
 Marathon Petroleum Company	SAFE WORK INSTRUCTION			HS-SWI-019
SALT LAKE REFINERY	Acid Caustic Handling			Page 1 of 9
RESPONSIBLE DEPT.	CONTENT STEWARD		APPROVED BY	
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1.0 INTRODUCTION

1.1 Purpose

1.1.1 This Safe Work Instruction outlines specific steps to be taken by employees and contractors to minimize potential exposure to acid, caustic and ammonia services at the Salt Lake Refinery.

1.2 Scope

1.2.1 This Safe Work Instruction applies to both employees and contractors.

1.2.2 This safe work instruction provides specific information in the following areas:

Engineering controls, administrative controls, procedures, safe handling, and personal protective equipment when working on or operating equipment in acid, caustic or ammonia service.

Will also provide information on acid release precautions, respiratory protection, and medical treatment when a person comes in contact with or inhale acids or caustics.

1.3 Corporate References

The following sections describe references used to generate this Safe Work Instruction.

1.3.1 **Marathon Standards, Policies and Procedures**

- Corporate: HLT-2001 Industrial Hygiene Program
- Local: HS-SWI-001 Safe Work Permit
- Local: Respiratory Protection Program

1.3.2 **Government Regulations**

2.0 DEFINITIONS

The following terms and definitions are used in this document.

Table 1 Terms and Definitions

Term	Definition
Ammonia (NH ₃)	Colorless / Flammable gas with a characteristic pungent smell that can cause tissue burns and is a strong respiratory irritant.
HEPA	High Efficiency Particulate Air
HMIS	Hazardous Materials Identification System
Hydrogen Chloride	Non-flammable, toxic gas. At room temperature, it is a colorless gas, which forms white fumes of hydrochloric acid upon contact with moisture, including skin moisture.
IDLH	"Any condition that poses an immediate or delayed threat to life (IDLH) or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space".
MoC	Management of Change


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Table 1 Terms and Definitions

Term	Definition
PEL	The permissible exposure limit (PEL or OSHA PEL) is a legal limit in the United States for exposure of an employee to a chemical substance or physical agent.
pH	measure of the acidity or basicity of an aqueous solution
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
SCBA	Self-Contained Breathing Apparatus (Fresh Air)
Sodium Hydroxide (NaOH)	Also known as lye or caustic soda, is a caustic metallic base.
Sulfur Dioxide (SO ₂)	A colorless, nonflammable, water-soluble, suffocating gas, SO ₂ , formed when sulfur burns: used chiefly in the manufacture of chemicals such as sulfuric acid
Sulfuric Acid (H ₂ SO ₄)	Colorless (pure) to dark brown, oily, dense liquid with a specific gravity almost double that of water.

3.0 ROLES AND RESPONSIBILITIES

3.1 Safety Department


Health and Safety is responsible for:

- Maintaining this instruction with a program review at least every five (5) years
- Providing training material to support the training responsibilities of Operations and the Training Department
- Implementing the EXAM process to anticipate and recognize potential exposures.
- Provide reports to management on any compliance issues

3.2 Owing Department Supervision

Supervision is responsible for the following:

- ensuring this policy is implemented consistently from shift to shift and across the refinery
- providing resource materials to safely handle acids caustics and ammonia
- performing audits to ensure compliance
- reviewing this policy on a pre-determined frequency.
- Ensure that those under their supervision are properly trained in the hazards of acids and caustics, safe work procedures, and the proper use of PPE.
- Ensure that the MOC process is followed when unit conditions require the use of temporary hard piping in place of utility hoses.

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3.3 Owing Department Personnel

Owing Department is responsible for:

- following the guidelines of this policy and operating procedures which preserve the integrity of acid and caustic systems.
- determining which process streams contain acid and caustic along with a general understanding of what concentrations may be present.
- the proper use and upkeep of PPE to ensure it is available for use when dealing with acid or caustic releases or response to leaks.
- ensuring all PPE and safety equipment (e.g. Acid Suits, Face Shields, Nitrile Gloves, respiratory protection, etc.) are replaced if found to be unfit for use.

3.4 Servicing Group

Servicing Group is responsible for:

- following the guidelines of this policy while ensuring that acid and caustic systems are maintained.
- proper use and upkeep of PPE to ensure it is available for use when dealing with acid and caustic releases or response to leaks.
- ensuring all PPE and safety equipment (e.g. Acid Suits, Face Shields, Nitrile Gloves, respiratory protection, etc.) are replaced if found to be unfit for use.

3.5 Contractors

Contractors are responsible for:

- following the guidelines of this policy while ensuring that acid and caustic systems are maintained.
- proper use and upkeep of PPE to ensure it is available for use when dealing with acid and caustic releases or response to leaks.
- ensuring all PPE and safety equipment (e.g. Acid Suits, Face Shields, Nitrile Gloves, respiratory protection, etc.) are replaced if found to be unfit for use.


3.6 Engineering

Engineering is responsible for:

- ensuring that equipment containing acid or caustic are closed systems.
- designing control measures to prevent backing acid or caustic into other systems by insuring higher pressure, installation of check valves and block valves, and maintenance of these valves and provisions for testing.

4.0 PRACTICES

The following section details the steps required to manage acid and caustic containing systems.

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4.1 General Safe Practices

- 4.1.1** Prior to opening lines or equipment which have contained acid or caustic, control of hazardous energy, line breaking, and process equipment opening, procedures must be followed to ensure that equipment is properly isolated, depressurized, purged and rinsed to a PH neutral condition.
- 4.1.2** Know the location and test the operability of safety showers and eyewash stations in the area where work is being performed.
- 4.1.3** Do not allow acids and caustics to come in contact with each other.
- 4.1.4** Have a large supply of water available when handling acid and caustic in the event of a spill
- 4.1.5** Acids attack metal releasing hydrogen, a highly flammable gas.
- 4.1.6** When opening railroad cars or lines containing sulfuric acid, ensure no source of ignition is present.


4.2 Laboratory Safe Practices

- 4.2.1** Work with chemicals in a lab should be done in a fume hood.
- 4.2.2** Where available, corrosives should be purchased in containers with a protective plastic film so that splash is inhibited should the container be dropped.
- 4.2.3** Keep the container sizes and quantities on hand as small as possible, consistent with the rate of use. Store each class by itself to avoid cross contamination.
- 4.2.4** Bottles containing corrosive materials from refinery process streams for lab analysis, should be properly labeled using a HMIS tag and capped.
- 4.2.5** Do not allow corrosives to come in contact with organics. Sulfuric acid can be explosive on contact with diesel fuels.

4.3 Acid Release to Sewer Precautions

Acid can be released during process leaks, draining equipment, or when starting equipment. Prior to releasing acid to the sewer, the following must occur:

- 4.3.1** Flush the Alky sewers with city or firewater prior to introducing acid to the sewer system.
- 4.3.2** Inform the OMD board operator prior to releasing acid to the sewer so they can alert the Traps operator of the incoming low pH water being sent to the WWTF.
- 4.3.3** Controlled acid draining should be kept to an absolute minimum.
- 4.3.4** Never purposefully drain more than 10 gallons of acid to the sewer. If draining more than 10 gallons is required contact the HPDN Foreman. It will be necessary to develop a procedure to safely dispose of acid.

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4.4 Uncontrolled release of acid to sewers

4.4.1 If an uncontrolled release greater than 10 gallons enters the sewer system or the ground call 4900 and follow the emergency reporting procedure found in the Salt Lake City Refinery Emergency Response Plan. All personnel should be evacuated from 268, 242, and 241 tank dikes.

4.5 Goggle Required Areas

4.5.1 Areas around equipment and vessels that contain chemicals that pose a significant acute hazard to the eyes should be permanently designated as a "Goggle Area". Goggles are required to be worn at all times when crossing or working within the boundaries of the designated goggle area.

4.5.2 Painted yellow lines should designate the area with black lettering. The ground around the equipment should read at a minimum "GOGGLE AREA". The goggle area should be marked at least 6 feet from the equipment or vessel whenever the surface permits.

4.5.3 Visible signs alerting people to the designated goggles area also recommended in all cases and are required when the boundary cannot be painted. Where signs must be relied upon to alert personnel to the designated goggle area, such as areas where the ground cannot be painted (e.g., tank farm or unpaved areas), the signs must be clearly visible at all pedestrian approaches or next to the equipment.

4.5.4 An example of a sign is as follows;




4.6 PPE Requirements


The PPE requirements below are to be followed when conditions warrant.

4.6.1 Level D PPE is required when no respiratory protection is required, and minimal skin protection is needed such as conducting routine maintenance or sampling. Level D consists of:

- a) Fire retardant coveralls (FRC) / work clothes
- b) Work boots
- c) Hard hats
- d) Safety glasses
- e) Goggles are required and must be immediately available

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- 4.6.2** Level D Prime PPE is for work requiring protection against chemical splash and the vapor concentration is below the PEL. Level D Prime PPE consists of:
- a) FRC Work Boots
 - b) Goggles and face shield
 - c) PVC or nitrile chemical jacket
 - d) PVC or nitrile bibs or overall
 - e) PVC or nitrile gloves.
- 4.6.3** Level C PPE is required when the vapor concentration is above the permissible exposure limit (PEL) but does not exceed 50x the PEL, there is a potential for splash hazard, cleaning up acid or caustic spills, containing small leaks or packing failures which are small, controlled, and nonemergency. Level C PPE consists of:
- a) Full face, air purifying respirator with combination HEPA and acid cartridge
 - b) One- or two-piece chemical splash suit (PVC)
 - c) Goggles/face shield combination
 - d) Chemical resistant boots or boot covers (neoprene or PVC)
- 4.6.4** Level B PPE is required when the vapor concentration may exceed 50X the PEL, a high potential for splash, containing large leaks or packing failures that are not controlled. Level B PPE consists of:
- a) Pressure demand full-face SCBA
 - b) Chemical resistant clothing; hooded, one, or two piece
 - c) Chemical splash suit (PVC)
 - d) Chemical resistant gloves (PVC)
 - e) Chemical resistant boots or boot covers (neoprene or PVC)
- 4.6.5** Level A PPE is required when vapor concentrations are IDLH or unknown, maximum skin protection is required, or a release is uncontrolled and requires emergency response. Level A PPE consists of:
- a) Pressure demand full-face SCBA
 - b) Totally encapsulating chemical protective suit (chemrel)
- 4.6.6** Laboratory PPE requirements are as follows when handling acids or caustics:
- a) Safety glasses with side shields are required when there is little or no potential for a splashing hazard.
 - b) Goggles or a face shield are required when a splash hazard exists.
 - c) Laboratory apron (PVC) and gloves (PVC) is required for all manual handling of acids and caustics.


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4.7 Safety Showers

- 4.7.1** At each point where acid or caustic is handled, there must be ready access to safety showers and eye wash stations. There must be a minimum of 15 minutes of warm water at a high enough volume to drench the user. Stations must be equipped with an automatic alarm system designed to summon help from adjacent areas. Safety showers must be supplied with 20 to 30 degree C tempered water to meet OSHA standards (min. 30 GPM flow), be within 50 feet of an unloading area, and be "winterized" (freeze protected).

4.8 Chemical Characteristics

- 4.8.1** Ammonia:
- a. Colorless / Flammable gas with a characteristic pungent smell that can cause tissue burns and is a strong respiratory irritant.
 - b. Exposure may cause severe injury to respiratory system and common 35% laboratory solution can cause severe skin burns.
 - c. High concentrations may cause temporary blindness.
- 4.8.2** Ammonia Exposure Limits:
- a. Short Term Exposure Limit 35 ppm
 - b. 8-hour permissible exposure limit 25 ppm
 - c. IDLH 300 ppm
- 4.8.3** Sodium Hydroxide (NaOH):
- a. Sodium Hydroxide is concentrated in a water solution within the facility. When dry, it is in the form of white pellets or flakes
 - b. Also known as lye or caustic soda
 - c. Is considered a severe eye hazard
 - d. Will destroy tissue on contact in solid or in a concentrated solution
- 4.8.4** Hydrogen Chloride (anhydrous)
- a. Non-flammable, toxic gas by all routes of exposure
 - b. At room temperature, it is a colorless gas, which forms white fumes of hydrochloric acid upon contact with moisture, including skin moisture.
 - c. Inhalation of the fumes can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory system failure, and death.
 - d. Skin contact can cause redness, pain, and severe skin burns.
 - e. Exposure above 1500 ppm, airborne concentration, can be fatal in minutes.
- 4.8.5** Sulfuric Acid (H₂SO₄) Characteristics

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- a. Colorless (pure) to dark brown, oily, dense liquid with a specific gravity almost double that of water.
 - b. Corrosive and reactive properties make it extremely hazardous when it comes in contact with organic substances, such as sugars, fats, and proteins that make up human tissue.
 - c. Acids react violently with various strengths of acids and alkalis generating heat and fumes.
 - d. Sulfuric acid mist is a human carcinogen and good ventilation must be provided to keep concentrations below exposure limits.
 - e. Sulfuric acid will also react violently with metal powders, carbides, chlorates, fulminates, nitrates, picrates and strong oxidizing, reducing or combustible organic materials.
 - f. Contact with acid can cause severe, deep burns to tissue.
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5.0 REVIEW AND REVISION HISTORY

5.1 Procedure Review

The Safe Work Instruction will be reviewed every 5 years.

5.2 History of Revisions

Table 2 provides the revision history for this Safe Work Instruction.

Table 2 Revision History

Revision	Date	Change Author	Reason for Change
1.0	12/13/1983	---	Original Issue
2.0	12/03/2012	---	Revision
2.1	01/06/2016	---	Updated to New SWI Format
3.0	1/31/2021	J.Moffitt	Updated to Marathon SWI Format