BLOWBACK: Between the Lines

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Introduction

Not enough of those in the pressure equipment industry are taking the time or effort to read between the lines: that is to more fully appreciate the safety message’s true dynamic. BLOWBACK was written to connect the dots between industrial-sized pressure vessels and pressure-retaining items everyone is exposed to everyday.

More important, BLOWBACK explains the significant impact pressure equipment has on our daily lives by providing examples of common pressure-retaining items many would not identify as such. Yet the public remains indifferent to the potential dangers. Indeed, few can even describe the function of a pressure vessel, let alone point to one.

This presentation underscores the need for vigilance by providing case histories and examples that are both educational and sometimes shocking. Communicating the importance of pressure equipment safety begins with educating our younger generations. And it is imperative our industry communicate to the general public that codes, regulations, and inspections work. If we fail, North America could revert to third world status where laws are nonexistent, casually enforced, or are of low priority. It should become the priority of everyone in industry to remove the limits that prevent our jurisdictions from effectively doing their jobs. To paraphrase Mark Twain: It’s not what you don’t know that can kill you. It’s what you think you know that isn’t so...
BLOWBACK addresses examples of incidents involving pressure equipment and what can go terribly wrong without proper vigilance.

Many of you have heard the phrase “reading between the lines.” Unfortunately, not enough of us are taking the time or effort to read between the lines; that is, more fully appreciating the true dynamic of the safety process. My point is that if those close to us don’t know what we do, how can we expect the general public? Why should we care about the general public? Why should the general public care about what we do? The answer: safety. When it comes to safety, we are all stakeholders! It is you, safety engineers of the world, who are in a unique position to impact public wellbeing. It is my hope most, if not all, of you will leave here this afternoon with a renewed urgency for spreading the gospel of safety. Accidents involving pressure-retaining items happen every day. But how many of us make the connection to the impact on daily life? Sometimes we fail to observe the subtlety of what goes on around us – the details. Let me give you an example.

Do you remember several years ago when it was revealed the group Van Halen demanded that all of the brown M&Ms be removed from bowls of candy in their dressing room? Each band performance is covered by a contract and a rider that goes into minute detail as to how a show is to be set up. While taking out the brown M&Ms may have seemed a bit narcissistic even for a rock band, there was a perfectly logical reason. When a rock show is being readied, there is tons of equipment to be set up. A lot of that apparatus has to do with safety fixtures essential to the show. When the band’s manager spotted brown M&Ms in the bowl, he surmised the rider had not been fully read. And if these specifications were not fully read, there was good reason safe working conditions were not going to be a priority of the evening.

Every day, we must confront a number of challenges that make our jobs tougher. The one that I find particularly disturbing concerns the lack of urgency to educate new generations. Many young people look upon pressure equipment as something their grandparents had in what they used to call “cellars.” Few fully understand pressure-retaining items are as important today as ever before. BLOWBACK addresses a number of what I call cultural associations such as paintball games and beer kegs. The objective was to make young readers see there is reasonable cause to be vigilant around items many would never suspect as being dangerous. I cited numerous and varied examples
with the goal of making the reader more aware of his surroundings . . . his contemporary surroundings.

The message: boys and girls, we’re not playing a video game here. There is no reset button, and losers don’t get a chance to go home and go to school the next day. Unless we educate the younger generations, I’m afraid the safety industry will become both less understood and less connected to the general public.

*BLOWBACK* was written to connect the dots between industrial-sized pressure vessels and pressure-retaining items we use and are exposed to every day. That’s why there are so many references in the book to everyday situations and items many people would not identify as retaining pressure. It’s all about identity. And yet few can even describe a pressure vessel, let alone point to one. Here are some elementary examples:

Exhibit 2. How many would call this a pressure-retaining item?

Exhibit 3. What kind of pressure does a ketchup bottle contain?

Technically it’s just that and it is the most iconic symbol in the world! And it is one of the very few packages granted a trademark by the U.S. Patent Office. Here’s another iconic pressure vessel shape:

A number of years ago, many restaurants experienced exploding ketchup bottles. Storing ketchup that has been opened in a hot environment or in direct sunlight initiates a fermentation process that can cause the container to explode. Even the simple transfer of ketchup from one bottle to another allows introduction of microbes that begin consuming the condiment and emitting gas. This creates a pressure that can only be released through removal of the cap. Let’s discuss one more example.

I’m sure all of us in this room are familiar with the champagne bottle. But it’s not this type of pressure vessel that is considered dangerous. It’s this cork-constructed stopper that concerns the American Academy of Ophthalmology. The academy was so concerned that it produced a video and even issued a news release preceding New Year’s eve on the dangers of eye-related injuries caused by champagne corks. Back in 1974, a study in a British journal said 32,000 people in the U.S. were treated for “bottle-related trauma.” According to the academy, champagne bottles contain pressure as high as 90 pounds per square inch. That’s considerably more pressure than found
inside a typical commercial truck tire. As the cork leaves the bottle, it can achieve speeds approaching 50 mph! Some of you are probably sitting back and saying to yourselves: that is why we have warning labels.

Let’s take a look at manufacturers trying to protect us through warning labels. For example, Vidal Sassoon tells users of its hairdryers: Do Not Use While Sleeping.

Exhibit 4. Consider this on the box of a rotary tool.

Exhibit 5. Instructions on the website for Apple’s iPod Shuffle.

Exhibit 6. Razor Scooter’s warning in case the buyer did not know.
I’m sure these warning labels appeased the company lawyers. And they may have been effective in providing legal cover for companies making these products. But is this the best these companies could do to discourage consumer abuse? *BLOWBACK* contains the somewhat surprising statement that “warning labels are meant for people who don’t read warning labels!”

![Exhibit 7. Does anyone think an inebriated college kid is going to heed any kind of warning label before he hoists a beer keg into a bonfire killing himself and those around him?](image)

Does anyone think a couple going to a Super Bowl party would have taken time to read a warning label while filling a couple of colorful Mylar balloons with acetylene? Did they know a static spark in the back seat of their car would ignite those balloons and rupture their eardrums?

So what about all of you? Do you always heed the safety warning? Have you ever used a product in a way it was not intended? For example: using a fork to retrieve a piece of toast from the toaster. Taking more aspirin than the recommended dosage. Failing to fully open a step ladder when the warning label on the ladder specifically states the spreader must be fully locked. Maybe using that top step not intended to be a step. Or maybe you have really taken a walk on the wild side by continuing to drive your car when the check engine light is on.

These are all elementary examples of what is easily considered customer or end-user abuse. Many manufacturers are aware of how the public misuses their products. But little can be done outside strategically placing a warning label. For the next few minutes or so I want to speak about why things break. And when they do break, who is responsible. To accomplish this, permit me to talk about three things critical to the safety process: communication, knowledge, and common sense.

Manufacturer designs a product that theoretically includes all safeguards to protect the end-user. Does that conclude the manufacturer’s responsibility to the end-user? Can all creative abuses be anticipated? I think we all know the answer.

National Board recently conducted a 10-year study. We asked our members: How many accidents were caused by human error? The answer may surprise you. Eighty-three percent of accidents were caused by the end-users despite the manufacturer making a product that was safe,
durable, and constructed to the ASME Code. And what were the causes of these accidents? Lack of common sense. Lack of communication. Lack of knowledge. Or a combination of all three. The result: end-user indifference costs hundreds of lives, countless injuries, and incalculable property loss.

What can industry do? A lot of professionals say better training. And that sounds reasonable until you consider many preventable accidents involve well-qualified and well-intentioned operators. Here is a dirty little secret: training is only as effective as the person being trained. For the next several moments, I want to discuss some everyday examples of how consumers abuse and misuse equipment – equipment that by all accounts should be harmless. Let’s begin by classifying the different kinds of accidents.

Exhibit 8. First there is the accident caused by incompetency, lack of knowledge, or communication (by far why most incidents occur), followed by aging equipment or a lack of proper maintenance, followed by a genuinely accidental accident.

An Example of a Genuinely Accidental Accident

Three years ago, a 79-year-old woman was in the kitchen cooking some red beans in her pressure cooker. In another room, her son heard an ear-shattering explosion. When he went to the kitchen, he found his mother lying on the kitchen floor with red beans covering the entire room. Not only was the old woman bleeding profusely, her left foot had been severed at the ankle.

Authorities said the pressure cooker must have fallen off the counter, thus releasing tremendous pressure inside the cooker. The woman against all odds survived this terrible accident but died three weeks later.

Now let’s talk about examples of accidents caused by incompetency.

Back in 1988, a couple of carpet layers in Ohio were severely burned after a three-and-a-half gallon container of carpet adhesive ignited. That can was placed on top of the hot water heater. When the water heater kicked on, it ignited the adhesive. The men sued the adhesive manufac-
turer saying the warning labels *flammable* and *keep away from heat* did not prepare them for an explosion. The courts agreed and awarded the now retired carpet layers $8 million.

And then there is pure incompetence.

Exhibit 9. Some may remember the 1980 explosion at the Gate City Day Care Center in Atlanta.

The tragedy resulted in the deaths of four small children and one adult. An investigation revealed the boiler was only partly filled with water. However, the low-water cutoff mechanism had not been wired into the system, thus rendering the protection device useless.

Exhibit 10. The 1982 explosion at the Star Elementary School in Spencer, Oklahoma, is yet another example of pure incompetence.

An explosion in the school kitchen killed six children and one adult. Forty-two others were injured. Investigators found the 80-gallon water heater had been in need of repair for three years. Among the factors causing this accident were tampering of the controls, removal of a temperature probe, and improper installation of a pressure relief valve.
Both of these school explosions resulted in the passage of new pressure equipment legislation in their respective jurisdictions. Is there any type of warning label that would have prevented these horrendous accidents?

I’m sure all of you are familiar with accidents resulting from old and worn equipment. In late 2012 in Shanghai the Orient Mall was filled with shoppers when a 33-ton, 7 by 3-meter shark tank exploded. Among the deceased were three sharks, dozens of turtles, and a variety of marine life. Fifteen people suffered minor injuries related to shattering glass. Shanghai construction officials said acrylic glass of 12 centimeters was a suitable thickness. But the shopping mall used 15 centimeters of qualified acrylic glass in order to ensure safety.

So how come the aquarium still burst? The official investigation showed that ultraviolet radiation and changing temperatures damaged the acrylic glass over time. And the acrylic glass had become brittle and fractured because of the cold temperatures.

So what is the moral of this story? The aquarium burst not because it was made of substandard material but because the material deteriorated over time, even though the aquarium exceeded Chinese construction standards.

Minneapolis Bridge Collapse

Exhibit 11. One of the worst accidents involving United States commuters occurred during rush hour on August 1, 2007, when the main span of Minneapolis’ I-35W Mississippi River Bridge collapsed taking numerous vehicles and occupants with it.

Thirteen people perished and more than 100 were injured. While it was originally suspected the bridge had been deteriorating for some time, the root cause is a bit more complex and might have been prevented with proper maintenance and inspection.
Exhibit 12. A corroded gusset plate fractured. Gusset plates are essential to the structural integrity of the bridge because they support bridge joints. On the 1-35 structure, the plate was the joint supporting the bridge’s main span. So why did the gusset plate fracture?

Exhibit 13. There are six main reasons why the gusset plate fractured.

Why?
- Insufficient load capacity
- Insufficient load capacity calculations
- Heavy load stress
- Rush hour traffic
- Construction closed half of bridge lanes
- Dead weight concrete overlay

Why did the main span of the bridge collapse? Because the load capacity was insufficient. Why the insufficient load capacity? Because calculations to determine load capacity were also insufficient. Despite capacity shortcomings, a heavy load also contributed to the stress. Add to that rush hour traffic and the high volume of traffic moving on only half the bridge’s lanes. Also add the dead weight concrete overlay put on the surface in 1977 to increase the life of rebar that was corroding due to harsh road chemicals.

The National Transportation Safety Board cited more than 50 causes. Bottom line: the cause of the bridge collapse was due to insufficient design coupled with lack of attention.
Ask yourself: Is equipment integrity only as good as the individuals who operate and maintain it? Can designers or architects anticipate every negative possibility if their finished product is abused or simply ignored?

There is one additional component of this story that has confounded me for years. Almost every accident witness interviewed on television preface their recollections with: “. . . It happened so suddenly!” You see, the bridge failure was anything but “sudden.” Spectacular? Perhaps. Shocking? Without a doubt. But sudden? Without parsing words, let’s simply define "suddenly" as “without warning.”

The demise of the I-35W bridge began years and most probably decades ago. To say it “suddenly” gave way is comparable to saying an overweight heart attack victim “suddenly” experienced clogged arteries. Some mechanical engineers suggest a piece of equipment starts to degrade the day it goes into service. That said, one can argue the bridge structure began deteriorating shortly after its completion in 1967. Over that period of time, there were warning signs. In 1990, the federal government gave the I-35W bridge a rating of “structurally deficient.” What resulted was a 17-year gamble that nothing would occur between the time the problem was discovered and when it would be finally resolved. And that, as we can now clearly observe, was a tragic miscalculation.

There are two lessons one can take away from this tragic accident.

Exhibit 14. One. The unfortunate turn of events of August 1 accentuate the importance of inspection in our everyday lives.

But inspection means nothing unless action is taken to reconcile the situation. The effectiveness of a trained professional identifying a problem is only as good as the problem’s resolution.
Exhibit 15. Two. Whereas the bridge incident was unpredictable and shocking, it was not without warning or – as noted – sudden.

While the degree of risk was debatable, it should come as no surprise structure failure was inevitable and consequently preventable. Knowledge of a problem that goes unresolved for any period of time significantly increases the odds of a highly volatile outcome.

Here are some additional accidents that were caused by lack of knowledge. Recently in Auburn, Washington, the parents of James LeBeau entered his home and found shattered glass extending from the kitchen to the living room. They also found their son slumped in the corner by his stove. A shard of glass had been driven deep into the young man’s chest. The glass came from a lava lamp James had placed on his kitchen stove. Authorities theorized heat from the stove increased pressure within the lamp, triggering a detonation not unlike a grenade.

Here’s another example of a harmless object converted into a deadly weapon.

Exhibit 16. Now as the game may seem harmless, the same cannot be said for the CO₂ canisters used in paintball guns.

About the size of a pack of gum, this small, high-pressure aluminum tank creates enough force to propel 14-mm paintballs 250 to 300 feet per second, or at speeds up to 200 mph.
In June 2003, a 15-year-old from Washington State and five of his buddies were out for a friendly game of paintball. After about two hours, the six young men removed their protective gear before removing their CO₂ canisters. Having taken off his helmet and eye protection, the 15-year-old unscrewed the CO₂ cylinder. As he did so, it separated from the valve and struck him in the forehead. The high-velocity projectile continued in an unknown direction and was never located. The fifteen-year-old died five days later from injuries sustained as a result of the violent tragedy. He had only had the paintball gun for three days.

Over the years, accidents resulting from lack of knowledge have resulted in some rather positive unintended consequences such as change in equipment design and new legislation created to protect the consumer. Natural gas is a good example.

Natural gas has been around as a fuel for almost 200 years. It is believed natural gas was first employed for illumination in Fredonia, New York, around 1821. It was later extracted from Pennsylvania oil and first used industrially in Pittsburgh, Pennsylvania, before finding utility in other manufacturing centers. While natural gas has significantly improved the wellbeing and lifestyle of countless generations, it has been responsible for some of history’s most gruesome disasters.

*BLOWBACK* chronicled what has been described as the greatest catastrophe in the history of American education. It was a devastating gas explosion that occurred on March 18, 1937, at a high school in the East Texas oil field community of New London. New London is about 130 miles west of where I now stand.

With your permission, I would like to read some excerpts from my book to give you a real sense of what can happen when what we don’t know can hurt us.

The time was 3:05 p.m. and in just a few moments, fifth to eleventh graders destined for home would soon be making their afternoon exodus.

![Exhibit 17. This school, by all accounts, was an attractive building. Framed of steel, the E-shaped structure had modernistic flare and was a source of pride for the residents of New London.](image-url)
And why not? Located in northwest Rusk County atop some of the richest oilfields in Texas, New London was among the most affluent rural school districts in the country.

The method of distributing gas within the school was not unusual for the time and had been used at other educational institutions. It involved equipping each of the 72 classrooms with individual heaters.

No one objected when school administrators – for purposes of controlling costs – decided to forego a central steam heating plant or boiler room when the school was constructed in 1932. After all, the oil fields were flush with natural fuel and tapping a seemingly endless supply of residue gas would result in savings of $250 to $300 a month.

Use of the raw or waste gas was common in the oilfield community. Many of the populace took advantage of the free fuel which was often burned in homes, churches, and yes, even schools.

Each [heater] unit had a small regulator at the source of the gas supply as well as a safety valve on the water chamber. The residue fuel was delivered (via 1 ½ inch pipes) to each of the rooms by a gas regulator connected to a two-inch pipe located in the school basement.

Fire officials speculated a large quantity of colorless, odorless gas collected in the basement area under an 8-inch slab of reinforced concrete serving as the main structure first floor of the two-story school. It was further theorized that at approximately 3:17, a spark was generated when instructor of manual training Lemmie Butler plugged an electric sander into a receptacle on the first floor. Ignition of the gas produced a lone explosion with enough force to lift the school – including auditorium – off its foundation. The concrete slab floor was instantly catapulted through the roof by way of occupied classrooms. Many of the victims were crushed beneath masses of concrete, tile, and steel. Some surviving victims had to be extracted by jackhammer.

Exhibit 18. While the detonation itself would have produced numerous casualties, it was falling debris from the slab and other building material that further threatened building occupants.
Final death toll: 294 (and some believe as many as 319). This included 120 boys, 156 girls, four male teachers, twelve female teachers, a woman visitor, and a four-year-old boy visitor. It should be noted no record exists of the actual number of people in the building during the incident. A total of 31 victims were sitting in the shop class when the gas ignited. Approximately 130 students were spared serious injury.

Hearing the horrific blast, oil field roughnecks ran to the school site and toiled relentlessly to reclaim bodies and remove New London School’s fragmented remains. Later that day, there would be over 1,500 volunteers on site from 20 organizations, agencies, and companies. Firefighters arriving at the scene found no fire (there was a minimal amount of combustible matter) and so began the forbidding task of locating survivors and sifting through human carnage.

According to the New London School Explosion Museum: “Bodies were carried to hospitals in five counties. When those hospitals were full, they began to put bodies dead or alive in garages, American Legion halls, tents, churches, car dealer shops or any place that could be found...Word was spread for all doctors, nurses and embalming personnel.”

The museum explained: “Horror-stricken and agonized families rushed to the scene frantically searching for their children through the mounds of rubble with tears running down their faces and hands torn and bleeding from jagged debris.”

This was not the circle of life as intended: children preceding parents in death. The few who survived the explosion were located at remote ends of the building structure.

Damage was not limited to the immediate area. A 1936 Chevrolet 200 feet from the scene was crushed by a two-ton slab of concrete. Another 50 vehicles were rendered totaled after being struck by airborne concrete and stones. Added the Museum: “Some of the flying wreckage included precious children thrown through the air like broken rag dolls.”
As with any disturbing event of this magnitude, news reporters from all over the state headed to New London. A cub reporter from the United Press International office in Dallas was excited about covering his very first major story. As he arrived on the scene, he observed floodlights being readied for the evening darkness, as well as erection of large oil field cranes that would be later used to assist the removal of large hunks of rubble.

Years later as this reporter approached the twilight of his career, he observed: “I did nothing in my studies nor in my life to prepare me for a story of the magnitude of that London tragedy, nor has any story since that awful day equaled it.”

In light of the fact he expertly chronicled every major story from all over the world during an iconic 45-year broadcasting career, Walter Cronkite could never dislodge the recollection of the horrible scene he personally witnessed on March 18, 1937.

Less than 24 hours following the explosion, the New London School site was completely devoid of any and all evidence from the previous day. Reported the Quarterly: “In the short space of 17 hours after the work was organized, some 2,000 tons of debris were picked up piecemeal and hauled away during an all-night rain storm; concrete slabs were broken up, tangled steel cut with torches and the smaller fragments that had to be shoveled were carried off in small baskets and carefully emptied under floor lights to avoid overlooking a hand or foot or any torn portion of a body.”

There was no shortage of theories on the cause of the school disaster. Unfortunately, in the accelerated confusion to save lives and remove rubble – nay, the dreadful memories – there would be no evidence to dissect. Much of what would be learned later was conjecture, albeit conjecture having some foundation in logic.

Texas Inspection Bureau official H. Oram Smith opined the space under the concrete floor became filled with an explosive mixture of gas and air. (Source of the gas leak was undetermined.) He concluded the gas found its way into the school shop area by way of an open door and was detonated by an arc formed when the sander plug was introduced into the receptacle. The consequent flash retreated under the concrete floor creating superheated gas and enough pressure to dislodge the school from its foundation. The blast traveled the building’s entire 254-foot length.

Following an investigation, a court of inquiry exonerated all school officials of the explosion and concluded no one individual was responsible. Thirty New London seniors who survived the blast finished their academic year in temporary facilities as a new school was constructed on nearly the same site as its doomed predecessor.

As bad as this human catastrophe was, it could have been – although difficult to believe – worse. The school had been using dynamite at its athletic field to build a running track. At the time of the blast, 18 sticks of the ordnance were stored in a lumber room under the auditorium. None was disturbed.

There is little solace discovering something positive resulting from such a horrendous turn of events. But the deaths of 276 children – nearly a complete generation of the New London com-
munity—did result in something that has saved the lives of perhaps millions of people worldwide. Up to this point in history, gas was clear, odorless matter. But within weeks of the New London incident, the Texas legislature passed an odorization law requiring the addition of distinctive mal-odorants to all gases used commercially and industrially. It was not only the first law of its kind, it is currently law throughout the United States.

Since the raw unprocessed gas at New London School was being tapped directly from its underground source, there probably was no mechanical procedure to odorize the gas mixture collecting under the concrete floor. Hence, it is doubtful the 1937 disaster could have been averted. Today, however, a smell tantamount to “rotten eggs” serves to alert anyone in close proximity to escaping natural gas and the real potential for an explosion. Despite new technology, gas explosions still occur with alarming regularity. And that’s why codes and standards remain critical to the wellbeing of every man, woman, and child. And that’s the way it is.

There is another example of good rising out of tragedy.

Exhibit 20. It was midafternoon on a Friday in October when a seam breached on the side of tank number four.

In 1944, an explosion of a liquefied natural gas tank destroyed one square mile on Cleveland’s east side. Back then, above-ground storage of natural gas was a common practice in buildings, homes and manufacturing facilities across America.

As a result, the 900-million-cubic-feet-capacity storage vessel began to emit liquefied natural gas vapor. Lake Erie winds floated the vapor toward Cleveland’s east side and into sewer lines by way of street catch basins. The combination of liquefied natural gas, air, and sewer gas subsequently found its way into the area’s sewer system before it ignited.

As flames shot out into the streets, manhole covers took off like flying saucers. Investigators would later locate one of the covers several miles east of the scene in the Cleveland community of Glenville. The incident prompted an exodus from homes and businesses in the area. But within an hour, residents began a return to their homes. Everyone thought the firemen had the situation under control. Just as residents settled in, another tank exploded that leveled the entire tank farm.

Houses covering a 20-block area became engulfed in flames as fire traveled the length of sewer lines and up through drains in sinks. Those at home reported clothing catching fire right after the second explosion. Initial deaths were estimated to be around 200. But Cuyahoga Coun-
ty’s coroner added a caveat: the intensity and volatile nature of the explosions and consequent fires might have been enough to vaporize human flesh and bone.

Exhibit 21. Although the death toll was later reported to be 131, the disaster left in its wake a much wider swath of destruction.

A total of 225 were injured, and 600 people were rendered homeless. Seventy-nine homes, two factories, 217 cars and seven trailers were also destroyed, as well as much of the underground infrastructure and utility system.

Investigators weren’t able to identify what ignited the gaseous mix. But they did believe an alloy used to construct the aboveground tank could not contain the liquid gas’ cold temperature.

Exhibit 22. Estimated personal and industrial property damage totaled between $7 and $15 million (which is today $91 and $196 million respectively).
While the Cleveland East Ohio explosion exacted an incredible toll, there was one positive outcome: utilities as well as communities began to re-evaluate the safety of above-ground natural gas storage systems. Not long after, tank-less, below-ground storage systems became commonplace. Who would have thought??

Ladies and gentlemen, what was lacking in many of the aforementioned examples I discussed was communication and knowledge. We will always have incompetence or lack of common sense.

I have always felt that structural integrity was an absolute, perfect in design and function. Is there such a thing as manufacturing flaws? Of course. But that is why we have critical documents like the ASME Code. But accidents do happen and many times it is outside the control of the manufacturer.

There is no argument that quality control is essential to equipment integrity. And don’t relegate the importance of training. However, once a product – an equipment product – leaves the manufacturer, and is installed (perhaps incorrectly), there is only one person who can professionally reconcile existing or potential problems. That is a qualified inspector. And that is why a rigorous inspection process is also essential to equipment integrity.

But we can never ignore the fact that 83 percent of accidents are caused by the end user. And that is why there are hundreds of deaths and injuries each year from product abuse and misuse.

Does the manufacturer have an obligation to preclude all accidental possibilities? Yes, to a reasonable extent that only the manufacturer and the manufacturer’s legal counsel can determine.

When it comes to equipment integrity and safety, the only elements that can preclude potential disaster are knowledge, communication, and common sense. Add to that list inspection. For inspection to be effective, however, knowledge and communication must be continually present.

In December of 2012, there was a pressure equipment incident that everyone can learn from. Listen carefully because the details of this accident may someday save your life.

Exhibit 23. Sports anchor Hannah Storm of ESPN.
In an effort to get dinner on the table one evening, ESPN sports anchor Hannah Storm suffered second and third degree burns when gas from the propane grill she was using outside her home exploded into a wall of fire.

The night began when she went outside on this cold wintry evening to ignite the grill.

Briefly returning to her kitchen, she went back outside to find the grill’s flames extinguished by gusty winds. As many would do under similar circumstances, she turned off the gas before turning it back on to reignite the grill. The first spark provoked an explosion Ms. Storm described as “something you see in a movie.” A wall of flames consumed the ESPN reporter, instantly setting her on fire. The explosion was such that it also set her hair on fire and blew off the grill doors. If it wasn’t for the fast action of her daughter, Ms. Storm’s obituary might have led next day’s sports report. After being released from a hospital, she spent weeks recovering at home.

The outcome of this story is important for a number of reasons, not the least of which is how this accident happened. And while I discussed a number of accidents involving the abuse of equipment by end users, this problem could extend to loved ones in your everyday lives. Propane is heavier than air, especially in the winter. Consequently, the wind doesn’t simply blow away the propane gas. Propane gas sort of hangs around the grill. Anyone finding themselves in a similar situation should wait at least fifteen minutes before attempting to reignite an extinguished propane flame.

Fortunately, Hannah Storm has made a full recovery.

Do you see the correlation of communication and knowledge? Some of you are thinking to yourselves: that’s why there are warnings on gas grills. But as I mentioned earlier, warning signs are meant for people who don’t read warning signs. So what can we do to improve upon communication and knowledge?

The good news is that we have so many more methods of communicating to the general public with social media, the Internet, etc. than ever before. The bad news is that we often lack a message and many times a direct communications connection to those who use and misuse our products.

Exhibit 24. BLOWBACK was written with the intention of educating the general populace about the many dangers associated with pressure-retaining items.
I think just about everyone in this room is aware of pressure equipment danger. How about the people you work with?

Industry arranges numerous conferences where safety and engineering professionals trade information...to one another. To invoke a cliché, the preacher preaching to the choir.

You are sadly mistaken if you think a warning label is the extent of consumer commitment. We must create the message we can deliver to the masses regarding the dangers of harmless, everyday items that can kill you.

Let me put this in a personal context. BLOWBACK will never be on the New York Times’ Best Seller list. And chances are if you pick up a copy, you may not read it. Many believe it’s a regurgitation of what they think they already know. That is the perception. But I will guarantee each of you one thing, if you do read it, you’ll learn more than you thought you would. College professors are using BLOWBACK in their classrooms.

I am not foolish enough to think one book is going to launch a major change in how the public views the dangers of industrial equipment. What I hope to do is spark an interest in getting others to be as passionate. As we have seen too many times to admit, bad things can happen to good people.

To those of you who have purchased or received a copy of BLOWBACK, we say thank you. If you don’t have a copy, get one, read it, and then pass it along to a family member or professional associate. When they finish it, tell them to pass it along to someone they care for.

A large number of you hold impressive credentials. And I believe you agree education does not stop after you earn those degrees. Your responsibility does not end after a product has been shipped to a customer. If a catastrophic accident occurs, your responsibility is only beginning.

You are the experts in your given fields. Consequently, when you speak, you do so with authority. Hopefully, each of you is willing to share your expertise...proactively and with passion. Always remember:

When it comes to safety, there are no second chances!