

# Pipeline and Hazardous Materials Safety Administration (PHMSA)

## Strategic Plan (2012-2016)

**E**nergy products and hazardous materials underpin our economy and quality of life. We use oil and natural gas to heat and cool homes and businesses, produce electricity, transport the commercial products we use, travel to work or recreation, and provide the feedstock for many other things we use (e.g., plastics, fibers, paints, etc.). We use a variety of chemicals to purify drinking water, fertilize crops, produce medicines, and manufacture clothing and many other essential commodities. These chemical and energy products are essential to our quality of life. They also introduce inherent risks to the public, the environment, and property when they are transported.

***Our mission is to protect people and the environment***  
from the risks of hazardous materials transportation.

To do this ... we establish national policy, set and enforce standards, educate, conduct research to prevent incidents, and prepare the public to reduce consequences if an incident does occur.

***Our vision is that no harm should result***  
from hazardous materials transportation.

We simply do not accept deaths as an inevitable consequence of transporting hazardous materials, and we work continuously to find new ways to reduce risk to reach *zero deaths, injuries, environmental damage, and transportation disruptions.*

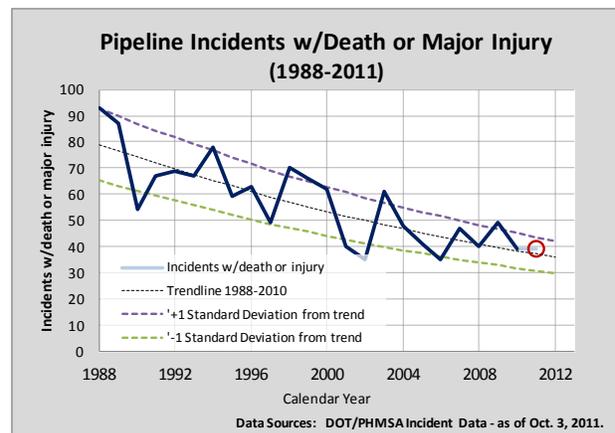
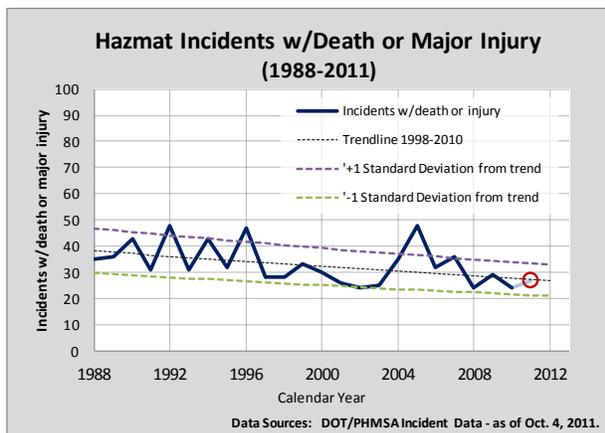
### The risks – *Where we are now*

**In 2010, accidents caused 118,000 deaths** in the U.S.—they were the 5<sup>th</sup> leading cause of death, accounting for about 1 out of every 20 deaths. Transportation accidents accounted

for about one-third (38,000) of accidental deaths, or 1.5% of all deaths. Hazardous materials transportation accounts for an average of 28 deaths each year—or about 1 out of every 11 million of the U.S. population.

**Accidents in hazardous materials transportation are low probability risks.** A person in the U.S. is three times as likely to be killed by lightning as by hazardous materials in transportation. Of course, this is not to minimize the threat—these accidents can be very high-consequence failures when they do occur, because they involve sometimes lethal forces or toxic materials that can strike anywhere. Annual accident data do not necessarily reveal all the threats. And some groups—particularly workers—face higher risks than others.

**Over the past 25 years, we have reduced the risk** of hazmat transportation incidents with death or major injury by 4 percent every 3 years; we have reduced the risk of pipeline incidents with death or major injury by about 10 percent every 3 years. And since 2002, we have reduced the risk of hazardous liquid pipeline spills with environmental consequences by an average of 5 percent per year. We aim to improve upon these long-term trends.



## Our programs – *What we do to reduce the risks*

**The Pipeline and Hazardous Materials Safety Administration (PHMSA)** is one of ten operating administrations within the U.S. Department of Transportation. We lead two national safety programs:

**Hazardous Materials Safety**—We identify and evaluate safety risks; develop and enforce standards for transporting hazardous materials; educate shippers, carriers, state partners and the public; investigate hazmat incidents and failures, conduct research, and



provide grants to improve emergency response to incidents. We also work with the Federal Aviation Administration (FAA), Federal Railroad Administration (FRA), Federal Motor Carrier Safety Administration (FMCSA), and the U.S. Coast Guard to help them administer their hazardous materials safety programs effectively.

**Pipeline Safety**—We identify and evaluate safety risks; develop and enforce standards for design, construction, operations and maintenance of pipelines carrying natural gas or hazardous liquids; educate operators and the public; conduct research on promising technologies; provide grants to states in support of their pipeline safety programs; review oil spill response plans; and respond to accidents and incidents.



## Our strategic goals – *What we aim to accomplish*

**OUR SAFETY GOALS** contribute directly to helping achieve the Secretary’s goal—to improve public health and safety by reducing transportation-related deaths and injuries. We work to protect people wherever they might be.

By 2016, we aim to:

- ✓ **Reduce the number of pipeline incidents involving death or major injury to between 26-37.**
- ✓ **Reduce the number of hazardous materials incidents involving death or major injury to between 21-32.**

**OUR ENVIRONMENTAL GOALS** contribute to helping achieve the Secretary’s goal to advance environmentally sustainable policies and investments that reduce carbon and other harmful emissions from transportation sources. We protect the natural environment, focusing especially on unusually sensitive areas.

By 2016, we aim to:

- ✓ **Reduce the number of hazardous liquid pipeline spills with environmental consequences to between 65-81.**
- ✓ **Reduce the number of hazardous materials incidents with environmental damage to between 44-64.**

**OUR GOALS FOR ORGANIZATIONAL EXCELLENCE** contribute to the Secretary's goal of a diverse and collaborative workforce that will help advance a transportation system to serve the Nation's long-term social, economic, security, and environmental needs. By 2016, we aim to:

- ✓ **Substantially improve the work environment and employee satisfaction** in PHMSA – to better than the government-wide benchmark – as measured through the Employee Viewpoint Survey.
- ✓ **Invest in our employees**, with Individual Development Plans for every PHMSA employee and increased access to training and professional development.

**Our efforts also support the Secretary's strategic goals** for *State of Good Repair*, *Economic Competitiveness*, and *Livable Communities*. While most of the pipeline infrastructure in the U.S. is owned by the private sector and/or local utilities, our safety regulations help ensure that infrastructure is assessed regularly and maintained in good condition. We design our policies and programs to help balance U.S. economic interests and costs while advancing safety. Our pipeline and hazardous materials safety programs both work to make communities safer and more livable.

## Challenges and strategies

**Many other factors** influence the outcomes we aim to achieve. While we cannot control all of them, we try to anticipate them, adapt our strategies, and account for them in how we evaluate program performance. Some of the key challenges we expect to address over the next 5-10 years:

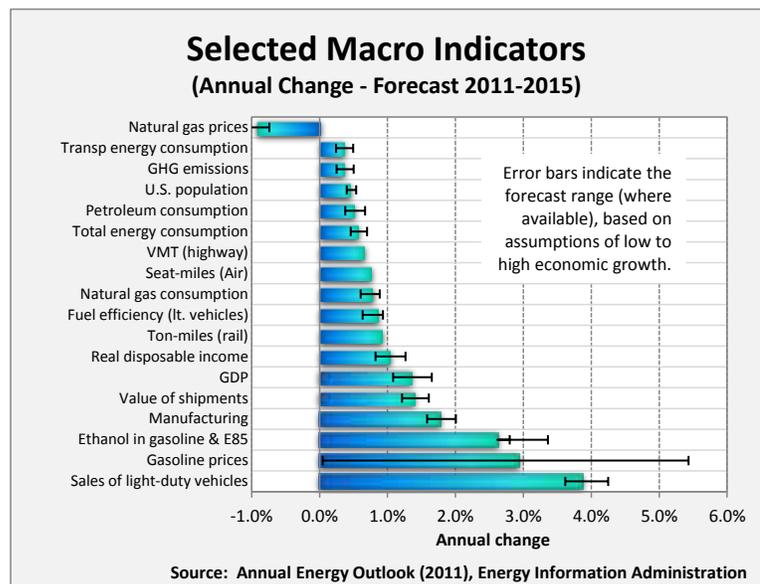
- Changes in risk exposure
- Aging and obsolete pipeline infrastructure
- Excavation and other outside force damage to pipelines
- Pipeline corrosion and material failure
- Bulk transportation of hazmat that is toxic by inhalation (TIH)
- Hazmat that presents a risk of fire aboard aircraft
- Tank truck crashes and rollovers
- Human error and organizational safety culture
- Understanding and targeting risk
- Mitigation and response
- Shared responsibility and collaboration
- Advances in technology
- Public perceptions of risk
- Making the organization run smoothly
- Community preparedness

**Our general strategies** include:

- Better understanding and targeting risks
- Strengthening our standards
- Strong enforcement
- Promoting strong safety culture and safety management systems
- Collaborating with others
- Expanding public education/awareness
- Leveraging technology & research
- Continuously improving our business processes for organizational effectiveness
- Supporting and developing our employees
- Cultivating a healthy work environment

**Changes in risk exposure:** Most of the macro indicators related to risk exposure are expected to increase. The most important of these factors are *population growth, energy consumption, and chemical production*. Risk exposure is generally a function of population *times* the amount of the hazard present. Forecasts from the U.S. Department of Energy suggest that the most likely scenario will be a 13-27% increase in risk exposure from 2011-2015.

*Population growth* is nearly certain. *Economic growth* projections, though, are much more uncertain, and this one factor tends to lead most other risk factors like energy consumption and chemical production.



Our ability to affect these changes is limited. In fact, they simply reflect the environment we operate in, and most are viewed broadly as public benefits. There are, however, some countermeasures already built into our systems and processes.

- *Focusing attention to populated areas* - One way we adapt to changes in population is to require companies to account for population exposure through their risk management programs. Pipeline operators must consider population exposure in implementing their integrity management programs and in classifying natural gas transmission lines. High population areas are subject to more rigid technical requirements and inspections. Hazardous material carriers must follow various route

restrictions, and certain rail shipments in particular require a process for reviewing alternative routes for relative risk.

- *Reducing the hazard* - Two other counter-measures can help reduce risk exposure—the chemical industry’s efforts to bring production closer to the point of use, and the pipeline industry’s efforts to optimize throughput through existing infrastructure. The Secretary’s *Call to Action* for Pipeline Safety challenged industry to further re-think ways that we might collectively reduce the hazard. We support these kinds of efforts and will always look for ways to mitigate risk exposure.

**Aging and obsolete pipeline infrastructure:** Nearly 450,000 miles of natural gas and hazardous liquid pipelines (about 17% of the total) are over 50 years old or unknown vintage. 168,000 miles of gas distribution pipeline (8% of the distribution mileage in the U.S.) were built



with bare steel, iron, copper, or “other” materials. These materials are more vulnerable to deterioration and failure than most of the plastic or protected steel materials commonly used today. Moreover, the condition of distribution pipeline is often unknown. Virtually all

of the gas distribution pipelines are buried underground, and many are inaccessible by internal inspection devices (“pigs”). States widely acknowledge the need to replace bare steel and cast iron pipeline, but replacement programs extend up to 100 years in some cases, with high replacement costs. Our strategy for dealing with this challenge is to:

- *Work with State pipeline safety programs* to assure the identification, repair, rehabilitation, requalification, or replacement of the highest risk pipelines are accelerated;
- *Extend the pipeline integrity management program* to gas distribution pipeline systems where 80 percent of the most serious safety incidents occur. Rules have been published, but implementation will take several years; and
- *Investigate new technologies* for improving the assessment, detection and control of pipeline risks.

**Excavation damage and other outside force damage** that compromise pipeline integrity remain one of the leading causes of incidents resulting in death or major injury. Our strategy for dealing with this challenge is to:

- *Enhance the "811 – Call Before You Dig" program* at the State and local levels to prevent pipeline damage from excavation. We want everyone to think automatically

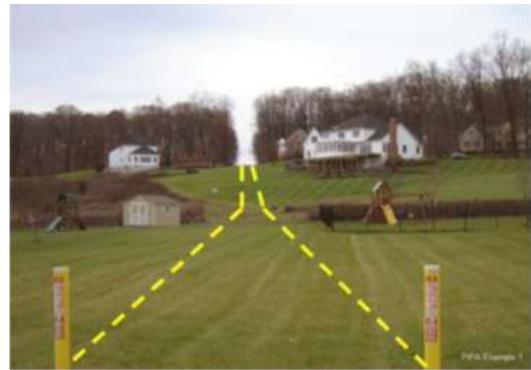


**Know what's below.  
Call before you dig.**

about calling 811 whenever they think about digging, and we want the process to be so quick and easy that it becomes second nature. Our efforts will focus on increased visibility and public awareness, supporting states and the Common Ground Alliance through state grants, targeted promotion, and participation in committees to broaden awareness of 811.

- *Promote awareness and use of recommended practices* for land use planning and development near transmission pipelines.

Working with local governments, real estate and development interests, insurers, pipeline operators, other Federal and state agencies and others, the Pipeline and Informed Planning Alliance (PIPA) has developed standards and best practices. Our efforts over the next several years will focus on engaging others to help implement the recommended practices.



**Pipeline corrosion and material failure** are the two leading causes of pipeline incidents overall, particularly for hazardous liquid and gas transmission lines. Our strategy for addressing these challenges is to:

- *Integrate, target, and expand safety inspections* based on the most serious risks;
- *Focus pipeline safety research* on methods that might be used to improve the identification of defects.

**Bulk transportation of hazmat that is toxic by inhalation (TIH):** In 2005, a train collision in Graniteville, South Carolina released 60 tons of chlorine gas, killing nine people and injuring hundreds of others. Chlorine is toxic by inhalation, and this general class of chemicals presents a very low-probability, very high-consequence risk in transportation. Our strategy for dealing with this is to:

- *Develop standards for loading and unloading* of bulk hazardous materials, including TIH.



- *Advance rail tank car design* through the Advanced Tank Car Cooperative Research Program and the development of a Next Generation tank car built under a hazmat special permit.

**Hazmat that presents a risk of fire aboard aircraft:** In 1996, a passenger jet operated by ValuJet crashed in the Florida Everglades as a result of an uncontrollable fire in the cargo compartment; 110 people died. An aircraft in flight is particularly vulnerable to the risk of fire, and the consequences can be catastrophic. Our strategy for dealing with this challenge is to:

- *Publish new safety rules for transporting flammable and combustible liquids* aboard aircraft, including secondary protections, and (where possible) harmonizing U.S. domestic regulations with United Nations (UN) standards; and
- *Strengthen rules/standards for transporting lithium batteries by air*, incorporating UN standards for domestic transportation and further developing international standards.

**Tank truck crashes and rollovers:** Rollover crashes involving tank trucks carrying gasoline and other flammable liquids are the leading cause of injuries and deaths from hazardous materials transportation incidents, accounting for roughly 75% of gasoline-related fatalities. These incidents are more likely to be fatal to the driver of the vehicle than other crashes. They can also cause spills and lead to highway closures and environmental contamination. Our strategy for dealing with this challenge is to:



- *Develop new standards for electronic stability control* (working with the National Highway Traffic Safety Administration and the Federal Motor Carrier Safety Administration, who have the lead on this initiative) for trucks;
- *Develop rules for reducing the hazard associated with tank truck wet lines;* and
- *Work with the other DOT operating administrations to improve driver training and to reduce driver fatigue.*

**Human error and organizational culture:** Human error is often cited as a major cause of accidents and incidents, and increasingly an organization's safety culture is found to be an important factor in safety risk management. Human error has been one of the leading reported

causes of both pipeline and hazardous materials incidents resulting in death or major injury. Our strategy for dealing with this challenge is to:

- *Increase our focus on safety beyond compliance* with minimum standards, with particular attention to developing a strong safety culture in the companies we regulate.
- *Evaluate the potential value of safety management systems (SMS)* as a comprehensive approach to managing risk.
- *Fully implement control room management requirements* for pipeline systems.
- *Evaluate the potential value of quality management systems* for pipeline construction and maintenance.

**Understanding and targeting risk:** A systematic approach to risk management requires a comprehensive understanding of the factors contributing to risk and the ability to focus resources in those areas that pose the greatest risk. There is considerable research needed to build our analytical capacity and improve the quality of our data. Our strategy for dealing with this challenge is to:

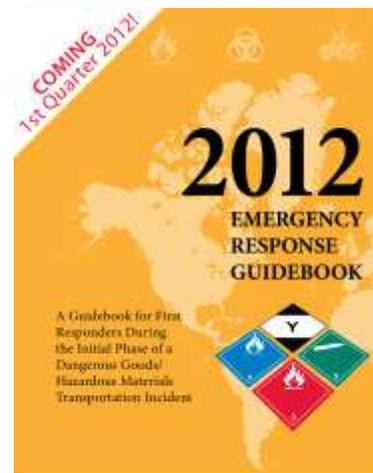
- *Develop our incident investigations program* to better understand the root causes of failures;
- *Integrate, target, and expand safety inspections* based on the most serious risks;
- *Develop uniform standards* for training hazmat inspectors and investigators;
- *Improve data collection and analysis*, collect the right data to evaluate risks from unregulated entities, and improve the transparency of information and public awareness of pipeline and hazardous materials safety issues; and
- *Develop a risk management framework* and improve hazardous materials transportation data collection to better target the data needed to manage the most serious risks and to detect emerging risks.



**Mitigation and response:** We reduce risk in two general ways—by *preventing failures* wherever possible, and by *reducing the consequences* of failures that do occur. While our

primary focus is on prevention, we recognize that accidents can still occur. Improved measures to detect and control releases, and a strong and effective response capability are critical to effectively mitigate the harm. Our general strategy for reducing consequences of failures is to:

- *Build in buffers*—secondary containment (e.g., outer packaging or absorbent material) that is designed to limit the spread of a hazardous material in the event of a failure of the primary package or container;
- *Improve leak detection and the use of product control systems* such as excess flow valves, remote control valves, and automatic shutoff valves on gas and liquid pipelines;
- *Advance the development of electronic shipping papers* to improve hazard communication and immediate access to hazmat information in the event of an incident;
- *Strengthen the capabilities of local emergency responders* with targeted planning and training grants and increased coordination;
- *Facilitate the movement of response equipment and materials* into/out of response areas through special permits;
- *Work with the Department of Homeland Security* to refine the response standards and isolation distances in the Emergency Response Guide.



**Shared responsibility and collaboration:** States, other Federal agencies, international organizations, companies, and the public, all have roles in reducing risk. We have an important leadership role, but we can accomplish our goals only through collective efforts. The private sector has the first and primary responsibility for the safety of their operations. State/local agencies provide a huge component of the overall national program, and they are stretched thin. Many other organizations and agencies, including those in the international community, play key roles as well. Our strategy for dealing with this challenge is to:

- *Strengthen the capabilities of others* at the State and local levels, and in other U.S. DOT operating administrations, in both prevention and response;

- *Share (more broadly) with others the information we have* to provide a standard of reference for safety performance, improve data quality, and motivate changes in behavior;
- *Develop incentives for sharing lessons learned* from failures, root cause analysis of incidents, close calls, and best practices—so individual learning becomes organizational learning;
- *Identify and reduce inconsistencies* between Federal and State pipeline safety programs, and across DOT operating administrations for hazmat safety; and bring together all constituents to create a more coherent approach to safety; and
- *Collaborate with Federal and State agencies and the international community* to ensure that the rules for the commercial transport of hazardous materials are uniform across modes and consistent with risk;

**Advances in technology**—particularly in materials, construction, and defect detection technologies—offer the potential for reducing risk. But there is also a potential downside: the temptation to rush with deployment of new technologies before knowing enough about them. Alternative fuels could pose unprecedented challenges in product delivery, safety, and environmental issues. Our strategy for dealing with this challenge is to:

- *Advance research to develop technologies and procedures* to better secure hazardous materials shipments and assess the risks of hazmat events;
- *Systematically identify and evaluate trends*, and actively monitor the development of new products, processes, and technologies that might affect the transportation of energy products or other hazardous materials;
- *Bring research and development to bear* on problems where a market failure, or inadequate market incentives, might prevent the private sector from investing adequately in technologies for public safety; and
- *Increase the safety oversight of companies and operations with permits and approvals*, including safety evaluations and fitness reviews. Evaluate and incorporate longstanding permits into the regulations, and develop a more cost-effective approvals program for fireworks.

**Public perceptions of risk:** A large body of research shows that most people have a distorted sense of the risks they face (compared to the actual risks we can calculate). People

tend to *overestimate* risks that are unfamiliar, uncontrollable, sensational, dreadful, or imposed by someone else who should be accountable. They tend to *underestimate* risks that are familiar, recreational, or offset by benefits of their choosing. Pipeline and hazardous materials transportation present many of the factors that cause people to overestimate risk. However, it is not enough simply to “educate” people about what the “real” risks are. We focus particularly on high consequence events because of the public’s high level of concern.

Our strategy for dealing with this challenge is to:

- *Focus special attention on high consequence risks*, even where failures might not appear in the recent historical data.
- *Hold companies accountable* for the risks they impose on others through our enforcement actions.
- *Increase the visibility* of our prevention and response efforts to protect the public.

**Making the organization run smoothly:** We accomplish our mission through our employees, so we need an environment that inspires people to perform at their very best to help achieve our mission and vision. Well-run programs require a great deal of behind-the-scenes work to support them—including legal counsel, human resources, budget and financial management, acquisition, information technology, administrative services, public affairs, intergovernmental coordination, and the advancement of diversity. It is a significant challenge to acquire adequate funding for these programs. It is also a challenge to bring together all the leadership, management, technical skills, processes, and teamwork to create and sustain a positive work environment.

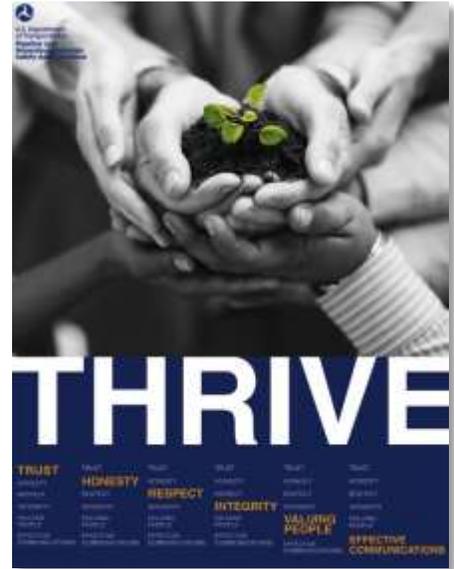
It still takes too long to hire a new Federal employee. It often takes too long to process enforcement actions and applications for permits and approvals. Our workforce is diverse, but not yet reflective of the relevant working population. We make good use of information technology, but our systems need extensive modernization. The Employee Viewpoint Survey has highlighted a number of challenges we need to address to create a better work environment. Our strategies for dealing with these challenges are to:

- *Engage our employees more fully for greater participation* in decision-making.
- *Support and develop our employees*, including more balanced allocation of training resources, mentoring, and individual development plans for all employees.
- *Continuously improve our processes* to make them more efficient and effective, including smart investments to leverage technology.

## Our core values – to *THRIVE*

**Our values underpin everything that we do.** They provide the foundation for strong performance and productivity and for sustainable performance. We value:

- **Trust** - Employees consistently demonstrate through their actions and decisions that they put the mission and the best interests of the organization first and assume that others are doing the same.
- **Honesty** - Employees are truthful with themselves and others, and are open to candid conversations. Employees are prepared to give and receive feedback and to explain openly their reasoning and actions.
- **Respect** - Employees acknowledge other people's experience, expertise, and performance.
- **Integrity** - Employees “do the right thing,” and admit and learn from their mistakes.
- **Valuing People** - Employees and organizational policies support development, growth and work life balance.
- **Effective Communications** - Employees are active listeners and commit to providing information in the most clear, direct and accessible way.



## Support and Accountability – *How we'll manage our work*

**We will develop annual Business Plans** to translate our strategic direction into actions. The Business Plans will guide our programs, projects, and activities based on the resources we have in our budget, progress in achieving our goals and implementing major initiatives, and the current conditions *on the ground*.

**All employees' performance plans** will be tied explicitly to outcomes; *accountability* will be based on an individual's:

- focus on important outcomes, and ability to develop logical priorities to affect these outcomes based on data and other information;

- monitoring the effects of actions taken and adjusting during the year and continuously improving processes and developing creative solutions; and
- understanding of the external factors that might also influence results, and explanation of the results at the end of the year, including evidence of how the priorities and actions affected the outcomes.



## Evaluation – *How we'll measure performance*

**Measures help drive performance.** That is both an opportunity and a risk. Measures that capture the essence of what we want to accomplish can align efforts and motivate people in a powerful way. Measuring the wrong things can distort priorities. A strong outcome focus and transparency in the process are critical to ensuring we move in the right direction. We will continue to research and experiment with performance measures, aiming at continuous improvement.



We measure safety outcomes in terms of the number of incidents resulting in death or major injury and spills with environmental consequences. However, we recognize that this is not enough for effective program management. We also need to measure or estimate:

- The total number of deaths and injuries;
- The most important factors in increasing risk;
- Changes in the underlying risk—apart from normal, annual variation in the numbers.
- The risk of very low-probability high-consequence events, or the type that might occur only once in many years—to help understand the risk we don't see, and to help frame the very large incidents that we might see;
- The economic cost of incidents;
- The economic cost of injuries, based on injury severity;
- The number and extent of disruptions (evacuations, road closures, alterations in flight plans, etc.) from pipeline or hazardous materials transportation incidents;
- Differences between public risk and occupational risk to workers;
- Changes in risk exposure;
- Leading indicators of risk and indicators of emerging risks; and
- Processing times for permits, approvals, enforcement, and action on petitions.

**Program evaluation** can help determine what works and what doesn't, as well as *why* our programs work well or not. We will develop an annual evaluation agenda, carry out objective and methodologically sound evaluations, and use the results of these evaluations to improve our programs. This is about *doing the right thing* as well as *doing things right*.