

# Saving Your Tail

**Unfortunately, many workers are seriously injured each year and many people still believe that accidents "just happen."  
But, accidents do not just happen!**

**What Goes Wrong? Usually, an error that is within the control of one or more people is at the bottom of things. Often, several errors take place, at the same time, for an accident to occur. So when we analyze accidents, we should focus on which aspects of a task were controlled and which were not. Assuming that workers have been properly trained and all the proper materials and tools were available, what else can go wrong? A lot! Accidents are most frequently due to haste and poor planning.**

This Means It's too Late to "Save Your Tail"



# THE WHY TAILGATE

- Every California employer must establish, implement and maintain a written Injury and Illness Prevention (IIP) Program and a copy must be maintained at each workplace or at a central worksite if the employer has non-fixed worksites. The requirements for establishing, implementing and maintaining an effective written injury and illness prevention program are contained in Title 8 of the California Code of Regulations, Section 3203 (T8 CCR 3203) and consist of the following eight elements:
  - Responsibility
  - Compliance
  - Communication
  - Hazard Assessment
  - Accident/Exposure Investigation
  - Hazard Correction
  - Training and Instruction
  - Recordkeeping

# CalARP Elements

(c) The operating procedures shall be reviewed as often as necessary to assure that they reflect current operating practice, including changes that result from changes in process chemicals, technology, and equipment, and changes to stationary sources. The owner or operator shall certify annually that these operating procedures are current and accurate.

(d) The owner or operator shall develop and implement **safe work practices** to provide for the control of hazards during operations such as lockout/tagout; confined space entry; **opening process equipment or piping**; and control over entrance into a stationary source by maintenance, contractor, laboratory, or other support personnel. These safe work practices shall apply to employees and contractor employees.

# The Catch-all

## The General Duty Clause

Under the Clean Air Act Section 112(r)(1), **all** facilities that use hazardous chemicals **in any quantity**, have a general duty “to prevent releases, and to minimize the consequences of accidental releases which do occur.”

This applies to any facility regardless of the chemical inventory

# Recent News

- OSHA cites paint business \$138K for PSM deficiencies <http://ow.ly/eiL7X>
- Man threatens police with a cylinder of anhydrous ammonia <http://ow.ly/elvGo>
- Fire fighters injured during NECCO ammonia leak response
- Ammonia leak at a winery causes evacuations, road closures
- More on the Fresno ammonia leak <http://ow.ly/eoYHh>
- Man accused of threatening police with ammonia is arrested
- Road reopened following a sulfur dioxide leak <http://ow.ly/er93z>
- Another ammonia spill
- Hospital evacuated after ammonia leak <http://ow.ly/ewhTw>
- Copper thieves nearly cut through an ammonia pipe <http://ow.ly/eyZEh>
- Anhydrous ammonia thief caught <http://ow.ly/eFauN>
- 30 hospitalized after Hubei ammonia gas leak - Xinhua <http://ow.ly/eHuiw>
- Ammonia appears to be the cause of a large fish kill in Iowa <http://ow.ly/eVi6L>
- Man has ammonia thrown at him in Gravesend restaurant <http://ow.ly/f3R9S>
- Ammonia leaks from ice factory <http://ow.ly/f7Hw1>
- Ammonia Leak Contained At Newark Warehouse <http://ow.ly/ffINm>
- Ammonia leak forces evacuation of Salina plant <http://ow.ly/fgE5o>
- Several people indicted for unlawful possession of ammonia <http://ow.ly/flRW4>
- OSHA Hands Out \$55,000 In Fines For Ammonia Spill <http://ow.ly/fIS1F>

# 200 Md. Workers Evacuated After Ammonia Leak In Howard County

9:01 PM, Dec 1, 2012 |  0 comments

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Written by  
9NEWS NOW

FILED UNDER  
Maryland News

HOWARD COUNTY, Md. (WUSA) – The Howard County Fire Department responded to a ammonia leak Saturday morning.

At about 9:40 officials responded to Taylor Farms Food Service at the 9000 block of Junction Dr. in Annapolis Junction, Md. and determined that the leak was coming from a refrigeration unit.

The Special Operations Team was able to stop the leak and used large fans to ventilate the warehouse.

According to officials, approximately 200 employees were evacuated. No injures were reported.

# TYSON FOODS

On October 4, 2007, and November 5, 2009, there were anhydrous ammonia releases at the Perry, IA facility that injured the same employee. Tyson blamed the October 4, 2007, incident on operator error alleging that the employee failed to lock out the ammonia line when initiating a line break and failure to follow SOPs for proper personal protective equipment. However, it was also noted in incident investigation that there was a 3 way safety relief valve failure.

# Chemical Spill Kills Worker At Sanger Winery

 Recommend  3 people recommend this.

Posted: Sep 11, 2012 10:30 AM MST

Updated: Sep 11, 2012 1:42 PM MST

By KMPH Web Staff - [email](#)



SANGER, Calif. (KMPH) - Authorities in Sanger are investigating a deadly chemical spill at a winery.

It happened just before 12:30 a.m. Tuesday at the Gibson Winery, located on Academy and Cherry avenues.

Sanger Police say one of the workers accidentally opened a wrong valve and released ammonia into a confined area.



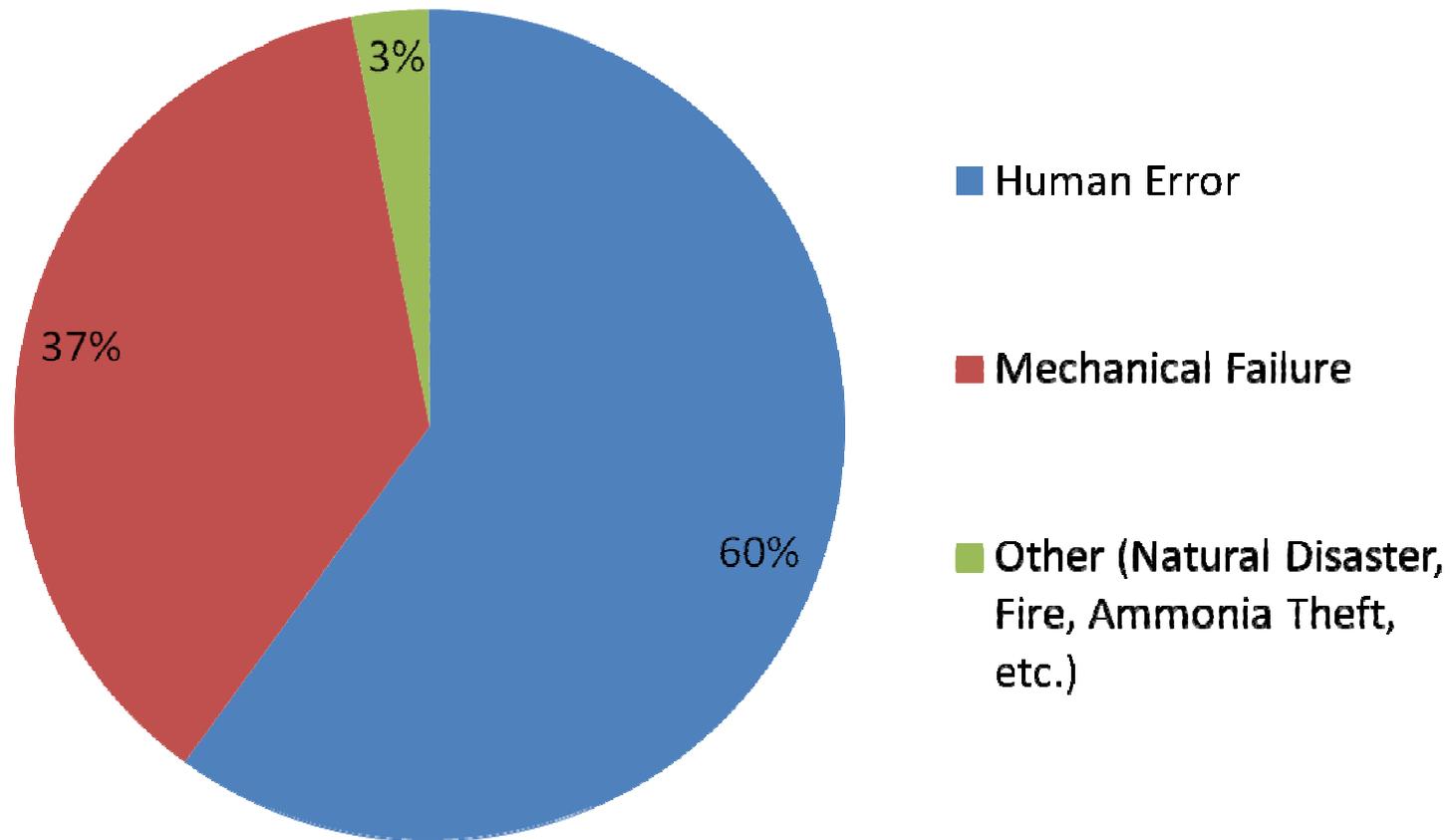
Other workers rushed to help the man out, but he died after being exposed to the chemical. He's been identified as 28-year-old Robert Munoz, of Sanger.

The Sanger Fire Department, OSHA and County Environmental Health are involved in the investigation.

# Question...

- Why are there so many safety and environmental regulations?
- Answer:
  - Historically there have been catastrophic process safety accidents that have injured and killed hundreds of thousands of people and also caused significant environmental damage. **These accidents are typically caused by human error or mechanical failure.**

# How Accidents Happen



**This is what Human Error looks Like**



# THE WHEN

## TRAINING AND INSTRUCTION

- All workers, including managers and supervisors, shall have training and instruction on general and job-specific safety and health practices. Training and instruction shall be provided as follows:
- When the IIP Program is first established;
- To all new workers, except for construction workers who are provided training through a Cal/OSHA approved construction industry occupational safety and health training program;
- To all workers given new job assignments for which training has not previously provided;
- Whenever new substances, processes, procedures or equipment are introduced to the workplace and represent a new hazard;**
- Whenever the employer is made aware of a new or previously unrecognized hazard;
- To supervisors to familiarize them with the safety and health hazards to which workers under their immediate direction and control may be exposed; and
- To all workers with respect to hazards specific to each employee's job assignment.

# THE WHEN

## **Training.**

### (a) Initial training.

- (1) Each employee presently involved in operating a process, and each employee before being involved in operating a newly assigned process, shall be trained in an overview of the process and in the operating procedures as specified in Section 2760.3. The training shall include emphasis on the specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the employee's job tasks.

- (2) In lieu of initial training for those employees already involved in operating a process on June 21, 1999 an owner or operator may certify in writing that the employee has the required knowledge, skills, and abilities to safely carry out the duties and responsibilities as specified in the operating procedures.

(b) Refresher training. Refresher training shall be provided at least every three years, and more often if necessary, to each employee involved in operating a process to assure that the employee understands and adheres to the current operating procedures of the process. The owner or operator, in consultation with the employees involved in operating the process, shall determine the appropriate frequency of refresher training.

(c) Training documentation. The owner or operator shall ascertain that each employee involved in operating a process has received and understood the training required by this section. The owner or operator shall prepare a record which contains the identity of the employee, the date of training, and the means used to verify that the employee understood the training.

# What is Ammonia?

**Ammonia** is a compound of nitrogen and hydrogen with the formula  $\text{NH}_3$ . It is a colorless gas with a characteristic pungent smell. Ammonia contributes significantly to the nutritional needs of terrestrial organisms by serving as a precursor to food and fertilizers. Ammonia, either directly or indirectly, is also a building-block for the synthesis of many pharmaceuticals and is used in many commercial cleaning products. Although in wide use, ammonia is both caustic and hazardous. The global production of ammonia in 2012 is estimated at 198 million tonnes a 35% increase over the estimated 2006 global output of 146.5 million tonnes.

# Where is Anhydrous Ammonia Located in Refrigeration Facilities?

- Anhydrous Ammonia is found throughout the plant site including:
  - Pressurized receivers



# Where is Anhydrous Ammonia Located in Refrigeration Facilities?

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- Compressors



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- Portables



# Recognizing Ammonia

The most recognizable property of ammonia is:

## Smell

Ammonia's strong, pungent and irritating smell gives early and positive warning that ammonia is present.



# Ammonia Characteristics

- **Ammonia Exposure**
- **Exposure to liquid anhydrous ammonia or high concentrations of ammonia vapor can cause:**
  - Blindness
  - Dehydration of body tissue
  - Chemical burns
  - Frostbite
- Learn the signs of a release, first aid procedures, and have an emergency action plan!

# Ammonia Characteristics

- Anhydrous = without water
- Pungent, colorless gas Stored as liquid under pressure (or refrigerated)
- DOT: Non-flammable compressed gas
- Ammonia UN identification number is 1005
  - This number identifies ammonia on shipping documents and vehicles as hazardous, and references information from DOT Emergency Response Guide.
- Pressure varies greatly with temperature
  - 50° F = 74.5 psig
  - 90° F = 165.9 psig
  - 115° F = 251.5 psig (Yuma)

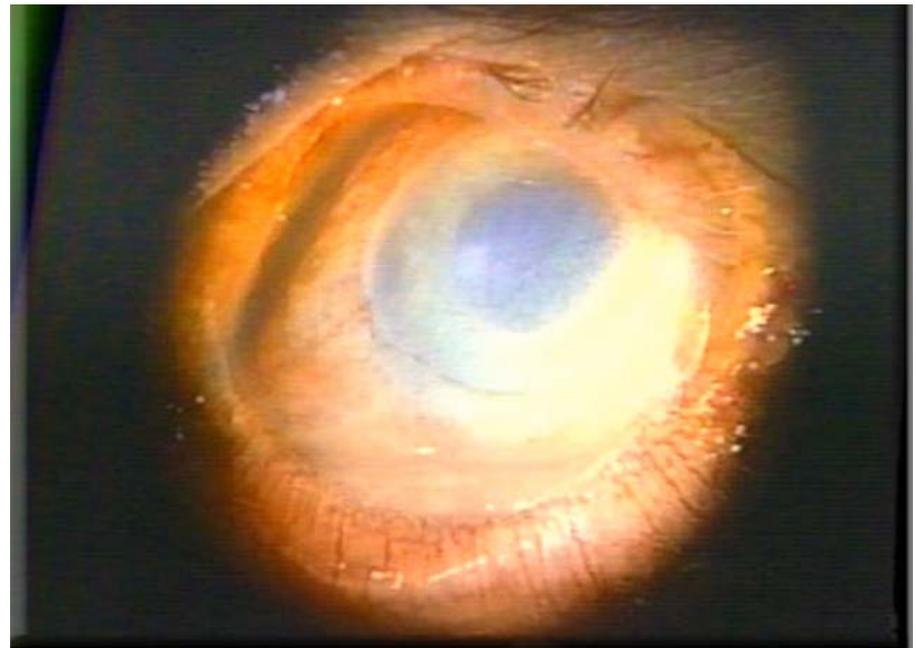
# Ammonia Characteristics

- Ammonia is sensitive to pressure and temperature
  - A small volume of liquid anhydrous ammonia will produce a large volume of gas at atmospheric pressure.
- Ammonia has a limited flammability range – 15-28% in air generally found only in confined space.
  - Mixtures of oil and ammonia may reduce lower level to 8%
- Ammonia has a very strong affinity for water.
  - 1 gallon of water will absorb 1,300 gallons of ammonia vapor by volume.

# Ammonia Loves Water

This is **Not So Good** because :  $\text{NH}_3$  aggressively seeks the moist areas of the body

The eye is 90% water and exposure can result in immediate eye damage



# Ammonia Loves Water

This is **GOOD** because :

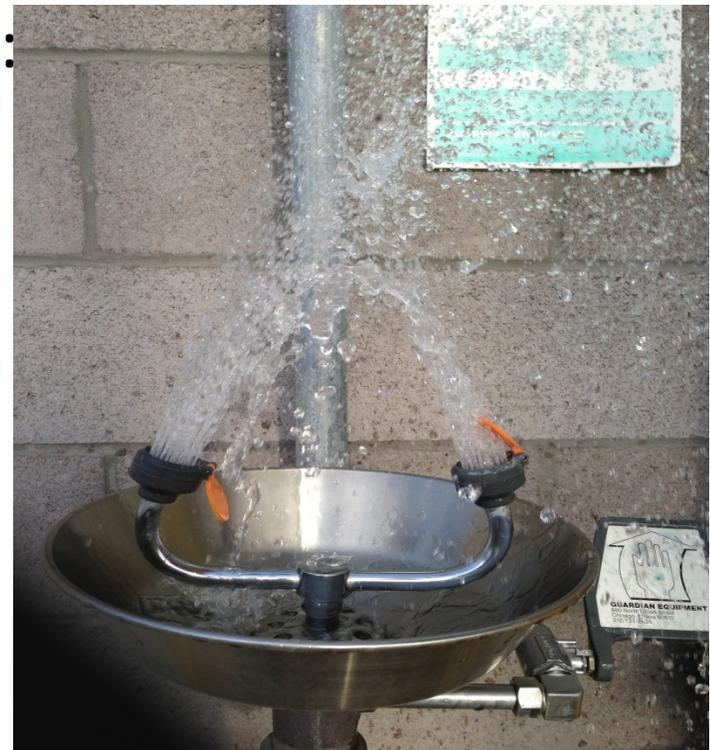
- **Water** can be used for first-aid treatment for NH<sub>3</sub> exposure
- **Water** can be used to absorb an ammonia vapor release
- **NOTE:** – Water should **NEVER** be used on liquid ammonia. This will result in a violent reaction and vapor release!

# First Aid for Ammonia

Large quantities of **Water** (15 minutes of continued flushing) are recommended for washing contaminated skin areas or for eye contact. (Longer is better)

And just incase I forgot to say this:

**For an eye exposed to Ammonia, hold the eyelid open and wash with water for 15 minutes or more.**



# First Aid for Ammonia

## INHALATION:

1. Remove from exposure.
2. Administer artificial respiration or oxygen if breathing has stopped.
3. Seek medical aid.

# Personal Protective Equipment (PPE) For Ammonia

- Personal protective equipment (PPE) should always be worn.
- Standard PPE should be non-vented goggles or “splash proof” vented goggles
- rubber gloves with thermal lining
- face shield or approved respirator.
- Wear a lightweight rubber apron or suit, or (at the very least) a long sleeve shirt and coveralls.

# Respirators & SCBAs

- Several types of respirators available  
Full-face, 1/2 mask, Escape  
Cartridge or Canister
- Only use respirators for escape or in a MINOR release:  
Ammonia odor while using a respirator might indicate improper fit, missing or broken seals, or ammonia concentration exceeding capacity.
- Self-Contained Breathing Apparatus (SCBA) required for major releases  
*(Should only be used by Emergency Responders)*

***\*\*\* Proper use of respiratory equipment requires training, maintenance and practice \*\*\****

# WHY USE PPE

## Skin Damage

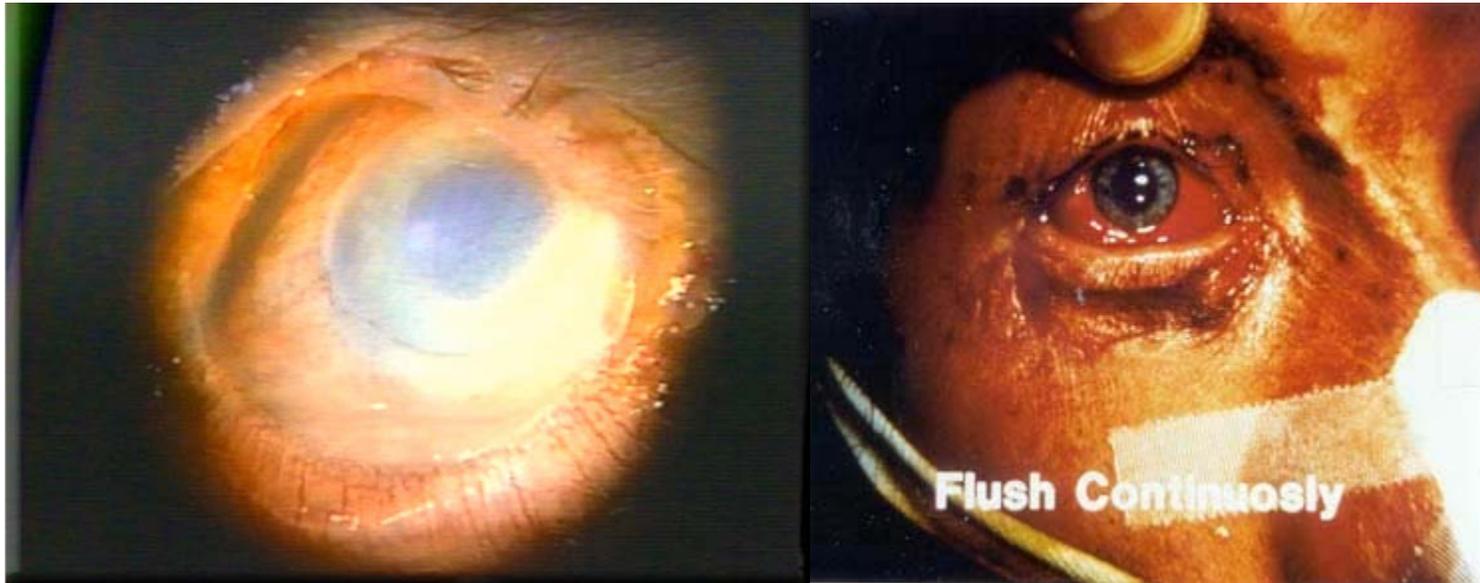
- *Critical* skin damage begins at 24.8°F and becomes irreversible at -18.5°F.
- The degree of tissue injury is proportional to the *duration* and *concentration* of exposure.
- Alkaline burns go *deeper* than acid burns.
- Alkali burns are yellow, soapy, and soft in texture. When burns are severe, skin turns black and leathery.



## What NOT to wear

Never wear contact lenses when working near ammonia!

Ammonia may become trapped behind the contact lens, increasing the risk of damage to the eye and reducing the effectiveness of the eyewash.



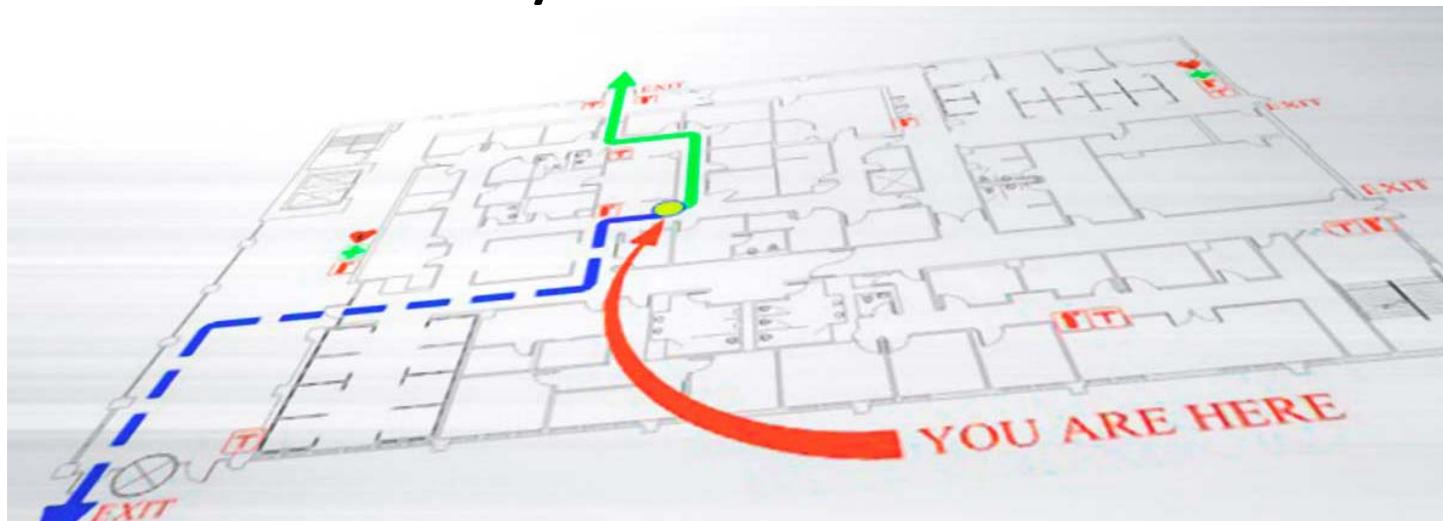
# Using the Windssock

- Windssocks can help you identify what way the wind is blowing. However be mindful of ground level wind shifts and eddies caused by structures
- In the event of an ammonia release you want to move upwind.



# Site Emergency Action Plan

- Required for every site which falls under the EPA's Risk Management Plan
- Includes evacuation Plan, Routes and Assembly points, **Fire** and **Chemical Release** as these are not always the same location



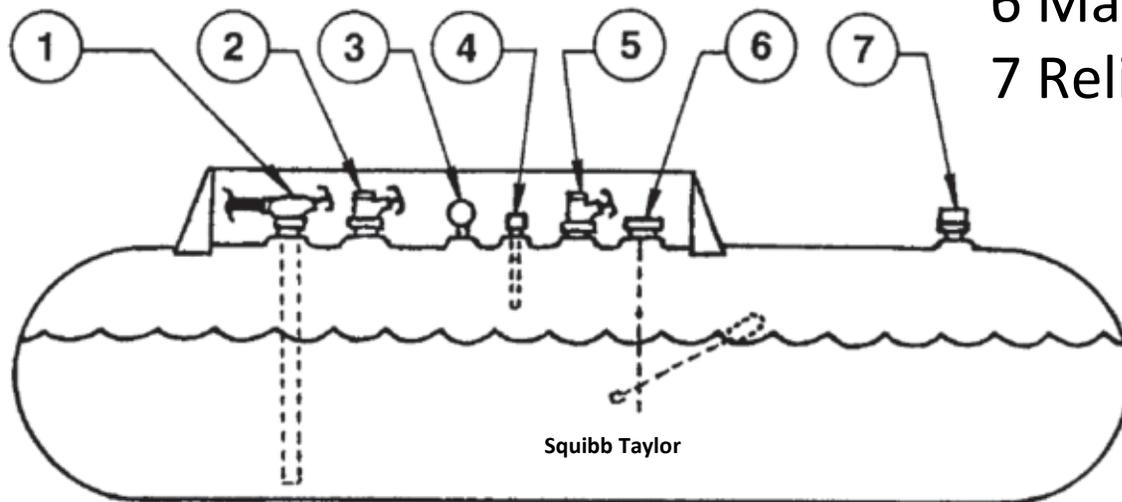
- Should be part of site safety orientation

# Traditional Nurse Tank

## Valve and Fitting Locations on an Anhydrous NH<sub>3</sub> “Nurse Tank”

### Key Number & Description

- 1 Liquid Withdrawal Valve (RED)
- 2 Liquid Filler Valve (RED)
- 3 Pressure Gauge
- 4 Fixed Liquid Level Gauge
- 5 Vapor Valve (YELLOW)
- 6 Magnetic Float Gauge
- 7 Relief Valve



# Nurse Tanks

## Accident Synopsis

About 11:50 a.m. central daylight time<sup>1</sup> on April 15, 2003, a nonspecification<sup>2</sup> cargo tank used by River Valley Cooperative (River Valley) exclusively for agricultural purposes as a nurse tank split open after being filled with anhydrous ammonia at River Valley's nurse tank filling facility near Calamus, Iowa. (See figures 1 and 2.) About 1,300 gallons of the poisonous and corrosive gas escaped, seriously injuring two nurse tank loaders, one of whom died from his injuries 9 days after the accident. Equipment repair and replacement costs associated with the accident totaled about \$3,100.



Figure 1. Accident nurse tank with shell fracture area circled.

National Transportation Safety Board  
Hazardous Materials Accident Report NTSB/HZM-04/01  
Nurse Tank Failure With Release of Hazardous Materials  
Near Calamus, Iowa April 15, 2003

# Nurse Tanks

## Damage

As a result of the accident, the front half of the bottom of the nurse tank shell split open. The 53.5-inch-long split was located about 6 inches to the right of center at the tank bottom (viewed from the back). The split was along one side of a longitudinal weld in the shell on the tank bottom. (See figure 4.) Equipment repair and replacement costs associated with the accident totaled about \$3,100.



**Figure 4.** Fracture running beside, to the left of, longitudinal weld (line of weld is marked with arrows).

National Transportation Safety Board  
Hazardous Materials Accident Report NTSB/HZM-04/01  
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# Transfer Hose

A black hose filled with anhydrous  $\text{NH}_3$  (both ends closed by valves) and heated in sunlight to  $115\text{ }^\circ\text{F}$  will develop an internal pressure of  $\sim 250\text{ psig}$ .

Question: Should lines and vessels need to have pressure relief methods.



**Ruptured Ammonia Hose**

Source: M.P. Jeppeson, "Anhydrous Ammonia, Health and Safety Issues", ASSE conference paper (June 2009)

# PREPLANNING METHODOLOGY

- **Preplanning** (verb) meaning you have to take ACTION
  - Preplanning is deciding how to get something done before starting on it.
  - An example of preplanning is making a list of how you're going to accomplish getting everything done in a day.
- Preplanning involves thoroughly examining, understanding, and documenting your process environment and management objectives.
- During preplanning you:
  - Analyze and document your current process environment.
  - Analyze your organization's needs and identify objectives.
  - Establish a test lab environment “ Analytical Thinking”.
  - Assemble the team.
  - Begin assembling the project plan.
- It is important, while performing these preplanning steps, that you understand your entire planning methodology and the risks involved. For more information about understanding an overall methodology and mitigating risks, see :
- **“ONE PLAN READINESS.”**

# Mitigation Usually Requires Action



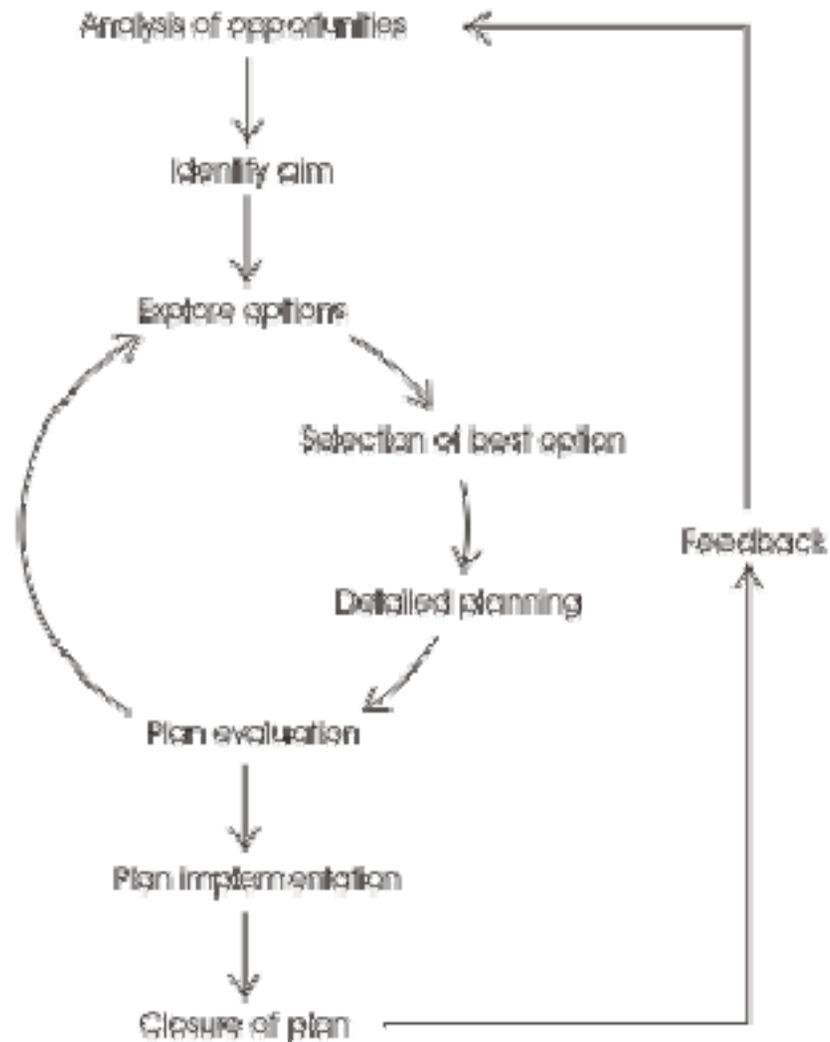
# The Planning Cycle

- The Planning Cycle brings together all aspects of planning into a coherent, unified process.
- By planning within this structure, you will help to ensure that your plans are fully considered, well focused, resilient, practical and cost-effective. You will also ensure that you learn from any mistakes you make, and feed this back into future planning and Decision Making.
- Planning using this cycle will help you to plan and manage ongoing projects up to a certain level of complexity – this will depend on the circumstance.

- It is best to think of planning as a cycle, not a straight-through process.
- Once you have devised a plan you should evaluate whether it is likely to succeed. This evaluation may be cost or number based, or may use other analytical tools. This analysis may show that your plan may cause unwanted consequences, may cost too much, or may simply not work.
- In this case you should cycle back to an earlier stage. Alternatively you may have to abandon the plan altogether – the outcome of the planning process may be that it is best to do nothing!
- Finally, you should feed back what you have learned with one plan into the next.
- The Planning Cycle is shown in figure 1:

# The Planning Cycle

Figure 1. The Planning Cycle



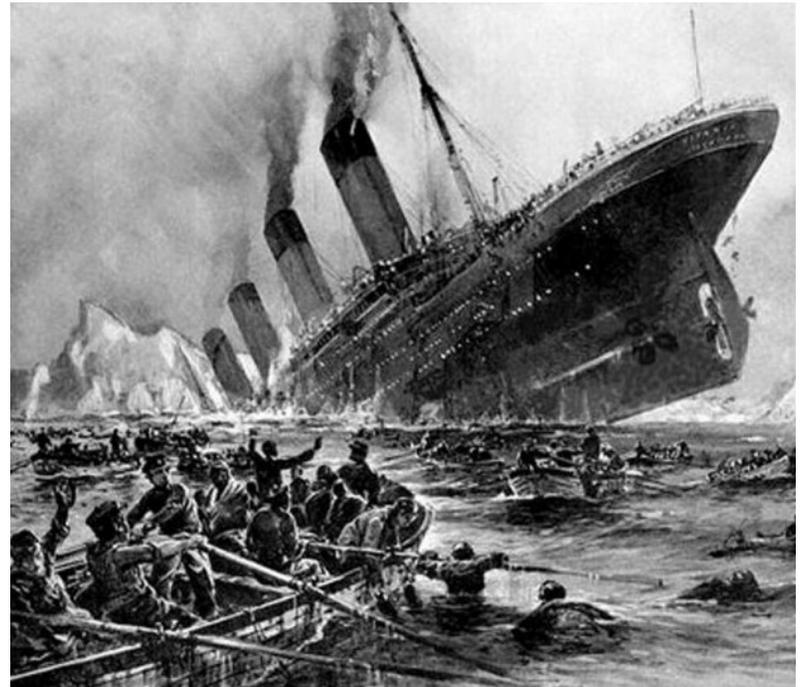
# The Planning Cycle

## Summary

- **Key Points:**
- The Planning Cycle is a process that helps you to make good, well-considered, robust plans.
- The first step, the analysis of opportunities, helps you to base the plan firmly in reality. The second, definition of the aim, gives your plan focus.
- The third stage is to generate as many different ways for achieving this aim as possible. By spending time looking for these you may find a better solution than the obvious one, or may be able to improve the obvious solution with parts of other ones.
- Next select the best approach, and make a detailed plan showing how to implement it. Evaluate this plan to make sure that it will be worth implementing. If it is not, return to an earlier stage and either improve the plan or make a different one. If no plan looks like producing enough benefit to justify the cost, make no changes at all.
- Once you have selected a course of action, and have proved that it is viable, carry it out. Once it is finished, examine it and draw whatever lessons you can from it. Feed this back into future planning.

# WHY DO PREPLANNING

April 15, 2012 marked the 100th anniversary of the loss of the ocean liner *Titanic* in the North Atlantic Ocean, approximately 2-½ hours after hitting an iceberg. Over 1,500 people died in the most famous maritime disaster in history. Thousands of pages have been written about the loss of the *Titanic*, as well as many documentary and fictional movies produced. Many focus on the construction of the ship and the actions of its captain and crew. Whatever the construction and operating issues, attention to one particular issue could have saved many lives



**Emergency Preparation and Preplanning**

# WHY DO PREPLANNING

- **Some specific failures in emergency preparedness before the sinking of the *Titanic* included:**
- Not enough lifeboats for all passengers and crew, perhaps because the builders considered the ship “unsinkable”!
- No lifeboat drills had been conducted, and many people did not know where to go or what to do.
- Many of the first lifeboats to leave the *Titanic* were not full and some occupants were reluctant to pull other people from the icy water for fear of capsizing their lifeboat.
- The decision to abandon ship was delayed while the captain and crew assessed damage. Had the captain started evacuation earlier, before people began to panic, more lifeboats may have been filled in a more orderly evacuation.

# WHY DO PREPLANNING

So you can repair emergency devices prior to really needing them or clear obstructions preventing their use.



STANDARD OPERATING PROCEDURES – AMMONIA UNLOADING (LOAD-IN) PROCEDURE	
SOP-8	
Ammonia Unloading Procedure (Load-in Procedure)	
Objective	This procedure is established to set forth Standard Operating Procedures (SOPs) for unloading ammonia from a tank truck to the ammonia refrigeration system.
Purpose	The purpose of the SOP is to provide the procedures for safely unloading ammonia to the ammonia refrigeration system.
Concerns	Careful attention to the level of ammonia in the high-pressure receiver and the condition of the unloading hose, which should be verified to be within date and is approved for ammonia work. It is important to this procedure because a release of ammonia can occur. Among the incidents we are trying to prevent are: Injury to operator(s) during the ammonia unloading procedure Potential fire and explosion due to formation of a flammable atmosphere and providing an ignition source
Department	Engineering
Operator/ Responsibility	Plant Engineer -Mr. LANCE Plant Manager - Mr. SIMPLE
Equipment	Main liquid ammonia intake port is located on the controlled pressure vessel, (CPR).
Location	Southwest corner of the building in controlled pressure vessel, (CPR) room.
Related documents	Inspection and Maintenance Records – in the Plant Engineer’s office. System Log Book – in the Plant Engineer’s office. Manufacturer's Installation and Operations documents – in the Plant Engineers office. Block Diagrams – in the PSM/RMP Program document –Plant Engineers office. P&IDs - in the PSM/RMP Program document – Plant Engineers office. Ammonia MSDS – in Right to Know notebook located in the hall at battery charging station. Copies of all documents – Plant Managers office.
Initial development date	Oct-02
Authorized by	
Revision	No. 0
Annual Review by	

	STANDARD OPERATING PROCEDURES – AMMONIA UNLOADING (LOAD-IN) PROCEDURE	
	Standard Operating Procedure (SOP)	
	Task Flow	
	Preparation & Preplanning	
	Assemble equipment	
	Ammonia unloading procedure	
Task	Step	Comment
Preparation	1. Be familiar with the emergency response procedures for the facility.	
	2. Know the location of the nearest eye wash/safety shower.	
	3. Know the location of the valves, which would have to be closed to isolate the line/equipment in an emergency.	
	4. Be familiar with ammonia first aid procedures.	
	5. Be familiar with the line and equipment opening procedures (SOP7).	
Assemble equipment	Before going to the ammonia unloading procedure, assemble the following equipment:	
	• Elbow-length rubber gloves	
	• Splash goggles and face shield	
	• Clean bucket containing water or quick access to a water hose.	
	• Closed valve markers and locks	
	• Emergency service bucket containing a full face type gas mask, eye wash bottle, pipe wrench	

Ammonia unloading procedures	1. Notify personnel and supervisors in the area that ammonia-unloading procedures are to be carried out.	
	2. Ensure that a backup person (buddy-system), in addition to the delivery tank truck driver, is available for the remainder of these procedures.	
	3. Check the documents provided by the delivery tank truck to ensure delivery of the correct grade and purity of ammonia.	
	4. Ensure that the driver of the tank truck has pulled the tank truck as close as possible to the unloading line to minimize the potential for accidents.	
	5. Ensure that the delivery truck driver locks the truck's brakes and chocks the wheels. Use yellow caution tape to isolate the area. Use cones to protect hose from any vehicle traffic.	
	6. Allow the delivery person to use his checklist to check the equipment and conditions in the refrigeration room.	
	7. Slowly remove the cap from the unloading line at the controlled pressure receiver (CPR). Install proper adaptor for liquid hose. CPR 1-19	

	<p>8. Work with delivery driver as required. Unroll the ammonia hose and inspect it carefully for cracks or other signs of wear that could result in hose failure and to ensure it is rated for ammonia service and verify that it is within date. Never use a hose that is in poor condition or that is not rated and is verified safe and in date for ammonia service.</p>	
	<p>9. When you have completed the above steps, give the go ahead to the delivery person that he may connect the hose to the tank truck and to the unloading line.</p>	
	<p>10. Plant engineer or plant operator should monitor the delivery person as he closes the bleed valve on the unloading hose.</p>	
	<p>11. Open the valve in the unloading line at the CPR and the manual valves on the tank truck.</p>	
	<p>12. Monitor closely as truck pump is started and begin unloading ammonia to the CPR. Verify that the pump flow direction indicator shows proper flow direction. Be sure to monitor the levels in the controlled pressure receiver and in the tank truck.</p>	
	<p>13. When the ammonia unloading is completed, close the unloading valve located on the tank truck first and then close the valve located on the CPR.</p>	
	<p>14. See that the pump down system on the truck is used to pump down any residual ammonia in the unloading hose back to the truck.</p>	

	<p>15. Open the bleed valve to drain any residual ammonia in the unloading hose into a bucket of water. When there is no more ammonia in the hose, close the bleed valve and disconnect the bleed hose and the unloading hose.</p>	
	<p>16. Wait approximately 10 min. to let any residual oil drip off the unloading line. Then replace the cap on the unloading line.</p>	
	<p>17. Be sure to monitor the level in the high-pressure receiver over the next several hours.</p>	
	<p>18. After the work is completed, notify the area personnel, the supervisors, and the backup personnel.</p>	

At the end of the  
day everyone  
deserves to go  
home to their  
family



# How are you going to train them

- Adults learn best by utilizing three primary information processing modes. These are:
  - **1. Visual (images)**
  - **2. Auditory (sounds)**
  - **3. Kinesthetic (feeling or action)**

# How People Learn

## 1. Visual (images)

Visual learning is strong in all people, however it is more pronounced in some. Visual learners learn best when they can:

- “See” what a presenter, book, or computer program is talking about.
- “See” examples, diagrams, and images of what they are learning about.
- “Create” images of what they are learning.

Examples of elements that incorporate visual learning include:

- Action pages with fill-in-the-blanks, sample calendar pages, or case studies.
- Visualization. Have learners describe a picture or image that comes to mind when they think of topics such as credit, children learning about money, or insurance.
- Images and pictures as well as words in PowerPoint presentations.
- Videos relating to topics, such as developing and managing a spending plan, solving consumer problems, or culture and resources.
- Graphics, such as a circle with spokes extending from the outer edge.

Learners write the word “debt” in the circle and on each spoke write one thing they can do to pay off their debt. Or have them draw a picture of a bank in the circle and on each of the spokes draw pictures that are associated with a bank.

# How People Learn

## 2. Auditory (sounds)

All learners, especially those with strong auditory sense, learn by talking and hearing.

Auditory learners learn best when they:

- Read out loud.
- Talk about their experiences and what they are learning.
- Talk out loud when solving problems, learning new skills, or making action plans.

Examples of activities that incorporate auditory learning include:

- Incorporating action pages that provide discussion, and small group work where learners talk out loud when solving problems or working on activities.
- Asking learners to share what they already know about a topic such as, “What is something you do or can do to reduce spending?” or “Share one thing you know about credit.”
- Asking learners a variety of questions on a topic and letting them share the answers out loud.
- Having learners take turns reading out loud from one of the Action Pages. Offer this as an option to learners. Note, it is important to know your class well before this is an option. Not everyone feels comfortable reading out loud.
- Dividing the class into pairs or small groups and have them discuss why the information they learned—such as understanding your pay statement or developing an emergency savings—is important.
- Letting learners create a question about what they have learned, such as “What are two things you want to remember when making decisions about money?”. Share the question and answer within a small group or the larger group.

# How People Learn

## 3. Kinesthetic (feeling or action)

Moving and doing improves brain circulation and enhances learning. Kinesthetic learners do best when they:

- Use hands-on learning.
- Stand and move about when learning.
- Do something that involves body movement.

Examples of activities that incorporate kinesthetic learning include:

- Having learners circle or highlight action page key concepts and terms that are important to remember within each of the units.
- Letting learners interact with written material by filling in blanks on action pages, discussing answers to true or false questions, or practicing concepts.
- Asking learners to stand up and tell the person next to them two important ways a spending plan can help them. Ask them to sit when they are done.
- Asking learners to stand up and toss a soft object, such as a stress ball, to another person in the group stating an action step they plan to take after completing the class. Keep tossing the object until all have had a chance to participate.
- Having learners write on an index card a question, comment, or concept they learned. Have them walk around the room trading cards with others several times. Tell them when to stop. Give them instructions as to what they are to do with the card they now have, such as read the card aloud, answer the question, or discuss cards they think are most important.

# How People Learn

It is important to incorporate a variety of activities, being sensitive to different types of learner levels and learning styles. Provide activities that create interest and practice what has been learned. Adults often learn or remember the following after one month:

- 10% of what they read.
- 20% of what they hear.
- 30% of what they see.
- 50% of what they see and hear.
- 70% of what they say.
- 90% of what they do and say.

## **What can you do?**

Process plants may conduct many types of emergency drills. Fire, leak or spill response, shelter-in-place, evacuation, and severe weather are some common types. Be aware of your responsibility in each situation – it may be different.

In a drill or actual emergency, watch for others who may not remember what they should do, especially new employees, visitors and contractors. Help them to respond safely.

- Promptly report any problem you observe during a drill or emergency to your supervisor. Some examples – actions which cannot be done in the available time, things you can't do safely because of the emergency condition, exit signs that can't be seen or are confusing, emergency alarms or speakers that can't be heard, required safety equipment which is not available or not working properly. Report your observations - it may save a life some day.
- Take drills seriously and remind others that they should as well. Don't think of drills as a time to see people from other crews or departments and let the drill become a social event.
- When you read about incidents in other industries, ask yourself if there is anything you can learn from what happened to make your plant safer!
- Don't let your plant "sink" due to a poor emergency plan or lack of knowledge of how to respond.