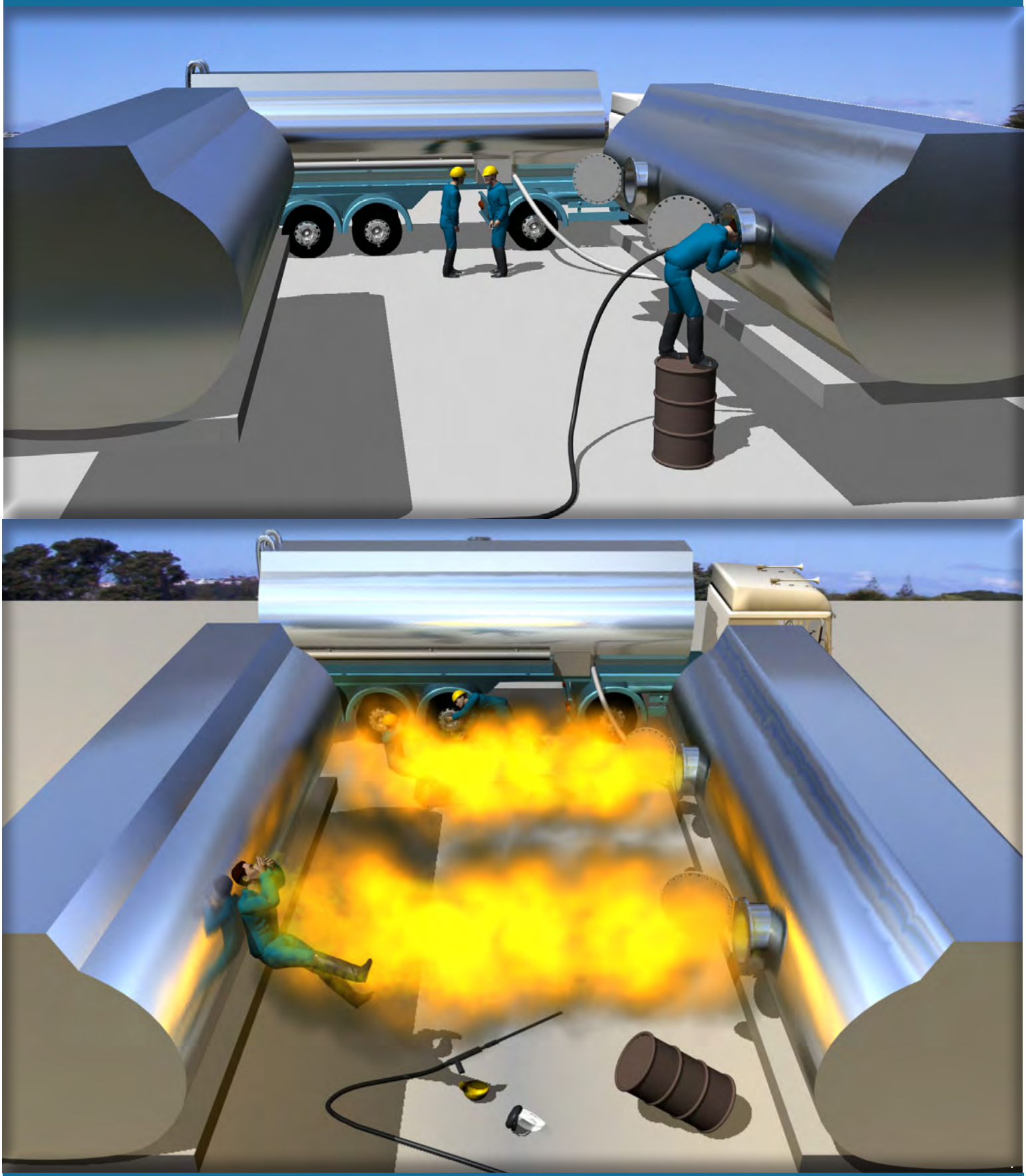
Communication Best Practice
Lessons Learned



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Larkin Communication Consulting

Communication Best Practice

Large Drawing
increases recall up to 800%

Writing Complexity
grade level 8;
50% of adults read at this level

Text Boxes
separating paragraphs into small text boxes increases comprehension by 20%

Color
increases time spent looking at page by 21%

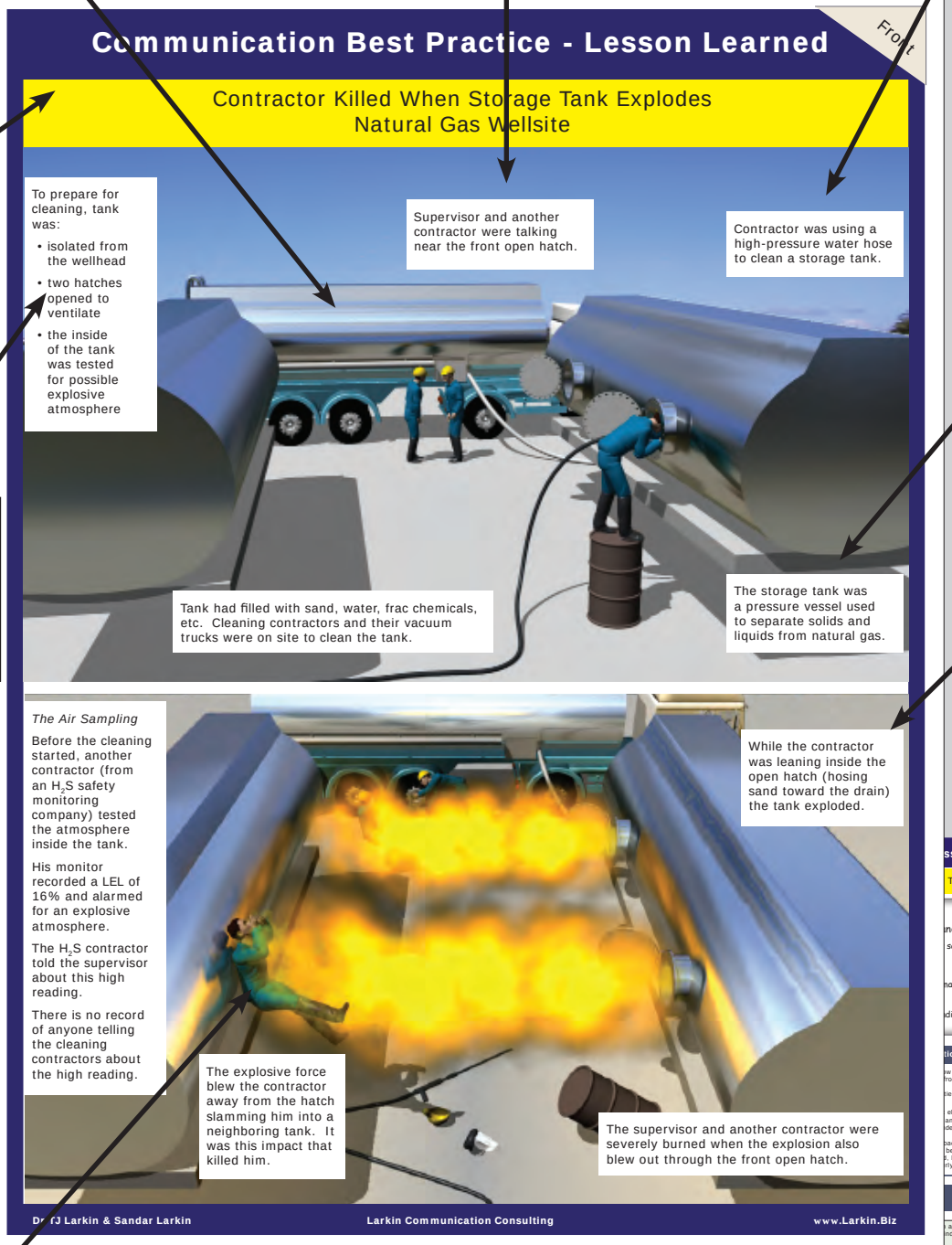
Lists / Dot Points
more than twice as many people will read a paragraph if sentences are replaced with a list or dot points

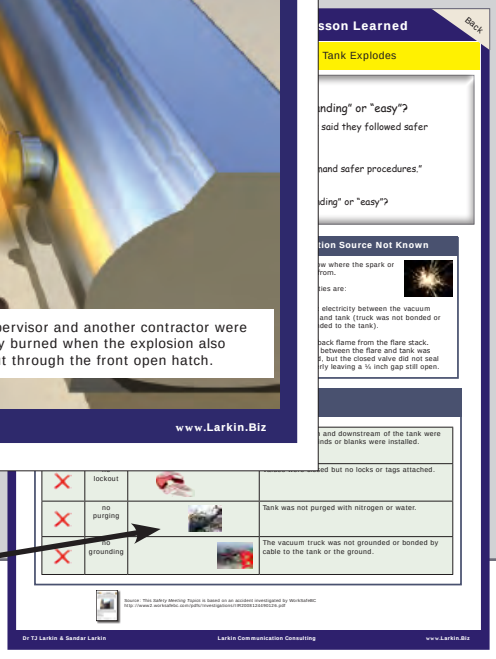
Line Length
3½ inches best length for accurate reading

Verdana Font
best font for reading online

Disturbing Image
fear-appeal image makes it 50% more likely employees will change their behavior

Back Page
- talking points
- background information
- links to source documents





Lessons Work When Leaders Talk About Them

r = –0.65

The correlation between supervisors' informal conversations about safety and serious accidents in eight Dutch chemical plants.

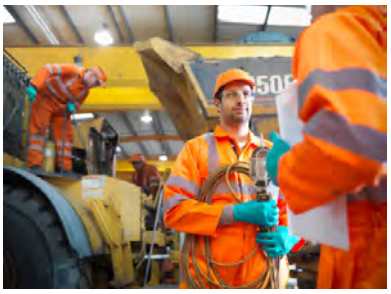
Sicco van As: "Communication and Industrial Accidents," SOM Research Report, University of Groningen, The Netherlands.

Only 3% of employees will change their behavior based solely on something they read.

70% of employees who change their behavior do so after a face-to-face conversation with their supervisor.

Rogers, E. M.: *Diffusion of Innovations*, New York, The Free Press, 1962.

Clampitt, Phillip G.: "Employee Perception of the Relationship Between Communication and Productivity: A Field Study," The Journal of Business Communication, vol. 30, no. 1, 1993, p. 5-27.



Compliance with written safety standards climbed from 47% to 74% when supervisors personally asked for the compliance.

Wogalter, Michael S.; Vincent C. Conzola; Tonya L. Smith-Jackson: "Research-Based Guidelines for Warning Design and Evaluation," Applied Ergonomics, vol. 33, 2002, p. 219-230.

When supervisors talk about safety, unsafe acts go down.

supervisors informal conversations about safety	unsafe material handling	r = –0.75
	unsafe electrical work	r = –0.81
	failing to use PPE	r = –0.86

Zohar, Dov and Gil Luria: "The Use of Supervisory Practices as Leverage to Improve Safety Behavior: A Cross-level Intervention Model," March 2003

Communication Best Practice - Lesson Learned

Sample #1

Nitrogen Asphyxiation During Turnaround

One Employee Died

Communication Best Practice - Lesson Learned

Nitrogen Asphyxiation During Turnaround

Employee killed. Supervisor seriously injured.

Nitrogen asphyxiation while working under a black plastic sheet.

Employee and supervisor cleaned the flange on a 48 inch pipe.

They did a black light inspection looking for any left over dirt or grease on the flange surface.

To see better in the bright sunlight, they covered the pipe opening with a black plastic sheet and climbed underneath.

The supervisor forgot he ordered a nitrogen purge the night before.

Derived from Chemical Safety Board Investigation: Report# 98-05-I-LA

Communication Best Practice - Lesson Learned

Explanation - Nitrogen Asphyxiation

During a turnaround, an oxygen feeder was removed for cleaning.

This left a 48-inch pipe opening.

After cleaning the flange, the supervisor and employee did a black light inspection.

Black light will reveal left over dirt or grease.

In the bright sunlight, they could not see the black light results.

So, they found a black plastic sheet, covered the pipe end, and they climbed underneath.

Two crane riggers were nearby ready to lift the oxygen feeder back into service.

It was windy, so the supervisor and employee asked the riggers to hold the plastic sheet in place around the pipe opening.

After 20 minutes, the riggers became concerned because there was no talking coming from under the plastic sheet.

The riggers looked under the sheet.

The riggers found the employee:

- face down
- half inside the pipe
- his skin color was purple
- he was dead on arrival at the hospital

The riggers found the supervisor:

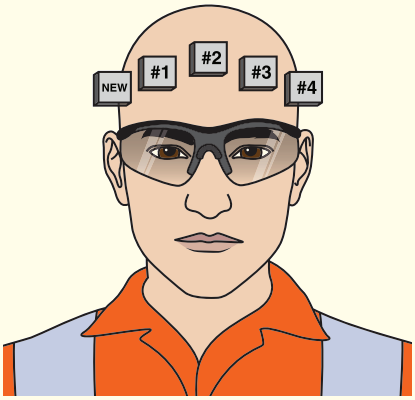
- unconscious
- leaning against the pipe flange
- facing out
- he suffered serious injuries from oxygen deprivation

Lessons - Nitrogen Asphyxiation

Talking Points

You Can Only Remember 4 Things Without Writing Them Down

- The supervisor forgot he ordered a nitrogen purge the night before.
- This forgetting is normal.
- Humans, on average, can only remember around 4 things in their "working memory."
- The brain can store more information in its long-term memory, but the part of the brain devoted to current "at hand" tasks (working memory) holds only about 4 items.
- As a 5th item is added, an older item is dropped out of the working memory.
- During a major turnaround, with so many demands on a supervisor, it was inevitable he would add a 5th item—the purge dropped out of his working memory.
- That's why we post signs.
- That's why we write things down.



Cowan, Nelson: "The Magical Mystery Four: How is Working Memory Capacity Limited, and Why?" https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2864034/

Download more samples:

Lessons Learned Brochure

www.Larkin.Biz

This Lesson is derived from:

Chemical Safety Board Summary Report: Nitrogen Asphyxiation; Report # 98-05-I-LA.

CSB has not previewed or approved our interpretation.

Communication Best Practice - Lesson Learned

Sample #2

Scissor Lift Truck Rises Unexpectedly

One Painter Died

Communication Best Practice - Lesson Learned

Painter Dies When Scissor Truck Goes Up Unexpectedly

Derived from WorkSafeBC Incident Investigation Report 2013124710035

What Happened - Painter Dies in Scissor Truck Accident

What they were doing:

A painter and his assistant were painting a sprinkler pipe.

They were working about 2½ feet below the ceiling.

Since the sprinkler pipe ran close to a wall, they were unable to get the truck directly under the pipe, so both workers were leaning over the top guardrail.

As they were painting the ceiling side of the sprinkler pipe, they held a mirror in one hand and paint brush in the other hand.

What happened:

The painter leaned over the top guardrail where the control panel was attached.

The painter's safety harness or perhaps overalls became entangled around the control panel joystick.

While leaning over, he unintentionally pushed the joystick forward causing the platform to go up.

The painter screamed: "What's happening?" and then, "Why is it going up?"

Since they were already working close to the ceiling, the two painters had only 5 seconds to get their bodies back inside the guardrails.

The last moments:

First, the painter attempted to untangle his clothing from the joystick.

Then, the painter tried to pull himself back inside the guardrails.

The assistant painter managed to get back inside the guardrails.

The painter didn't make it. His head became stuck between the top guardrail and the ceiling.

As his body was still pushing the joystick forward, the platform continued to rise putting ever increasing pressure on his head.

Two electricians working nearby heard the screaming and ran to the scissor truck.

They opened a compartment at the base of the truck and pushed an emergency stop button.

This caused a drop in the hydraulic pressure and slowly the platform began lowering.

The painter fell unconscious onto the platform and died a few hours later in the hospital.

Assistant painter couldn't find the emergency stop button:

The assistant painter desperately looked for the emergency stop button located on the control panel.

Finding the emergency stop button was difficult because the painter's body was covering the control panel.

Worse, the assistant painter was looking for a red mushroom-capped emergency stop button—but the cap was missing—only a slender pin protruded from the button casing.

The assistant painter, not trained to operate the scissor truck, did not notice the slender pin. If he had pressed the pin in, the platform would have stopped rising.

Communication Best Practice - Lesson Learned

Primary Cause: Control Panel in Very Poor Condition

Lock ring broken:

Normally, the lock ring must be raised before the joy stick is operational.

But, the lock ring was broken.

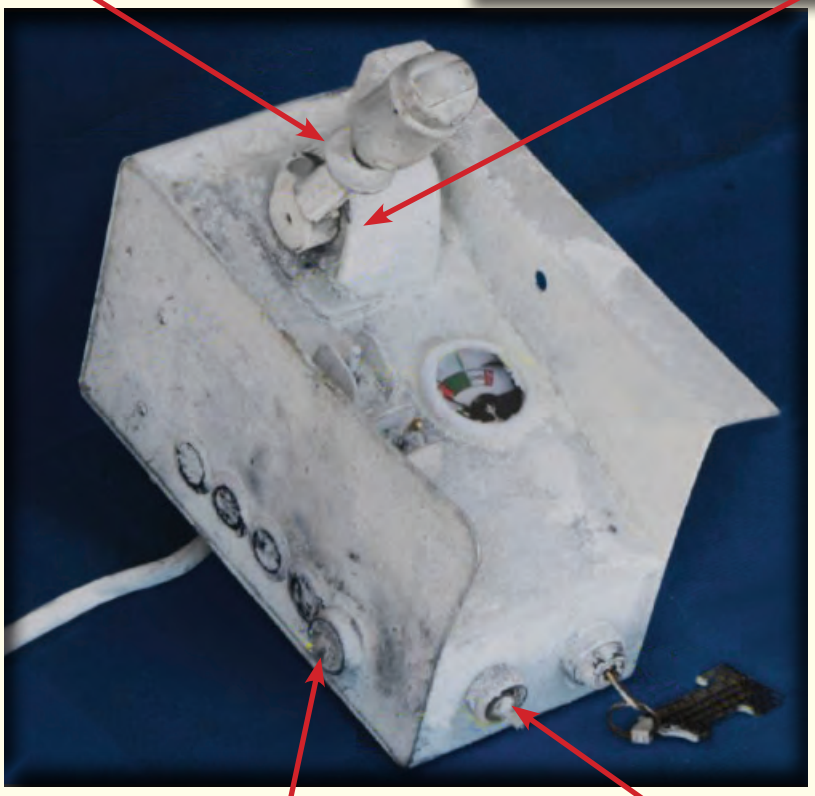
Joystick did not stick in neutral:

Normally, the joystick "sticks" in neutral. A pin on the joystick slides into a groove cut into its housing. This holds the joystick in neutral.

However, the entire control panel was covered with over-spray paint.

Paint filled the groove so the joystick pin no longer slipped into the groove and held in place.

Now, the slightest pressure (around 1 kg of force) was enough to move the joystick.



Enable switch overridden by employees:

The scissor truck design required "two-hands-on" operation.

The truck should not move, go up, or down unless an enable switch was pressed in with one hand, and the joystick moved with the other hand (with fingers raising the joystick lock ring).

Employees bypassed this feature by drilling two small holes into the enable button housing and then sliding a thin nail through the holes. This override kept the enable switch permanently pressed in.

Investigators found "two-hands-on" operation was "hated" by employees because it left them with no free hand to hold onto the guardrail when they were moving the scissor truck.

Overriding the enable switch allowed the driver to operate the joystick with one hand, and hold onto the guardrail with the other hand. Investigators found employees frequently override the enable button when using this type of scissor truck.

Emergency stop button missing its cap:

Months before this tragedy, the red mushroom-cap had fallen off the emergency stop button.

All that remained was a thin pin sticking out from the button housing.

The pin would have stopped the platform rising if it was found and pressed in.

The assistant painter did not know the cap was missing, and he was not trained to operate a scissor truck.

He frantically searched for the red mushroom-caped button and of course he never found it.

Lessons - Painter Dies in Scissor Truck Accident

Talking Points

When Defective Equipment Seems Normal

- The problems with this scissor truck's control panel were not new—they existed for months.
- Employees had grown used to these defects.
- Before beginning work, the painter completed a "Pre-Use Inspection Checklist." He did not mark anything as defective.
- These defects seemed normal to him.
- Let's talk about our equipment. What defects are we ignoring?
- What equipment defects could kill one of us today?

Overriding Safety Devices

- This scissor truck was designed for "two-hands-on" operation.
- This truck was designed to not move, go up, or down without using two hands: one hand pressing the enable button—while the other hand moves the joystick.
- Employees "hated" this two-hands-on design because it left no free hand to hold onto the guardrail, especially important when they were moving the truck to a new work location.
- So, they overrode it.
- What safety devices do we override?
- How could our overrides come back to hurt us?
- Can we get design changes made so these overrides are not necessary?

This lesson learned is derived WorkSafeBC Incident Investigation Report #2013124710035:

Scissor lift platform rises pinning worker between guardrail and ceiling

WorkSafeBC has not previewed or approved our interpretation.

Communication Best Practice - Lesson Learned

Sample #3

Storage Tank Exploded

One Contractor Killed

(Natural Gas Wellsite)

Communication Best Practice - Lesson Learned

Contractor Killed When Storage Tank Exploded Natural Gas Wellsite

To prepare for cleaning, tank was:

- isolated from the wellhead
- two hatches opened to ventilate
- the inside of the tank was tested for possible explosive atmosphere

Supervisor and another contractor were talking near the front open hatch.

Contractor was using a high-pressure water hose to clean a storage tank.

Tank had filled with sand, water, frac chemicals, etc. Cleaning contractors and their vacuum trucks were on site to clean the tank.

The storage tank was a pressure vessel used to separate solids and liquids from natural gas.

The Air Sampling

Before the cleaning started, another contractor (from an H_2S safety monitoring company) tested the atmosphere inside the tank.

His monitor recorded a LEL of 16% and alarmed for an explosive atmosphere.

The H_2S contractor told the supervisor about this high reading.

There is no record of anyone telling the cleaning contractors about the high reading.

While the contractor was leaning inside the open hatch (hosing sand toward the drain) the tank exploded.

The explosive force blew the contractor away from the hatch slamming him into a neighboring tank. It was this impact that killed him.

The supervisor and another contractor were severely burned when the explosion also blew out through the front open hatch.

Communication Best Practice - Lesson Learned

Lessons - Contractor Killed When Storage Tank Explodes

Talking Points

When it comes to safety, are we "demanding" or "easy"?

During the incident investigation, the cleaning contractors said they followed safer procedures at other sites.

Why didn't they follow safer procedures at this site?

Because, they said: "the supervisor at this site did not demand safer procedures."

Many of us have experience at other sites.

When it comes to safety, what kind of site are we: "demanding" or "easy"?

Sampling Result Not Communicated

H_2S contractor found an explosive atmosphere inside the storage tank.

H_2S contractor told the supervisor about this dangerous result.

But, this dangerous result was not communicated to the cleaning contractors.

Worse, the dangerous result was not posted at the tank hatches.

Ignition Source Not Known

We don't know where the spark or flame came from.

Two possibilities are:

1. Static electricity between the vacuum truck and tank (truck was not bonded or grounded to the tank).
2. Flashback flame from the flare stack. Valve between the flare and tank was closed, but the closed valve did not seal properly leaving a ¼ inch gap still open.

Other Serious Problems

X	no isolation		Values upstream and downstream of the tank were closed but no blinds or blanks were installed.
X	no lockout		Values were closed but no locks or tags attached.
X	no purging		Tank was not purged with nitrogen or water.
X	no grounding		The vacuum truck was not grounded or bonded by cable to the tank or the ground.

Source: This *Safety Meeting Topics* is based on an accident investigated by WorkSafeBC

Communication Best Practice - Lesson Learned

Sample #4

Pneumatic Plug Fires From Pipe

One Employee Killed

(Oil Refinery)

Communication Best Practice - Lesson Learned

Pneumatic Plug Fires From Pipe and Kills Employee (Oil Refinery)

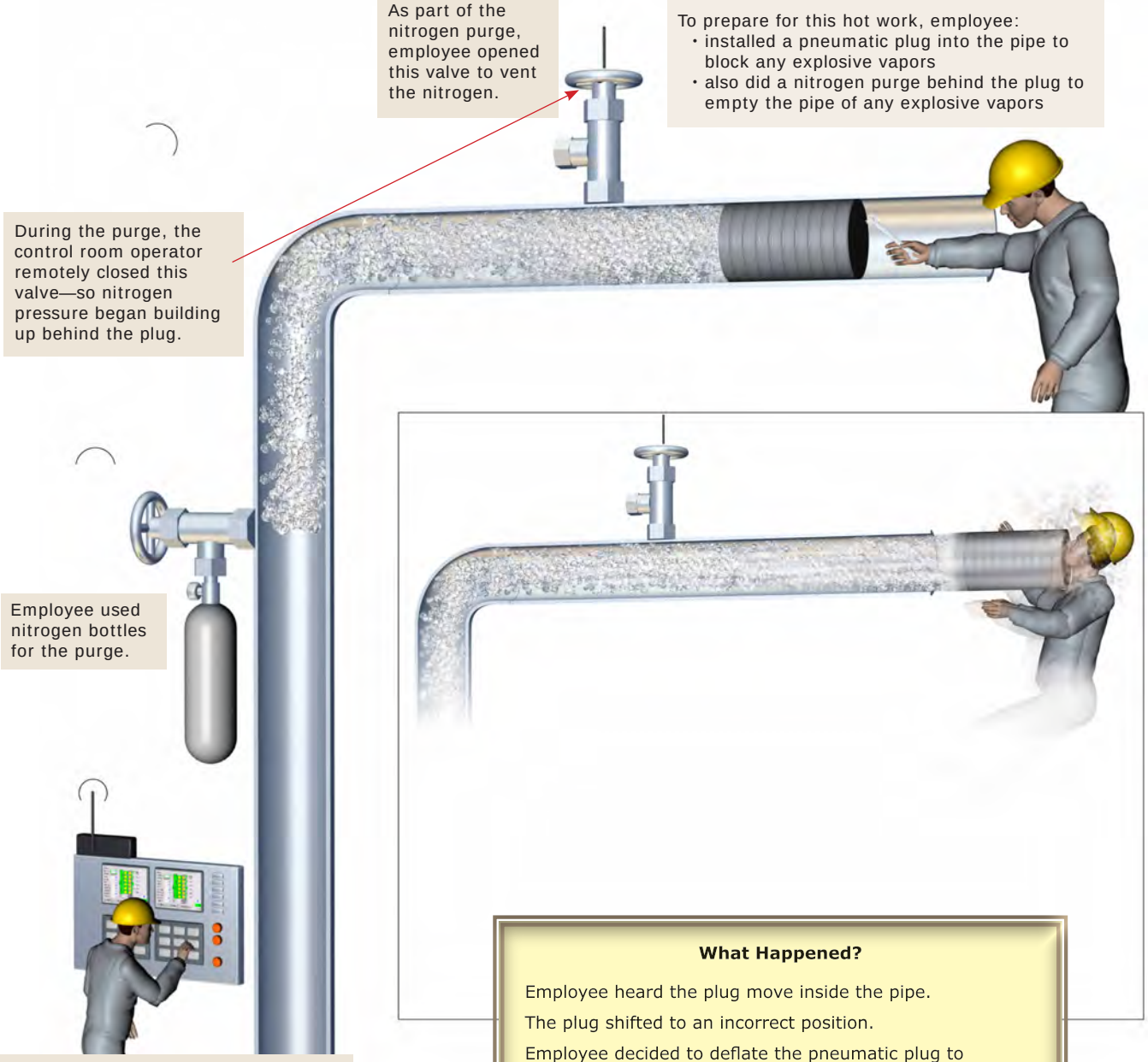
Employee was going to make a pipe tie-in.

Welding was necessary.

To prepare for this hot work, employee:
- installed a pneumatic plug into the pipe to block any explosive vapors
- also did a nitrogen purge behind the plug to empty the pipe of any explosive vapors

As part of the nitrogen purge, employee opened this valve to vent the nitrogen.

During the purge, the control room operator remotely closed this valve—so nitrogen pressure began building up behind the plug.



Employee used nitrogen bottles for the purge.

Control room operator did not know the field employee was working on the pipe.

Control room operator prepared the pipe for a planned product transfer.
- the product transfer procedure required closing the valve

Control room operator closed the valve.
- value was motor-operated
- value could be remotely opened and closed from the control room

What Happened?

Employee heard the plug move inside the pipe.

The plug shifted to an incorrect position.

Employee decided to deflate the pneumatic plug to reposition it.

As the plug deflated, the nitrogen pressure that had built up behind the plug fired the plug, at high speed, out the open end of the pipe.

The flying plug hit the employee in the head, and he died from the injury.

Lessons - Pneumatic Plug Fires from Pipe

Talking Points: Who's in the Permit Process?

Control room operators were not included in the pipe tie-in work permit.

- control room operators had no idea anyone was working on the pipe
- maintenance team did not radio the control room operators saying they were working in their area
- control room operators were preparing to move product through that pipe—that's why they closed the valve

Could this happen at our site?

Let's discuss the work we did here last week...

1. Did we communicate this work to everyone who needed to know?
2. Does our permit process include all the right people?
3. How can we improve our communication around permits?

Team Did Not Lockout the Valve

Maintenance team should have locked out the valve before beginning the purge.

If the valve was locked open, the control room operators would not have been able to remotely close the valve.

Plug Was Not Inflated to Correct Pressure

The employee deflated the plug because he noticed the plug shifted inside the pipe.

The plug moved inside the pipe because it was under-inflated.

- instructions were to inflate the plug to 35 psig
- the employee inflated the plug only to 15 psig
- that's why the plug moved, had to be deflated, and then repositioned

When properly inflated, the plug was designed to withstand a backpressure up to 12 psig.

The backpressure from the nitrogen purge was estimated at only 2 to 6 psig.

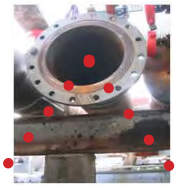
pneumatic plug

No Pressure Gauge

A pressure gauge should have been installed.

This gauge would measure any pressure buildup behind the plug.

Employees would have noticed something was wrong if they saw increasing pressure building up behind the plug.



No Barriers Blocking the Line of Fire

The "line of fire" around the open end of the pipe is dangerous and should have been barricaded.

The line of fire is a cone-shaped area extending from the pipe opening.

While the plug was inflated, no one should be in this line-of-fire danger zone.

The pneumatic plug was attached to a long hose that allowed inflation and deflation without standing in the line-of-fire danger zone.

Communication Best Practice - Lesson Learned

Sample #5

Heat Exchanger Exploded

Seven Employees Killed

(Oil Refinery)

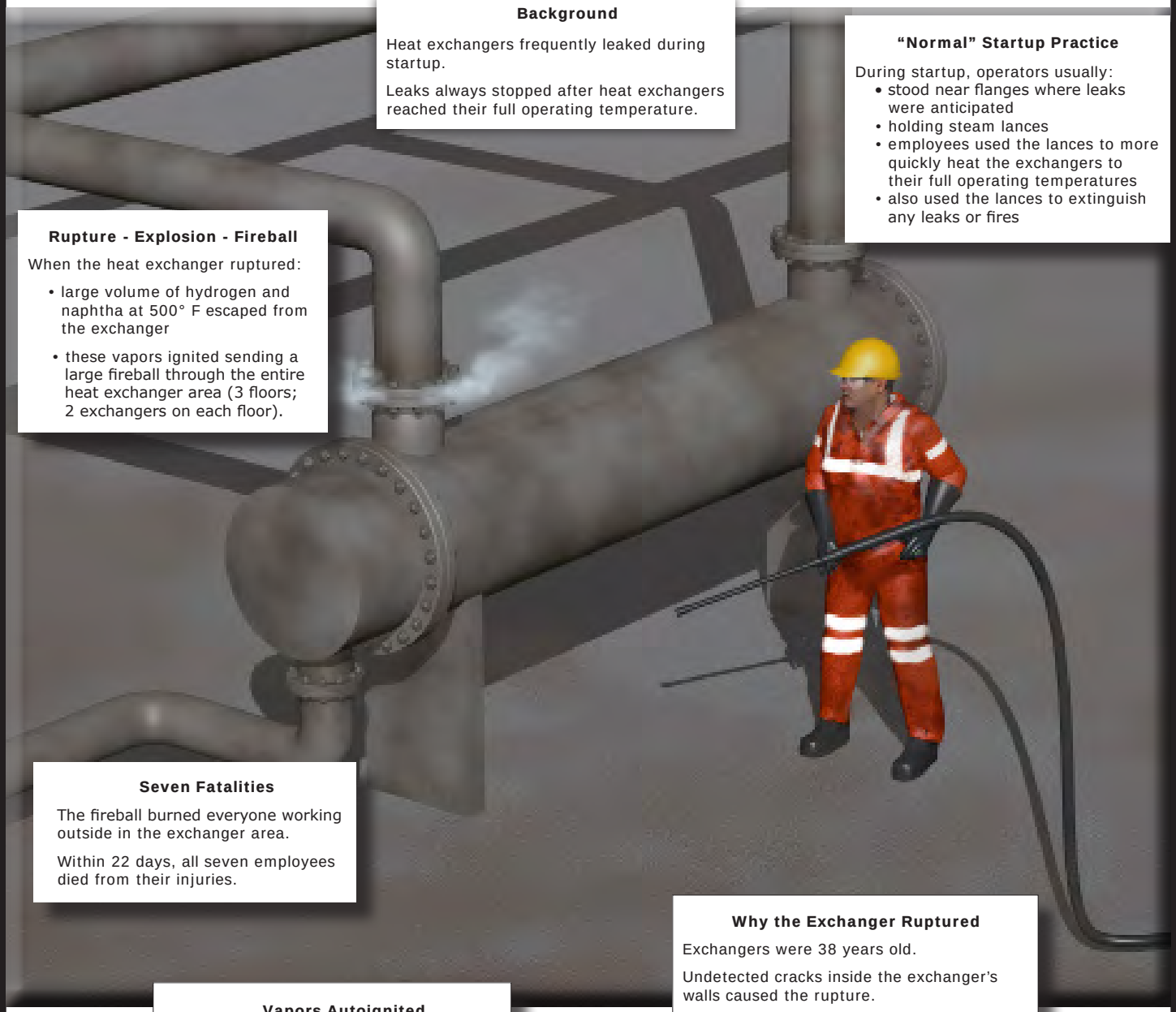
Communication Best Practice - Lesson Learned

Heat Exchanger Exploded - Seven Employees Killed (Oil Refinery)

Heat exchanger in oil refinery exploded.

Seven employees killed.

Heat exchanger located in the refinery's catalytic reformer/naphtha hydrotreater unit (NHT).



Background

Heat exchangers frequently leaked during startup.

Leaks always stopped after heat exchangers reached their full operating temperature.

"Normal" Startup Practice

During startup, operators usually:

- stood near flanges where leaks were anticipated
- holding steam lances
- employees used the lances to more quickly heat the exchangers to their full operating temperatures
- also used the lances to extinguish any leaks or fires

Rupture - Explosion - Fireball

When the heat exchanger ruptured:

- large volume of hydrogen and naphtha at 500° F escaped from the exchanger
- these vapors ignited sending a large fireball through the entire heat exchanger area (3 floors; 2 exchangers on each floor).

Seven Fatalities

The fireball burned everyone working outside in the exchanger area.

Within 22 days, all seven employees died from their injuries.

Vapors Autoignited

The vapors did not need an ignition source (spark).

At high temperatures, the naphtha and hydrogen mixture will autoignite when exposed to the oxygen in the atmosphere.

Why the Exchanger Ruptured

Exchangers were 38 years old.

Undetected cracks inside the exchanger's walls caused the rupture.

Operators using the steam lances did not contribute to the heat exchange rupture—the exchanger would have ruptured anyway.

However, the large number of fatalities was due to the many employees working in the exchanger area during the startup.

Communication Best Practice - Lesson Learned

Lessons: Heat Exchanger Exploded - Seven Employees Killed

Talking Point: When "Dangerous" Becomes "Normal"

Most experienced operators would not put seven people near a unit during a startup.

- startup is "non routine work"
- "non routine work" is 45 times more dangerous than continuous operation

(Process Improvement Institute)

Why did they put seven people near a unit in startup?

Because this dangerous practice had become "normal."

- employees said they did it this way for more than 10 years
- the formal written procedure called for one outside operator
- the normal practice was between four and seven outside operators

The technical term for this is: "normalization of deviance."

- over time, dangerous practices slowly become normal
- for those inside the organization—the danger becomes invisible
- "normalization of deviance" was made famous in the investigation of the Challenger space shuttle disaster (The Challenger Launch Decision)

Let's talk about our practices.

What do we do that seems "normal" but is, in fact, "dangerous?"

What dangers are we blind to because we've done it this way so many times?

HTHA Caused the Exchanger Wall to Rupture

Investigation showed the insides of the exchanger walls were cracked.

Cracks were caused by HTHA (high temperature hydrogen attack). The carbon steel walls were susceptible to HTHA.

Hydrogen added to the naphtha feed interacted with the carbon steel walls to created methane gas.

The methane gas was trapped inside the exchanger walls creating fissures and eventually larger cracks.

The standards used during inspections did not anticipate HTHA at the *design* temperatures for these exchangers.

Actual temperatures inside the exchangers were higher than the design temperatures.

HTHA was subsequently found in other exchangers within the same bank of exchangers.

After the incident, old exchangers were replaced with new exchangers made from steel less susceptible to HTHA.

Original Source for This Lesson Learned

Chemical Safety Board

U.S. Chemical Safety and Hazard Investigation Board: "Investigation Report: Catastrophic Rupture of Heat Exchanger (Seven Fatalities)," Report 2010-08-I-WA, May 2014.

Communication Best Practice - Lesson Learned

Sample #6

Chemical Leak

Four People Killed

(Methyl Mercaptan)

Communication Best Practice - Lesson Learned

Chemical Leak Kills Four People

Methyl mercaptan

Methyl mercaptan is a chemical used to make insecticides.

It can be a liquid or gas.

Methyl mercaptan is highly toxic and flammable.

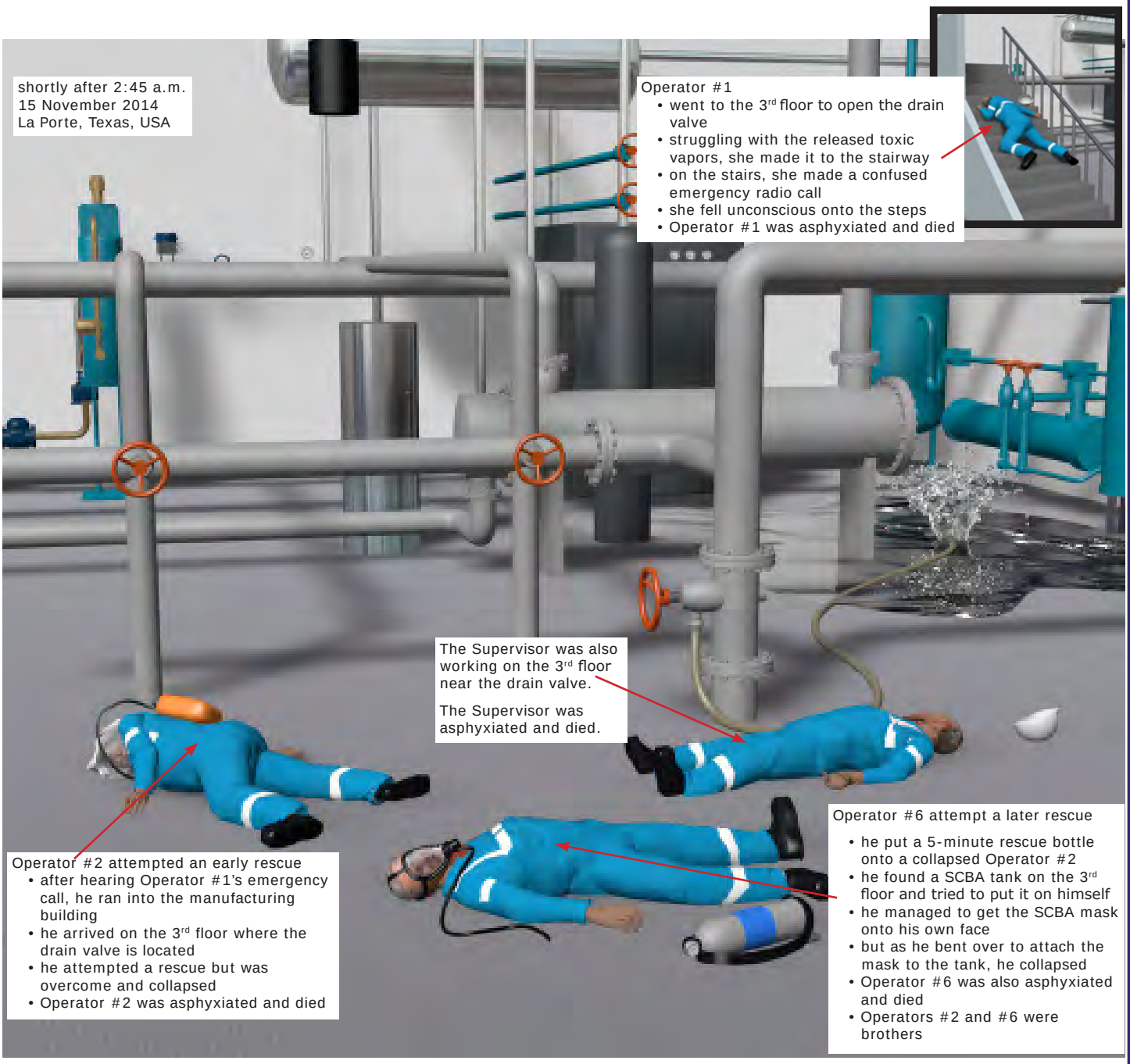
The Shift Supervisor and Operator #1 were responding to a high pressure alarm in a waste gas vent header area.

They went to the 3rd floor of the manufacturing building to open a drain valve.

As the valve was opened, a large amount of methyl mercaptan escaped. Methyl mercaptan may also have been leaking from other equipment in the area.

Both the supervisor and Operator #1 were asphyxiated and died.

Two other operators (#2 and #6) attempted a rescue but were also asphyxiated and died.



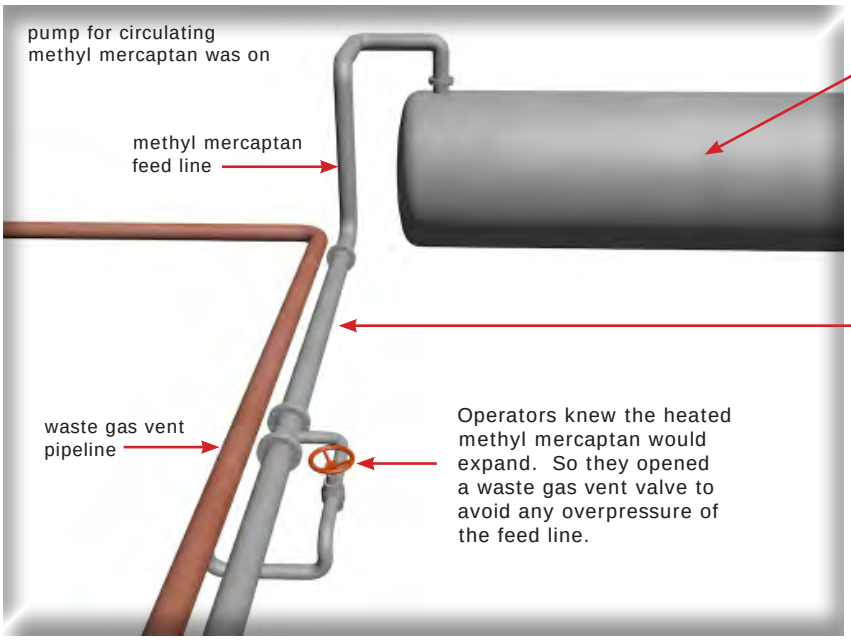
Derived from CSB Interim Recommendations

Communication Best Practice - Lesson Learned

Situation Leading Up to the Gas Leak

During normal operations, methyl mercaptan is pumped from a storage tank through a feed line into the process unit.

The operators were trying to start up this process unit after a shutdown.



During the shutdown, water was accidentally pumped into the methyl mercaptan storage tank.

When combined with water, methyl mercaptan will create a hydrate (freeze) at relatively warm temperatures (50°F.).

Frozen methyl mercaptan plugged the feed line and blocked the flow into the process unit.

Operators knew the heated methyl mercaptan would expand. So they opened a waste gas vent valve to avoid any overpressure of the feed line.

To melt the frozen methyl mercaptan, night shift operators were pouring hot water onto the feed line using a hose.

Around 1:30 a.m., the operators took a break, left the outside piping area, and went into the control room.

They left: hot water pouring onto the feed line, the pump on, valve into the process unit closed, and the valve to the waste gas vent pipeline open.

After the operators left the area: the methyl mercaptan melted, the blockage cleared, and the methyl mercaptan began to flow.

The methyl mercaptan liquid flowed through the open valve and into the waste gas vent pipeline.

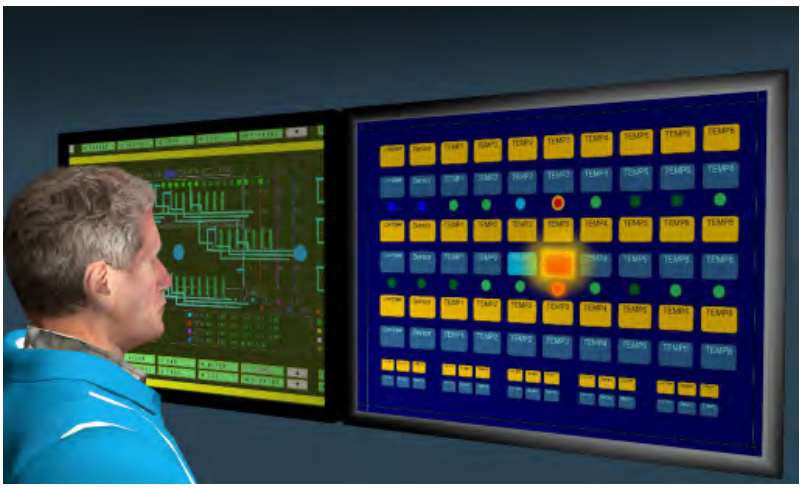
The waste gas vent pipeline traveled through a multi-story manufacturing building and eventually to an incinerator.

Alarms Began

Alarms inside the control room began showing a high pressure situation in the waste gas vent header located on the 3rd floor of the manufacturing building.

The incinerator at the end of the waste gas pipeline was installed four years earlier.

After installing the incinerator, high pressure alarms in the waste gas pipeline happened frequently.



This alarm had become "normal."

Almost daily, employees cleared this alarm by opening a drain valve on the 3rd floor of the manufacturing building.

On this night, the operators did not associate this alarm with their outside work heating the frozen methyl mercaptan.

Communication Best Practice - Lesson Learned

Gas Leak Began Asphyxiating People - Operators Attempted a Rescue

Supervisor and Operator #1 went to the 3rd floor of the manufacturing building to manually open a drain valve connected to the waste gas vent header piping.

Usually the drained liquid was water with a small amount of other chemicals. The liquid ran from the drain valve through a hose to a drain on the floor.

This time, however, a large amount of methyl mercaptan poured from the drain valve and deadly vapors filled the building.

Methyl mercaptan may also have been leaking from other nearby equipment.

The Supervisor was asphyxiated and fell near the drain valve.

An Operator #5 working on the 1st floor of the manufacturing building became disoriented, left the building, collapsed on the ground, and survived.

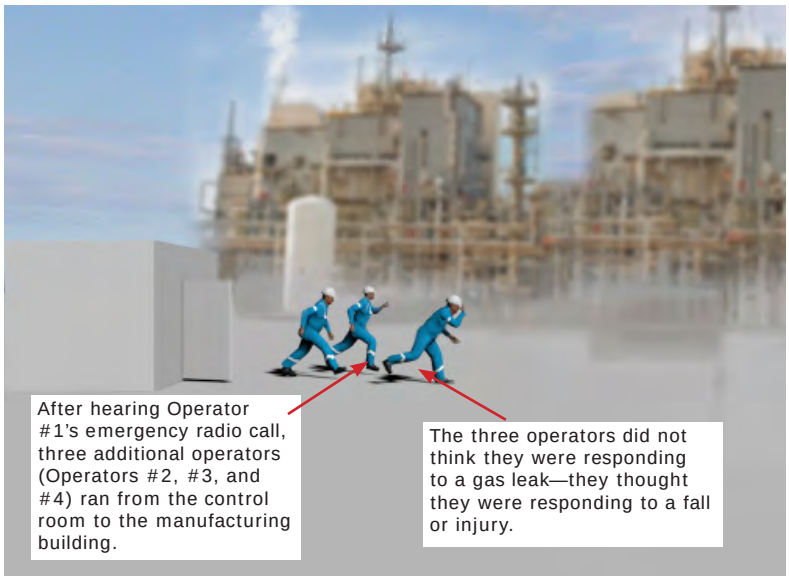
Operator #3 attempting a rescue made it to the 3rd floor, he then:

- began feeling light-headed
- tried to escape the 3rd floor
- fell unconscious in the stairway
- after 45 minutes regained consciousness
- manged to get out of the building
- taken to the hospital and survived

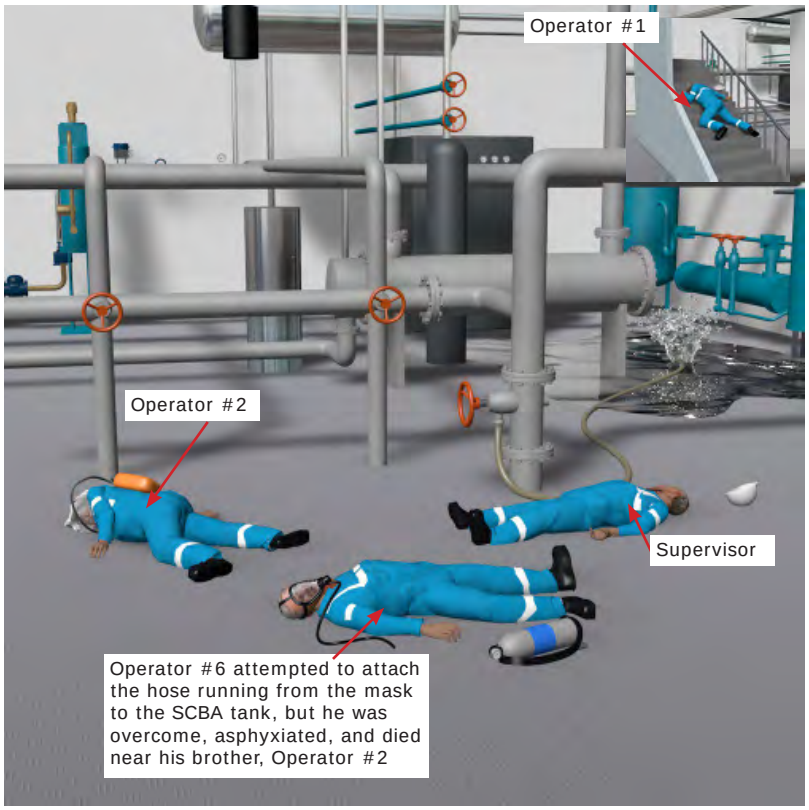
Operator #1 began feeling disoriented, made her way to the staircase and attempted an emergency radio call.

Her call was very unclear.

To those listening, it seemed someone may have fallen and was injured.



Operator #6 Attempted a Rescue



Operator #6 Attempted a Rescue

- the first three rescuers (Operators #2, #3, and #4) did not respond to radio calls
- Operator #6, still in the control room, then suspected a gas leak
- running to the manufacturing building, he grabbed three 5-minute air bottles
- other control room operators warned Operator #6 not to enter the building as the risks were too unknown—he ignored these warnings
- going up the stairs, he came across an unconscious Operator #4 (an earlier rescuer); Operator #6 put an air bottle on Operator #4
- with this air supply, Operator #4 left the building and survived
- Operator #6 then put the second air bottle on himself
- once on the 3rd floor, Operator #6 found his brother, Operator #2, and put the last air bottle on his brother
- when Operator #6's air bottle emptied; he found a SCBA tank located on the 3rd floor

When the emergency response team (ERT) arrived:

- they did not have adequate respiratory equipment to enter the building
- ERT thought they were responding to a fall
- 90 minutes later, ERT had proper respiratory PPE
- all four people were found unresponsive

Communication Best Practice - Lesson Learned

Lessons - Chemical Leak Kills Four Workers

Talking Points

Risk Assessment

- These were experienced operators; average age was 47, supervisor was 60.
- A few moments of thinking may have revealed the likelihood of methyl mercaptan running into the waste gas vent pipeline - a gas pipeline not designed for large amounts of liquid methyl mercaptan
- Can't we occasionally stop work today and think a little harder about what we are doing? Just a moment or two to think about the risks?

Non-Routine Work is Dangerous source: http://download.discover2.org/how-to-efficiently-perform-the-hazard-evaluation-pha-w36491/

- This was the 1st time these operators melted hydrate on the methyl mercaptan feed line.
- 70% of major process safety accidents happen during non-routine work.
- What non-routine work do we have planned? How dangerous is this work?

Rescuers Often Die source: http://www.cdc.gov/niosh/docs/86-110/

- The first two people died after opening the drain valve—the other two deaths were rescuers.
- Rescuing is dangerous. For example, in confined-space fatalities, 60% of the people who die are rescuers.
- Do we have the discipline to stop and understand the situation before we try to do a rescue?

Biggest Senior Management Problem

Uneven Design Safety Across Business Units

After the 1984 Bhopal disaster killing thousands in India, this company improved their design safety in business units using MIC (the chemical released in Bhopal).

A disaster similar to this methyl mercaptan tragedy probably could not happen in the MIC production areas of this plant.

These MIC design precautions (inherently safer design) were not applied to the methyl mercaptan business units.

Biggest Plant Management Problem

No Written Procedures

There were no written procedures for melting hydrate on the methyl mercaptan feed line.

There were no written procedures for draining the waste gas vent piping.

It is 50 times more likely an operator will make a serious mistake when they are doing work without written procedures.

source: http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6883/cr6883.pdf

This lesson learned is derived from a *CSB Interim Recommendation*:

CSB: DuPont La Porte, Texas Chemical Facility Toxic Chemical Release, Sept 30, 2015

The CSB has not previewed or approved our interpretation.

See the CSB's video animation of this accident:

http://www.csb.gov/dupont-laporte-facility-toxic-chemical-release-/

What To Do Next

Email or Call Us

We would be happy to speak with you about lessons learned or any of your safety communication needs.

You may schedule a telephone call or conference call for no charge.

Phone: 1-212-860-2939; Email: Larkin@Larkin.Biz

Making a Lesson Learned

Based on your investigation, we write a *Larkin Lesson Learned* for your:

- fatality
- explosion/fire
- near miss

We write this lesson learned at our NYC offices; or we write this lesson learned at your location working with your team.

Working at your location, with your team, creates the most transfer of skills to your people—but where we work is your preference.

You may chose a current incident, or you may go back in time and make *Larkin Lessons Learned* for older incidents that you fear may be repeated in the future.

For fees, email our office: Larkin@Larkin.Biz

Who We Are

Dr TJ Larkin

Sandar Larkin

Since 1985, we have been helping large companies improve communication with employees.	
Book	*Communicating Change*, McGraw-Hill, New York
Most Read Paper	"Reaching and Changing Frontline Employees," *Harvard Business Review*
Newest Papers	Download our newest papers on communicating safety from our website: www.Larkin.Biz (no charge)
TJ's Background	Ph.D. in Communication (Michigan State University) M.A. in Sociology (University of Oxford)
Sandar's Background	Sandar is originally from Burma and worked with the Long Term Credit Bank of Japan before starting Larkin Communication Consulting with TJ.

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