
	GILES CHEMICAL ~ PREMIER MAGNESIA		
	Company Procedure		
	Title: Acid Spill Response Plan - Waynesville	Number: S12-PG-200-005	
	Owner: Deborah Durbin	Revision: 5	
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1.0 Purpose

The following *Acid Spill Response Plan* has been prepared for Giles Chemical, a division of Premier Magnesia, LLC in Waynesville, NC. The purpose of the plan is to protect the safety and welfare of the employees, the community, and the environment in the event of an emergency acid spill incident. This plan has been developed to comply with OSHA standards 29 CFR 1910.120(q) and other applicable Federal, State, and Local laws.

The *Acid Spill Response Plan* is a guide of emergency procedures in the event of a Sulfuric Acid spill. This document is also intended as a reference source to familiarize local emergency response agencies, fire and police departments, and area hospitals on responder operations relating to Sulfuric Acid and the emergency response at Giles.

2.0 Scope

The plan outlines the steps to be taken to identify, contain, clean-up and report a Sulfuric Acid spill at the Waynesville Manufacturing facility. This plan does not apply to small leaks and mishaps which can be successfully covered under the plant's Hazard Communication program, 29 CFR 1910.1200. The key points of a hazard communication response are that partial or total evacuation is not necessary and employees in the immediate work area of the spill or mishap can safely handle the situation.

○ General Facility Information



The address of the Waynesville Manufacturing facility is:

**Giles Chemical, a division of Premier Magnesia, LLC
102 Commerce Street
Waynesville, NC 28786
828-452-4784**

The property consists of approximately 5.5 acres and is located on the corner of Commerce Street and Smathers Street and is bisected by Richland Creek. Operations at the site started in 1950 and the facility currently employs approximately 45 people. The facility operates 24/7 with four alternating shifts of four to five production workers each shift. The office operates typically 8am-5pm Monday through Friday with up to fourteen employees. Additionally, there are 11 other employees during office hours that are working in the plant. This facility produces bulk Epsom Salt (magnesium sulfate heptahydrate).

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Manufacturing processes at the Waynesville facility are located in a single building and consist of only three raw materials: **Magnesium Oxide**, **Sulfuric Acid** and **Water**. The Magnesium Oxide and Sulfuric Acid are received by railcar (on rare occasion by tanker) and are stored in three silos and two tanks respectively. These materials are dispensed from storage at prescribed rates to digesters where a chemical reaction occurs, and MgSO_4 brine is formed. The brine is filtered and directed to Vacuum Crystallizers where crystal growth is promoted, following which crystals are separated from residual liquor, dried and packaged for shipment to customers. Liquid product is also produced in which the brine, at specified strengths, is shipped direct to customers via liquid transportation. Finished product is shipped out via truck and rail service. No hazardous wastes are generated from the manufacturing process.

The two Sulfuric Acid storage tanks contain 20,000 gallons each of 93-97% acid and are labeled as tanks 1 & 2; these tanks are located outside (behind the building) within secondary containment. There is also a secondary containment beneath the railcars (in front of building) where they are unloaded.

The three Magnesium Oxide storage silos contain 120 tons, 120 tons and 100 tons and are labeled as silo 1 & 2 & 3.

2.0 Responsibility



Employees' responsibilities are commensurate with their level of training. See Appendix A for the response roles of specifically named individuals, their job titles, and contact information.

At a minimum, where response activities exceed the defensive action stage, there must be two Level 3 responders and two Level 5 incident commanders (one to initiate the coordination with outside parties listed in Appendix B, and one to coordinate on-scene activities).

- First Responders (Awareness Level 1) – any employee that discovers an acid spill or leak has the responsibility to initiate the *Acid Spill Response Plan* sequence by notifying their supervisor of the release. All plant employees are trained to recognize an acid spill, to understand the risks associated with the spill, and how to make the appropriate notifications of the spill. Training is conducted at hire and annually thereafter by the Safety Department.
- First Responders (Operations Level 2) – employees that respond to an acid spill as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from effects of the release. Their responsibility is to contain the release from a safe distance, keep it from spreading, and prevent exposures. They are trained to respond in a

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defensive fashion without actually trying to stop the release. These employees receive HazWoper 8-hour training in addition to Awareness Level 1 training.

- Hazardous Materials Technician (Level 3) – employees that respond to an acid spill for the purpose of stopping the release. They assume a more aggressive role than a level 2 in that they will approach the point of release in order to plug, patch or otherwise stop the release of acid. Level 3 responders receive HazWoper 24-hour training.
- Incident Commanders (ICs Level 5) – assume control of the emergency by activating and coordinating all aspects of the *Acid Spill Response Plan*. The ICs have been selected based on their familiarity with the facility, the *Acid Spill Response Plan*, operation and activities at the facility, the locations and characteristics of Sulfuric Acid, and regulatory requirements. These employees have received HazWoper 24-hour and are certified as Incident Commanders. Certifications are maintained through annual HazWoper 8-hour training. They have complete authority to commit all resources of the company to carry out the *Acid Spill Response Plan* in the event of an acid spill.

3.0 Safety Considerations



- **SULFURIC ACID REACTS VIOLENTLY WITH WATER!**
- The main hazard associated with sulfuric acid is its corrosiveness to skin and eyes. It can cause rapid damage to skin and eye tissue on contact and may result in burns and/or permanent eye damage. Inhalation can cause respiratory irritation.
- The main environmental hazard is that it would quickly lower the pH of any water it reaches, causing potential damage to plants and wildlife.
- PPE:
 - Acid Splash Suit – not a rain coat; acid-resistant material (ie. coated PVC) for 93-97% acid that is designed to minimize tears/rips and is properly sized
 - Acid-resistant gauntlet-length gloves
 - Acid-resistant steel-toed boots
 - Chemical goggles with a face shield
 - Respiratory protection is typically not required when handling <100% sulfuric acid under normal conditions; engineering controls (good ventilation) are preferred over respirator use. However, respiratory protection is recommended in the event of a large spill. Where the potential exists for exposure > 0.2 mg/m³, use a NIOSH approved full face-piece respirator with an acid gas cartridge specifically approved for Sulfuric Acid, with an R or P100 pre-filter.

See Appendix D, *Right to Know Hazardous Substance Fact Sheet – Sulfuric Acid*

See Appendix E, *Sulfuric Acid Safety Data Sheet (Norfalco)*

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5.0 Materials/Equipment

- PPE referenced above
- Lime
- pH paper
- Wheel barrow, shovel

6.0 Procedure

The *Acid Spill Response Plan* will be activated for sulfuric acid spills that meet or exceed a reportable quantity of 1000 pounds (67 gallons) or is uncontrolled. Acid spills under the reportable quantity will be documented using the *Incidental Acid Spill Log* in Appendix D.

A. Identification

Sulfuric acid is a clear to turbid, oily, colorless to light brown or grey, odorless liquid. It has a pH of <1 and is dispersible and soluble in water. Although odorless, it can irritate the nose and throat. It can appear to be greenish when in contact with the plant floor.

Sulfuric acid spills or leaks would mostly likely occur at the Railcar Unloading Station or within the secondary containment from a storage tank outside. All piping from these sources are labeled and encapsulated with secondary containment piping where leakage would be highly unlikely but not impossible.

B. Immediate Actions



- Immediately call **911** if the acid spill has resulted in injury, fire, or an emergency situation. Activate an Emergency Evacuation air horn 2 times, if necessary, to initiate evacuation procedures (*Emergency Evacuation, S12-PR-200-003*).
- Immediately notify the supervisor and/or one of the Hazardous Materials Technicians (Level 3) on duty listed in Appendix A.
- Do not discuss event with anyone outside of Giles. Jim Hill and/or Matt Haynes are the only individuals authorized to speak publically or to the media.

C. Emergency Recognition and Prevention

- Supervisor and/or Hazardous Materials Technician will assess the spill to determine if it is an incidental release (under 1000 pounds or 67 gallons, controlled, poses no safety or health hazard) or if the release requires an emergency response.

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- a) Incidental Release – contain spill, neutralize with Lime to pH 6-7, dispose in Mud Pit (waste not to exceed 55 gallons), and record incident on the *Incidental Acid Spill Log* in Appendix D.
- b) Emergency Response Release – Secure operations only if adequate personal protective equipment is available and employ the buddy system. Employees have the option to evacuate without penalty if they subjectively believe response is beyond their capabilities.

Controls to stop leak:



- Emergency Stops at the Commerce Street door, at the pump, or at the top of the steps of the Unloading station will shut down the pump (when activated an audible alarm will sound to alert employees of spill;
- or close valves;
- or shut plant down;

D. Coordination Efforts

- Supervisor and/or Hazardous Materials Technician will immediately notify a member of the Incident Commander Team in Appendix A. The incident commander contacted will contact a secondary incident commander.
 - a) On-scene Incident Commander – will manage emergency response activities to a successful conclusion, supervising the response team:
 - ensure all employees are accounted for in the case of an evacuation
 - will designate an alternative safe distance and place of refuge, if required
 - small spill isolation distance is 200 feet
 - large spill isolation distance is 1000 feet
 - isolation distance for fire is ½ mile
 - manage site safety and control by prohibiting unauthorized personnel from entering the danger area
 - create a safe location for a command post
 - will determine if outside emergency assistance is needed
 - document all response activities using Appendix E, *IC On-scene Acid Spill Response Report*
 - b) Secondary Incident Commander – will immediately initiate Federal, State, and Local notification and reporting requirements listed in Appendix B, *Federal*,

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State, and Local Notifications. Calls will be recorded using Appendix C, *Acid Spill Response Notifications Log*. The secondary incident commander will also be responsible for required follow-up reports to applicable regulatory agencies.

E. Clean-up Procedures - Those employees trained to at least Level 3 or Hazardous Materials Technician will perform the following under the guidance of the Incident Commander:

- Ensure that the source of the acid spill/leak has been identified, stopped and repaired.
- Prevent the acid spill from entering sewers, waterways, or low areas. If there is an immediate threat and no safety concerns, then attempt to contain the spill using an absorbent (cat litter) and/or sock booms or rags to stop the spill from getting into the drains or to any permeable surfaces.
- Once the spill has been contained and any immediate threat to storm drains or permeable surfaces have been minimized, commence cleanup procedures.
- Cautiously neutralize the spill with Lime to a pH of 6-7.
- If the volume of cleanup does not exceed 55 gallons, it may be disposed of in the Mud Pit. If more than 55 gallons, then it must be contained and disposed of as a Hazardous Waste. In this case, contact Mountain Environmental, our Spill Clean-up Contractor.

F. Decontamination Procedures – any residual sulfuric acid is to be removed from employees and their equipment using copious amounts of water to the extent necessary to preclude the occurrence of foreseeable adverse health effects.



G. Emergency Medical Treatment and First Aid

- If an employee requires emergency medical care, either call 911 or have another employee transport them to the hospital or urgent care.
- First aid treatment is fairly simple – get as much water on the affected area, as fast as possible. Wash/rinse the affected skin for at least 15 minutes. Flush eyes with water for at least 30 minutes. Seek medical attention immediately. Emergency eye wash and shower stations are located throughout the facility. For inhalation, remove the affected person from the source of exposure. If not breathing, institute CPR.

H. Critique of Response and Follow-up – all practice drills and actual incidents will be critiqued within 72 hours for response effectiveness using the *IC On-scene Acid Spill Response Report* (Appendix E). This critique will discuss the high points, low points, successes and failures

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encountered. Any changes or improvements to the plan and/or plant procedures will be noted. This information will serve as a training tool during the annual refresher training.

- I. Personal Protective and Emergency Equipment – all PPE and/or equipment will be cleaned (decontaminated) and evaluated for reuse. This evaluation will be documented on the *Acid Gear Check Sheet* form that is used weekly.

7.0 Reference Documents

Emergency Evacuation (S12-PR-200-003)

Acid Gear Check Sheet



U.S. Department of Transportation 2012 Emergency Response Guide (ERG)

8.0 Change Information

Complete re-write of existing procedure.

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Appendix A



Emergency Contacts List

Incident Commanders (Level 5)			
<i>Name</i>	<i>Title</i>	<i>Office Phone</i> 828-452-4784	<i>Cell</i>
Jason Bumgarner	Plant Manager	x-13	828-508-4377
Sammy Joe Henson	Maintenance Manger	x-32	828-342-1748
Deborah Durbin	Dir. of Quality & Safety	x-33	828-734-5285
Patrick Owen	Process Engineer	x-25	828-553-8806
Lee Cagle	Quality & Safety Coord.	x-47	828-550-1888

Emergency Spill Response Team (Levels 1-3)			
<i>Name</i>	<i>Title-Shift</i>	<i>Training Level</i>	<i>Cell</i>
James Frizzell	Lead Operator-A	3	828-400-2471
Marvin Crawford	Lead Operator-B	3	828-734-1629
Keith James	Lead Operator-C	3	828-734-2779
Joe Phillips	Lead Operator-D	3	828-400-9481
Randy Frizzell	Material Handler-A	3	828-989-6674
Chris Snyder	Material Handler-B	3	727-482-9425
Kirby Redmon	Material Handler-C	3	
Dalton Messer	Material Handler-D	3	828-400-9433
Phillip Davis	Warehouse-A	3	828-734-7874
Alberto Quesada	Material Handler-B	3	828-283-1272
Daniel Riddle	Assistant Operator-C	3	828-593-0705
Chris Phillips	Warehouse-D	3	828-450-9622
Lester Parton	Maintenance	3	828-734-4898
Jody Conner	Maintenance	3	828-400-2377
Rex Chambers	Maintenance	3	828-734-5764

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Appendix B

Federal, State and Local Emergency Notifications

- | | |
|---|--|
| National Response Center (NRC) <ul style="list-style-type: none"> • Call immediately; they will contact other appropriate agencies • On-line report | 1-800-424-8802 |
| North Carolina Emergency Response Commission (NCERC)/
North Carolina Division of Environmental Management (NCDEM) <ul style="list-style-type: none"> • Call immediately or as soon as possible • Follow-up report within 30 days | 1-800-858-0368 |
| Haywood County Local Emergency Planning Committee (LEPC) <ul style="list-style-type: none"> • Call immediately or as soon as possible • Contact Chairman Greg Shuping immediately • Follow-up report within 30 days | 911
(office: 828-456-2391)
(cell: 828-508-8387) |
| Waynesville Police, Fire and County Sheriff's Department | 911 |
| Town of Waynesville Waste Water Plant <ul style="list-style-type: none"> • Call only if property other than Giles affected • Contact David Smith | 828-452-4685 |
| Town of Waynesville Public Works <ul style="list-style-type: none"> • Call only if property other than Giles affected • Contact Fred Baker (Director) | 828-456-4410 |
| North Carolina OSHA <ul style="list-style-type: none"> • Call within 8 hours after the death of an employee or hospitalization of three or more | 800-625-2267 |

Remediation Services



Mountain Environmental Services	828-648-5556
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Addresses for Follow-up Reports

- North Carolina Emergency Response Commission (NCERC), 4714 Mail Service Center, Raleigh, NC, 27699-4714 Attn: Patrick Lake
- Haywood County Local Emergency Planning Committee (LEPC), Waynesville, NC, 27, Attn: Greg Shuping

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Appendix C

Acid Spill Response Notifications Log



Who discover the spill: _____ Date: _____ Time: _____

Quantity of spill: _____ Duration of spill: _____ Location of spill: _____

<i>Calls</i>	<i>Phone Number</i>	<i>Who Called</i>	<i>Date/Time</i>	<i>Comments</i>
NRC National Response Center	800-424-8802			
NCERC/NCDEM NC Emergency Response Center / NC Dept. of Environmental Management	800-858-0368			
LEPC Local Emergency Planning Committee	911			
LEPC Chairman Greg Shuping	828-508-8387(m) 828-456-2391 (o)			
Police / Fire	911			
Town of Waynesville Waste Water	828-452-4685			
Town of Waynesville Public Works	828-456-4410			
NC OSHA (Death / Hospitalization 3+)	800-625-2267			
Mountain Environmental Spill Clean-up Contractor	828-648-5556			

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Appendix D

Incidental Acid Spill Log (spill under 1000 lbs./67 gallons)

Date/Time	Location	Quantity	Duration	Cause	Corrective Action	Initials

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Appendix E

IC On-scene Acid Spill Response Report

Date/Time of Spill:	Location of Spill:	Spill Discovered By:
Duration of Spill:	Quantity of Spill:	Weather Conditions:
Regulatory Notifications Initiated:	Notifications made by:	Report Prepared By:
Fire Dept. Present?	Police Present?	EMT Present?

Responder Names on Team:

Incident Commander:	Incident Commander:	HazMat Tech:	HazMat Tech:
HazMat Tech:	HazMat Tech:	First Responder Operations:	First Responder Awareness:

Outline Actions Taken to Respond to and Contain Release:

What was the cause of the spill?
Extent of injuries, if any?
Assessment of actual or potential hazards to human health or environment (if applicable)?
Estimated quantity and disposition of material recovered from the spill?
Time Incident was over and 'All Clear' notification announced?
Critique of Response. Are procedural changes recommended?

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Appendix F

Right To Know

Hazardous Substance Fact Sheet

Common Name: **Sulfuric Acid**

Synonyms: Battery Acid, Hydrogen Sulfate, Oil of Vitriol

Chemical Name: Sulfuric Acid

CAS Number: 7664-93-9

RTK Substance Number: 1761

Dot Number: UN 1830

Description and Use

Sulfuric Acid is a clear, colorless to brown, odorless liquid. It is used to make storage batteries, fertilizers, paper products, textiles, explosives, pharmaceuticals, and in steel and iron production.

Reasons for Citation

- **Sulfuric Acid** is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, IARC, NFPA and EPA.
- This Chemical is on the Special Health Hazard Substance List.

SEE GLOSSARY ON PAGE 17 OF THIS PROCEDURE.

FIRST AID

Eye Contact:

- Immediately flush with large amounts of water for at least 30 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. Seek medical attention immediately.

Skin Contact:

- Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.

Inhalation:

- Remove the person from exposure
- Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- Transfer promptly to a medical facility.
- Medical observation is recommended for 24 to 48 hours after overexposure, as pulmonary edema may be delayed.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222

CHEMTREC: 1-800-424-9300

National Response Center: 1-800-424-8802

EMERGENCY RESPONDERS>>>>SEE BACK PAGE

HAZARD SUMMARY

Hazard Rating	NJDOH	NFPA
Health	-	3
Flammability	-	0
Reactivity	-	2-W

CARCINOGEN

CORROSIVE AND REACTIVE

OXIDIZER

POISONOUS GASES ARE PRODUCED IN FIRE

CONTAINERS MAY EXPLODE IN FIRE

DO NOT USE WATER

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- **Sulfuric Acid** can affect you when inhaled.
- **Sulfuric Acid** is a CARCINOGEN. HANDLE WITH EXTREME CAUTION.
- **Sulfuric Acid** is CORROSIVE and contact can severely irritate and burn the skin and eyes, and may lead to blindness.
- Inhaling **Sulfuric Acid** can irritate the nose and throat.
- Inhaling **Sulfuric Acid** can irritate the lungs. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency.
- Exposure can cause headache, nausea and vomiting.
- Repeated exposure can cause permanent lung damage, damage to teeth, and upset stomach.
- **Sulfuric Acid** is REACTIVE and a DANGEROUS EXPLOSION HAZARD.
- **Sulfuric Acid** is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances.

Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is **1 mg/m³**.

NIOSH: The recommended airborne exposure limit (REL) is **1 mg/m³**.

ACGIH: The threshold limit value (TLV) is **0.2 mg/m³** (as the Thoracic fraction) averaged over an 8-hour work shift.

Sulfuric Acid is a CARCINOGEN in humans. There may be NO safe level of a carcinogen, so all contact should be reduced to the lowest possible level.

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Determining Your Exposure

- Read the product manufacturer's Safety Data Sheet (SDS) and the label to determine product ingredients and important safety and health information about the product mixture.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Health Hazard Information

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Sulfuric Acid**:

- Contact can severely irritate and burn the skin and eyes, and may lead to blindness.
- Inhaling **Sulfuric Acid** can irritate the nose and throat.
- Inhaling Sulfuric Acid can irritate the lungs causing coughing and/or shortness of breath. Higher exposures may cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
- Exposure can cause headache, nausea and vomiting.

Chronic Health Effects

The following chronic (long term) health effects can occur at some time after exposure to **Sulfuric Acid** and can last for months or years:

Cancer Hazard

- **Sulfuric Acid** is a CARCINOGEN in humans. There is evidence that occupational exposure to *strong inorganic acid mists* containing **Sulfuric Acid** cause cancer of the larynx in humans.
- Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

- While **Sulfuric Acid** has been tested, further testing is required to assess its potential to cause reproductive harm.

Other Effects

- **Sulfuric Acid** can irritate the lungs. Repeated exposure may cause bronchitis to develop with coughing, phlegm, and/or shortness of breath.
- Repeated exposure can cause permanent lung damage, damage to teeth, and upset stomach.

Medical

Medical Testing

Before beginning employment and at regular times thereafter, (at least annually), the following are recommended:

- Lung Function tests

If symptoms develop or overexposure is suspected, the following is recommended:

- Consider chest x-ray after acute overexposure

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing, you have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Mixed Exposures

- Smoking can cause heart disease, lung cancer, emphysema, and other respiratory problems. It may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

Workplace Controls and Practices

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include:

1. Enclosing chemical processes for severely irritating and corrosive chemicals
2. Using local exhaust ventilation for chemicals that may be harmful with a single exposure.
3. Using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at www.cdc.gov/niosh/topics/ctrlbanding/.

The following work practices are also recommended:

- Label process containers.
- Provide employees with hazard information and training.
- Monitor airborne chemical concentrations.
- Use engineering controls if concentrations exceed recommended exposure levels.
- Provide eye wash fountains and emergency showers.
- Wash or shower if skin comes in contact with a hazardous material.

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- Always wash at the end of the work shift.
- Change into clean clothing if clothing becomes contaminated.
- Do not take contaminated clothing home.
- Get special training to wash contaminated clothing.
- Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- Before entering a confined space where **Sulfuric Acid** may be present, check to make sure that an explosive concentration does not exist.
- Where possible, transfer **Sulfuric Acid** from drums or other containers in an enclosed system.

Personal Protective Equipment

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Gloves and Clothing

- Avoid skin contact with **Sulfuric Acid**. Wear personal protective equipment made from material which cannot be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your protection.
- Safety equipment manufacturers recommend Butyl, Silver Shield®/4H®, Viton and Barrier® for gloves, and Tychem® fabrics; Zytron® 300; ONESuit®/TEC; and Trellechem® HPS and VPS, or equivalent, as protective materials for clothing.
- All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
- Wear indirect-vent, impact and splash resistant goggles when working with liquids.
- Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

Respiratory Protection

Improper use of respirators is dangerous. Respirators should only be used if the employer has implemented a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- Where the potential exists for exposure over **0.2 mg/m³**, use a NIOSH approved full face piece respirator with an acid gas cartridge specifically approved for **Sulfuric Acid**, with an R or P100 pre-filter. Increased protection is obtained from full face powered-air purifying respirators.
- Leave the area immediately if:
 1. While wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Sulfuric Acid**.
 2. While wearing particulate filters abnormal resistance to breathing is experienced.
 3. Eye irritation occurs while wearing a full face piece respirator. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
- Consider all potential sources of exposure in your workplace. You may need a combination of filters, pre-filters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- Where the potential exists for exposure over **2 mg/m³**, use a NIOSH approved supplied-air respirator with a full face piece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- Exposure to **15 mg/m³** is immediately dangerous to life and health. If the possibility of exposure above **15 mg/m³** exists, use a NIOSH approved self-contained breathing apparatus with a full face piece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

Fire Hazards

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156)



- **Sulfuric Acid** is not combustible, but it is a **STRONG OXIDIZER** that enhances the combustion of other substances.
- Extinguish fire using an agent suitable for type of surrounding fire. **Sulfuric Acid** itself does not burn.
- **DO NOT USE WATER** directly on Sulfuric Acid.
- **POISONOUS GASES ARE PRODUCED IN FIRE**, including *Sulfur Oxides*.
- **CONTAINERS MAY EXPLODE IN FIRE.**
- **Sulfuric Acid** may ignite combustibles (wood, paper, and oil).

Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

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If **Sulfuric Acid** is spilled or leaked, take the following steps:

- Evacuate personnel and secure and control the entrance to the area.
- Eliminate all ignition sources.
- Neutralize spill with crushed limestone, soda ash, or lime and place into sealed containers for disposal.
- DO NOT USE WATER OR WET METHOD.
- Ventilate area of spill or leak, DO NOT wash into sewer.
- It may be necessary to contain and dispose of **Sulfuric Acid** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

Handling and Storage

Prior to working with **Sulfuric Acid** you should be trained on its proper handling and storage.

- **Sulfuric Acid** reacts violently with ALCOHOL and WATER to release Heat and will also react violently or explosively with ORGANIC MATERIALS; COMBUSTABLES; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); REDUCING AGENTS (such as LITHIUM, SODIUM, ALUMINUM and their HYDRIDES); and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLORINE).
- **Sulfuric Acid** reacts with MOST METALS to produce flammable and explosive *Hydrogen gas*.
- **Sulfuric Acid** is not compatible with STRONG ACIDS (such as HYDROCLORIC and NITRIC); MOISTURE; AMINES; and many OTHER SUBSTANCES.
- Store in tightly closed containers in a cool, well-ventilated area away from HEAT SOURCES, MOIST AIR, and COMBUSTABLES.
- **Sulfuric Acid** will absorb WATER from the air.

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GLOSSARY

ACGIH is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

Acute Exposure Guideline Levels (AEGLs) are established by the EPA. They describe the risk to humans resulting from once-in-a-lifetime, or rare, exposure to airborne chemicals.

Boiling point is the temperature at which a substance can change its physical state from liquid to a gas.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

CFR is the Code of Federal Regulations, which are the regulations of the United States government.

A **combustible** substance is a solid, liquid, or gas that will burn.

A **corrosive** substance is a solid, liquid, or gas that causes destruction of human skin or severe corrosion of containers.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

ERG is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

Emergency Response Planning Guideline (ERPG) values provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group.

Ionized Potential is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

IRIS is the Integrated Risk Information System database on human health effects that may result from exposure to various chemicals, maintained by federal EPA.

LEL or Lower Explosive Limit is the concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the federal Occupational Safety and Health Administration, which adopts and enforces safety and health standards.

NCOSHA is the North Carolina Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

ppm means parts per million parts of air. It is a measure of concentration by volume in air.

Protective Action Criteria (PAC) are values established by the Department of Energy and are based on AEGLs and ERPGs. They are used for emergency planning of chemical release events.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

UEL or Upper Explosive Limit is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

Vapor Density is the ratio of the weight of a given volume of one gas to the weight of another (usually *Hydrogen*), at the same temperature and pressure.

The **vapor pressure** is a force exerted by the vapor in equilibrium with the solid or liquid phase of the same substance. The higher the vapor pressure, the higher concentration of the substance in the air.

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Emergency Responders Quick Reference

Common Name: **SULFURIC ACID**

Synonyms: Battery Acid; Hydrogen Sulfate; Oil of Vitriol

CAS No: 7664-93-9

Molecular Formula: H_2SO_4

RTK Substance No; 1761

Description: Clear, colorless to brown, odorless liquid

HAZARD DATA

Hazard Rating	Firefighting	Reactivity
3 Health 0 - Fire 2-W - Reactivity DOT#: UN 1830 ERG Guide #: 137 Hazard Class: 8 (Corrosive)	Sulfuric Acid is not combustible, but it is a STRONG OXIDIZER that enhances the combustion of other substances. Extinguish fire using an agent suitable for type of surrounding fire. Sulfuric Acid itself does not burn. DO NOT USE WATER directly on Sulfuric Acid . POISONOUS GASES ARE PRODUCED IN FIRE, including <i>Sulfur Oxides</i> . CONTAINERS MAY EXPLODE IN FIRE. Sulfuric Acid may ignite combustibles (wood, paper and oil).	Sulfuric Acid reacts violently with ALCOHOL and WATER to release Heat and will also react violently or explosively with ORGANIC MATERIALS ; COMBUSTIBLES ; STRONG BASES (such as SODIUM HYDROXIDE and POTASium HYDROXIDE); REDUCING AGENTS (such as LITHIUM , SODIUM , ALUMINUM , and their HYDRIDES); AND OXIDIZING AGENTS (such as PERCHLORATES , PEROXIDES , PERMANGANATES , CHLORATES , NITRATES , CHLORINE , BROMINE and FLUORINE). Sulfuric Acid reacts with MOST METALS to produce flammable and explosive <i>Hydrogen Gas</i> . Sulfuric Acid is not compatible with STRONG ACIDS (such as HYDROCHLORIC and NITRIC); MOISTURE ; AMINES ; and many OTHER SUBSTANCES .

SPILL/LEAKS

Isolation Distance:

Small Spill: 60 meters (200 feet)

Large Spill: 300 meters (1,000 feet)

Fire: 800 meters (1/2 mile)

Neutralize spill with crushed limestone, soda ash or lime and place into a sealed container for disposal.

DO NOT USE WATER OR WET METHOD.

DO NOT wash into sewer.

Sulfuric Acid is harmful to aquatic organisms.

PHYSICAL PROPERTIES

Odor Threshold:	Odorless
Flash Point:	Nonflammable
Vapor Density:	3.4 (air = 1)
Vapor Pressure:	0.001 mm Hg at 68°F (20°C)
Specific Gravity:	1.8 (water = 1)
Water Solubility:	Soluble (mixes)
Boiling Point:	554° to 640°F (290° to 338°C)
Melting Point:	51°F (10°C)
Molecular Weight:	98.1
pH:	0.3

EXPOSURE LIMITS

OSHA:	1 mg/m ³ , 8-hr TWA
NIOSH:	1 mg/m ³ , 10-hr TWA
ACGIH:	0.2 mg/m ³ , 8-hr TWA
IDLH:	15 mg/m ³ , ERPG-1 = 2 mg/m ³ ERPG-1 = 2 mg/m ³ ERPG-1 = 2 mg/m ³

PROTECTIVE EQUIPMENT

Gloves:	Butyl, Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
Coveralls:	Tychem® fabrics; Zyttron® 300; ONESuit®TEC; and Trelchem® HPS and VPS (>8-hr breakthrough)
Respirator:	<2 mg/m ³ - full face piece APR with Acid gas cartridge and R or P100 prefilter >2 mg/m ³ - Supplied Air SCBA

HEALTH EFFECTS



Eyes:	Severe irritation and burns
Skin:	Severe irritation and burns
Inhalation:	Nose, throat and lung irritation with coughing and severe shortness of breath (pulmonary edema)
Chronic:	Headache, nausea and vomiting Strong <i>inorganic acid mists</i> containing Sulfuric Acid causes cancer of the larynx in humans

FIRST AID AND DECONTAMINATION

Remove the person from exposure.
Flush eyes with large amounts of water for at least 30 minutes. Remove contact lenses if worn. Seek medical attention immediately.
Quickly remove the contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention immediately.
Begin artificial respiration if breathing has stopped and CPR if necessary.
Transfer promptly to a medical facility.
Medical observation is recommended as symptoms may be delayed.

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Appendix G

Sulfuric Acid Safety Data Sheet (SDS) - Norfalco

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Appendix H

Site Layout

Note locations of spill kits, floor drains, storm drains, and acid storage areas

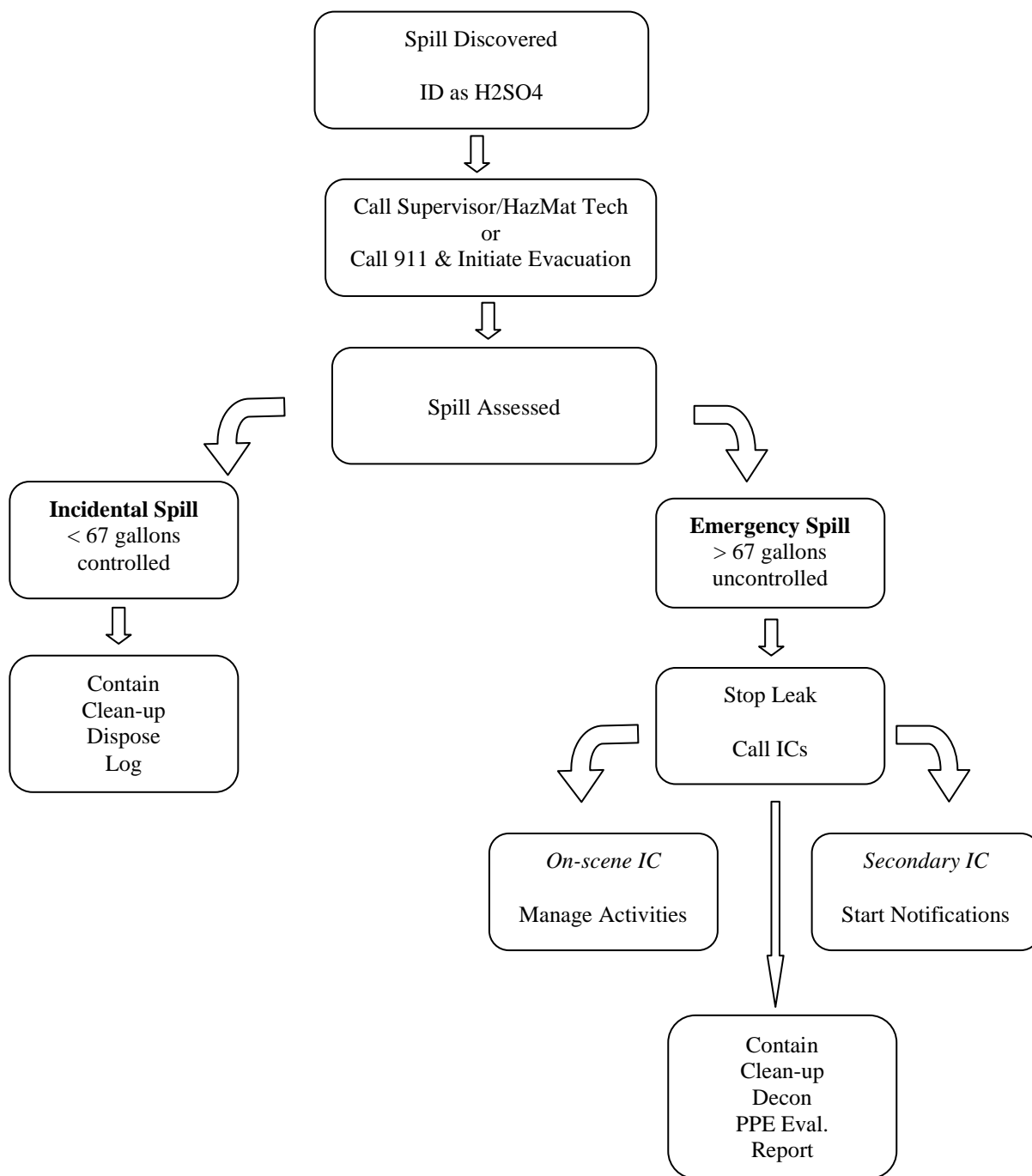
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Appendix I

Acid Spill Response Flow Chart



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