyewash station, and extends to emergency responses in case of a major spill.

Individuals need to know the location of emergency equipment, such as eyewash stations, and they need to ensure they are in proper working order.

CRISIS MANAGEMENT

A crisis/emergency management plan is a plan that is developed, maintained, and practiced to respond to crises and emergencies that may arise on site. Each site has a crisis management plan in place. Drivers must also know how to respond to a crisis that may occur off the property.

TRANSPORTATION

The transport of sulfuric acid is subject to rules which must be complied with by all drivers involved. Follow your company requirements and regulatory agencies' requirements on reporting incidents.

ENVIRONMENTAL

Prevent entry to sewers and public waters. Notify authorities if sulfuric acid enters sewers, public waters, or low areas. Follow your company requirements and regulatory agencies' requirements on reporting incidents.

COMPLIANCE

Comply with your company requirements and regulatory agencies' requirements on reporting incidents.

INCIDENT REPORTING AND COMMUNICATION

Information on emergency action and incident reporting information is found in the Contractor Health and Safety Manual. When referencing this document, make sure it is the current version as the document is updated annually. Discard any copies that are published before and up to the expiration date and reference only the latest document.

EMERGENCY ACTION

In the event of a serious incident or injury on Freeport-McMoRan-owned property, immediately activate the emergency response/notification system and maintain scene safety. Trained Contractor personnel should render first aid to any incident victims. FCX will address any media inquiries or announcements and make other decisions critical to the overall site and project.

Emergency telephone numbers/radio channels must be posted in areas accessible to Contractor employees.

If an incident requires immediate notification to government agencies, the area must be secured and nothing disturbed or removed after an evacuation of the injured employee until approval from all government agencies and FCX representatives is received. The area can only be released by an authorized representative of FCX.

For emergencies off Freeport-McMoRan-owned properties, comply with your company requirements and regulatory agencies' requirements on crisis management.

INCIDENT REPORTING

For incidents on Freeport-McMoRan-owned properties, comply with the Contractor Health and Safety Manual on incident management.

All incidents shall be reported to the FCX Health and Safety Department immediately with the initial written report to be submitted by shift end. Initial reports will include, at a minimum:

- Location of incident
- Name of persons involved
- Equipment involved
- Time/date of incident
- Nature of incident: occupational injury, occupational illness, near miss, property damage
- Brief description of incident
- Where injured (body part)
- Name of person contacted for report

Written final report is due to the Health and Safety Department within 48 hours of the incident, unless otherwise extended based on severity of incident.

- Each incident will be reviewed immediately to determine if it had the potential to result in a fatality. In such instances, the event will be investigated with the same rigor as if a fatality had actually occurred.

- Contractors may be required to conduct or participate in any investigations and/or root cause analysis (RCA).
- Action plans may be developed and implemented to prevent re-occurrence.

For incidents off Freeport-McMoRan-owned properties, comply with your regulatory agencies' requirements on incident management. If the incident involves any damage to Freeport-McMoRan property, a report of damage is required.

EMERGENCY INFORMATION

Each site will provide carriers with relevant information for emergency evacuation and response. Speak with your point of contact for additional information.

EVACUATION POINTS

Evacuation and muster points are located throughout sites. When arriving to site, ensure you know the location of these points. In the event of an emergency while loading or off-loading acid, note the direction of the wind by checking the windsocks in the area, and proceed to the muster point in the upwind direction.

If you are unsure of muster point locations, consult site security, health and safety, or operators at the loading/unloading locations.

MODULE 6 QUIZ

Complete the following quiz.

1. In the case of an emergency on Freeport-McMoRan-owned property, what are drivers expected to do? Circle all that apply.
 - a. Immediately activate the emergency response system
 - b. Maintain scene safety
 - c. Trained personnel should render first aid to incident victims
 - d. Contact the media to announce the emergency

2. List all items that need to be included in an initial incident report.

3. If an incident occurs on-property, a written report is required. What is the time frame to submit the *initial* report and to whom should the report be submitted?
 - a. The report should be submitted to the local media immediately
 - b. The report should be submitted to the FCX Health and Safety Department within 48 hours
 - c. The report should be submitted to the FCX Health and Safety Department by the end of the shift
 - d. The report should only be submitted to your employer when applicable and within the carrier indicated timeframe

CONCLUSION

Freeport-McMoRan's expectation as a company is for every employee to return home safely at the end of their shift. This course was designed to educate personnel on standardized operating and safety procedures for loading, unloading, and transporting bulk concentrated sulfuric acid.



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GLOSSARY

The glossary provides an alphabetical list of words, acronyms, terms, and phrases relating to and found in this course.

Entry	Definition
Critical Control	A device, system, or process implemented to eliminate or reduce the risk for a task/job, and if missing or overlooked has the potential to lead to catastrophic outcomes such as serious injury or death.
Fit for Duty	Well rested, free from effects of drugs and alcohol.
Hot zone	An area that is considered dangerous. It requires special PPE and training to enter.
IDLH	Immediately Dangerous to Life and Health
PAPR	Powered Air Purifying Respirator. The battery-powered equipment consists of a face-piece, breathing tube, blower, and particulate filters. The blower passes air through a HEPA filter to remove contaminants.
Positive Communication System	A communication method that allows two people to have a conversation such as a landline, cellular device, radio, etc.
SOP	Standard Operating Procedure
Standard Operating Procedure	A set of step-by-step instructions compiled by an organization to help workers carry out operations.
Warm zone	An area where decontamination of personnel and equipment takes place.

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STUDENT COURSE EVALUATION

Course Title

Site

Date

Your Name (optional)

Facilitator

Directions: Circle the number that best fits your level of agreement with the statement. Then complete the short answer questions.

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. The course content was relevant to my job.	1	2	3	4
2. The course materials were clear and well written.	1	2	3	4
3. The lecture, discussions, and activities improved the quality of the course.	1	2	3	4
4. The facilitator was knowledgeable about the content.	1	2	3	4
5. The facilitator created an atmosphere that enhanced my learning.	1	2	3	4
6. I am confident I can apply the course content to my job.	1	2	3	4
7. The course met my expectations.	1	2	3	4
8. What did you find valuable in the course?				
9. What can be improved in the course?				
10. Please clarify your responses (questions 1-8) and provide any additional comments.				

Thank you for taking the time to complete this evaluation. We value your feedback.

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