

PROPER PRIORITY FOR EMERGENCY RESPONSE

LANCAGE

LIFE SAFETY
→ Escape/Rescue

ALERT
→ Employees/Response Team

NOTIFY
→ Call 911

CONTAIN
→ Close the door!

EVACUATE OR SHELTER IN PLACE?
→ Lateral and upwind

ASTI issued protective helmet.

Protective eye goggles.

Full-face air purifying respirator.

30 minute safety plan.

Safety jacket.

Safety gloves.

Radio or walkie talkie.

400 PPM NH₃ monitor.

Flashlight.

Safety boots.

SIZE UP:

- ▶ Rescue live victims?
- ▶ What is the type of release:
 - aerosol?
 - low or high pressure gas?
 - liquid?
- ▶ What happened?
- ▶ What did you do?
- ▶ What do you plan to do next?
- ▶ Is there any downwind or downstream effect?



EVACUATE OR SHELTER IN PLACE?

REACT TO THE WARNING—ALERT— COMMUNICATE WITH THE EVACUATION COORDINATOR

- ▶ Call or radio for instructions.
- ▶ Check status of the emergency.
- ▶ Track the release.
- ▶ Check the direction of the wind.
- ▶ Move lateral and upwind.

THE DECISION: SHELTER IN PLACE OR EVACUATE?

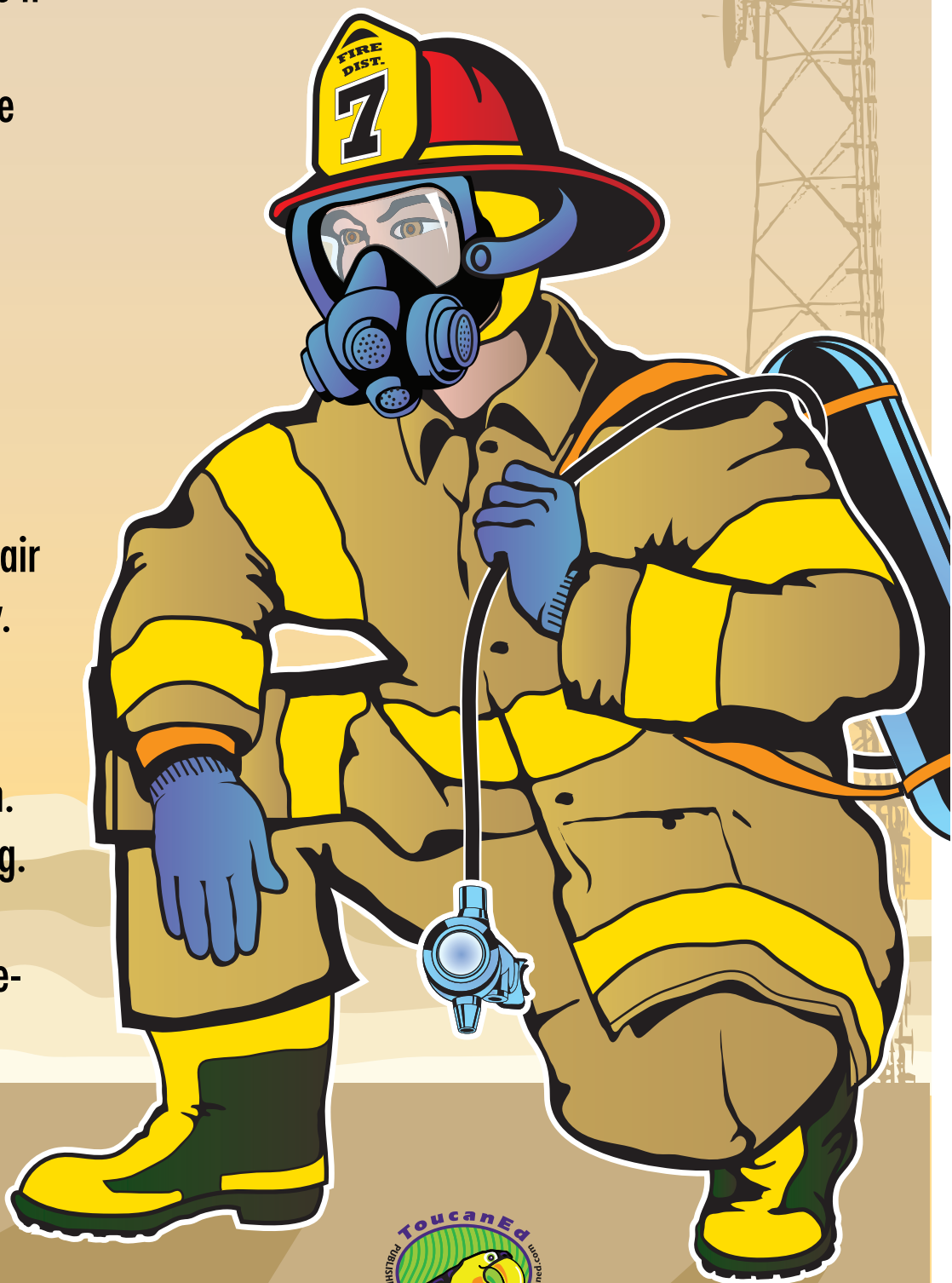
- ▶ Where is the release? What is the amount of the release? What type of release? What direction is it traveling?
- ▶ Are there strong odors outside? Is there a visible cloud?
- ▶ Remember—you can always return to the structure to shelter in place if escape to the outside is dangerous.

MOVING INSIDE TO SHELTER IN PLACE

- ▶ Get inside—close the doors and windows; seal air gaps with duct tape or towels to prevent airflow.
- ▶ Shut down heating, ventilation, and air conditioning.
- ▶ Tune into the local emergency broadcast system.
- ▶ Call 911 if the odor of ammonia becomes strong.
- ▶ Public safety officials will focus on tracking the release and dealing with the highest priority life-safety concerns.

EVACUATION—RECOGNIZE AND RESPOND TO THE CALL

- ▶ Avoid the cloud or heavy odors of ammonia.
- ▶ Move lateral and upwind to the assigned gathering point.
- ▶ Communicate with Scene Manager or Evacuation Coordinator.
- ▶ Have a second way out.
- ▶ Avoid emergency response routes.
- ▶ Roll-call—check the status of employees, visitors, and guests.
- ▶ Notify downwind/downstream threats and risks.



CHARACTERISTICS OF

AMMONIA

CHEMICAL CHARACTERISTICS

- ▶ Boiling Point: -28° F at zero psig
- ▶ Latent Heat: 590 Btu/lb
- ▶ Vapor Pressure: 114.1 psig at 70° F
- ▶ Avoid: Chlorine, acid, copper, zinc and alloys
- ▶ Flammability: High concern for confined space dense accumulation of an ammonia 1204° F Ignition Temperature 16%–25% flammable limits
- ▶ Disassociates at 842° F and liberates hydrogen
- ▶ Vapor Density: 0.6; air is 1:00
- ▶ Expansion Rate: 1 cu. ft. liquid at -28° F will expand to 766.9 cu. ft. of gas

PHYSICAL CHARACTERISTICS

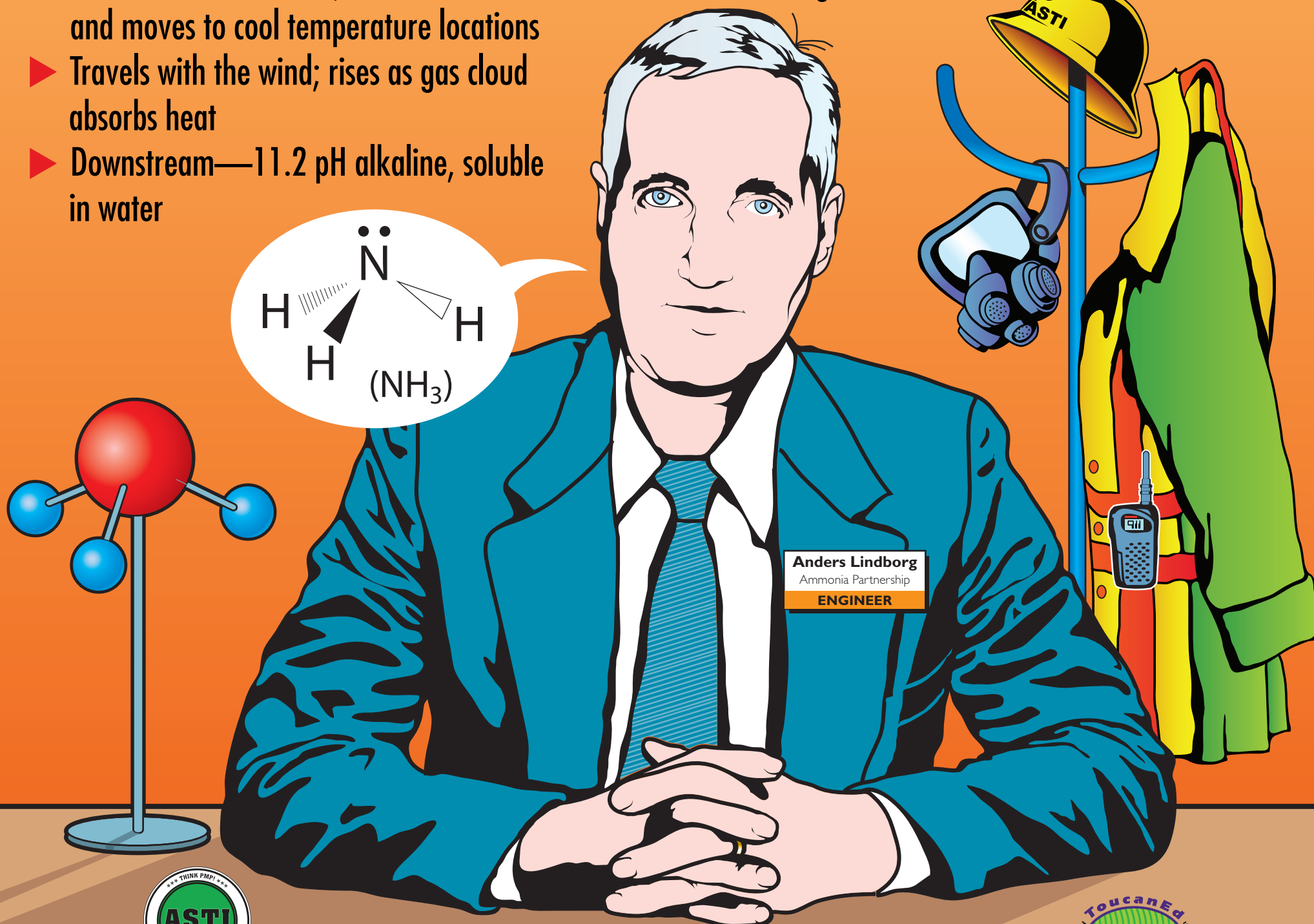
- ▶ Types of Release: Vapor, Dense Gas, Aerosol and Liquid
- ▶ Downwind—V-Pattern, attracted to moisture and moves to cool temperature locations
- ▶ Travels with the wind; rises as gas cloud absorbs heat
- ▶ Downstream—11.2 pH alkaline, soluble in water

RISKS AND HAZARDS

- ▶ Fire—caution for dense cloud, especially when confined in a room with a source of ignition
- ▶ Overpressure—know the high- and low-side cut-out pressures
- ▶ Release—aerosol, dense gas, vapor or liquid
- ▶ Human Error—mistakes and poor attitude
- ▶ Disaster—fire, storm, earthquake, flood, etc.

HEALTH RISKS

- ▶ Respiratory—25 ppm to 300 ppm action levels; 5,000 ppm airway spasms; 30,000 immediate burns/blisters
- ▶ Eye exposure—15 to 30 minutes of water!
- ▶ Skin tissue freeze burns: from a liquid contact exposure—use water to thaw before removing clothing



TAKE A BREATH - THINK SIMPLE

SIMPLE

SOURCES OF IGNITION

➔ 16% to 25% mixture with air

ISOLATE THE RELEASE

➔ Manage liquid

MANAGE PRESSURE

➔ Drop high-side pressure

POS. PRESSURE VENTILATION

➔ Plan downwind

LANCE AGAIN

➔ Track and update

EMERGENCY RESPONSE PLAN

➔ 30 Minute Plan



THE SELF ALARMING LIQUID!

SAL MONIA

FOUR WAYS I EXIST

- 1. Aerosol:** I am a sub-zero cone of concern.
- 2. Dense gas:** I am buoyant and float like a cloud—because I mix with the humidity in the air.
- 3. Vapor:** I travel with the wind and on a hot dry day will move fastest to the upper atmosphere.
- 4. Liquid:** I boil off, sub-cool all my surroundings and settle down. If you pour a little water on me you will see me react with a spitting gas cloud!

WHAT TO DO

- ▶ If I am released—you can escape laterally and upwind or shelter in place.
- ▶ If you breathe me in—get to fresh air and breathe in and out deeply. If it hurts in your chest when you breathe, seek medical attention.
- ▶ If I get on you and freeze to your clothing—thaw me out immediately in water.
- ▶ If I get on you as a liquid—get your clothes off and rinse with tap water for 15 to 30 minutes.

DON'T BE AFRAID OF ME.

- ▶ Replace fear with knowledge.

I TRAVEL IN THE "COOL" WITH THE WIND.

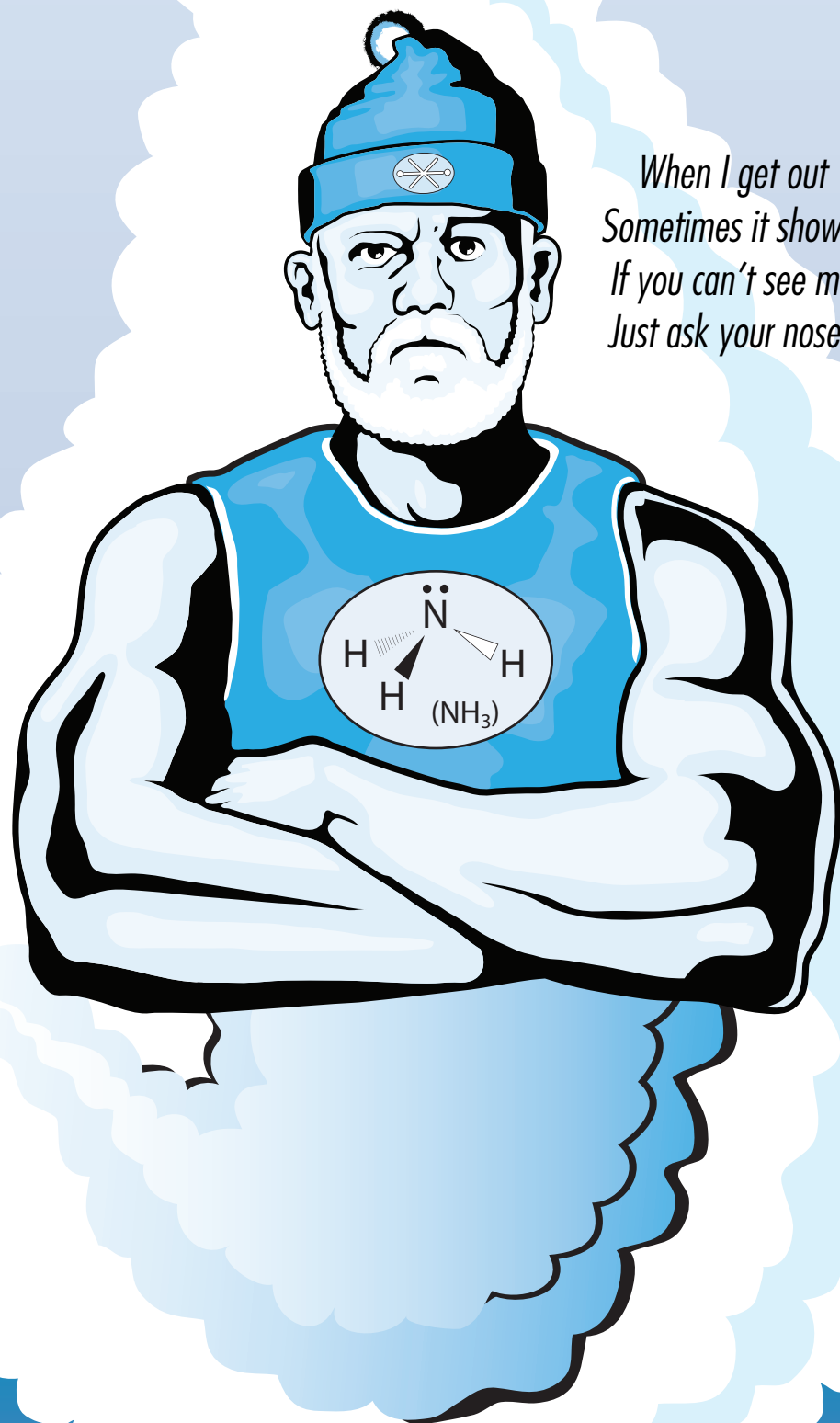
- ▶ I will evaporate to the upper atmosphere as a natural part of our environment.

I LOVE WATER!

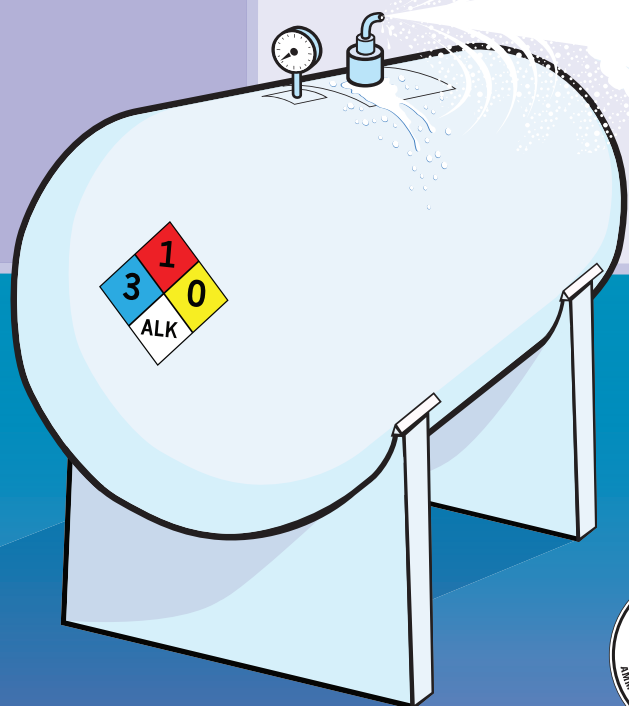
- ▶ I seek humidity, bodies of water, plant life and YOU!

WEAR YOUR SAFETY GEAR IF YOU LET ME OUT!

- ▶ Helmet, overalls, gloves, chemical goggles, face shield and breathing protection.



*When I get out
Sometimes it shows,
If you can't see me
Just ask your nose!*



**Use PMP to PREVENT THEM ALL AND
EFFECTIVE RR TO STOP THEM SMALL!**

PMP & RR

PREVENT

- ➔ Inspect
- ➔ Maintain
- ➔ Act safely

MITIGATE

- ➔ Build in control
- ➔ Reduce risk through engineered solutions

PREPARE

- ➔ Train
- ➔ Build good plans
- ➔ Use personal protective equipment
- ➔ Collaborate

RESPOND

- ➔ Use 30 Minute Plan
- ➔ Coordinate with public safety

RECOVER

- ➔ Transition to terminate the incident safely
- ➔ Debrief
- ➔ Save product
- ➔ Clean up

