

# Environmental Regulation of the Oil and Gas Industry



**CASE STUDY: PIONEER NATURAL RESOURCES – THE RESPONSE  
OF A LARGE INDEPENDENT**



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# Central Questions

- How do environmental laws affect the day-to-day operations of an oil and gas company?
- Several large oil and gas companies came under fire in recent years for their denial of climate change, how does Pioneer view the issue?
- What does Pioneer plan to do to address future regulations on climate change?

# Background on Pioneer Natural Resources

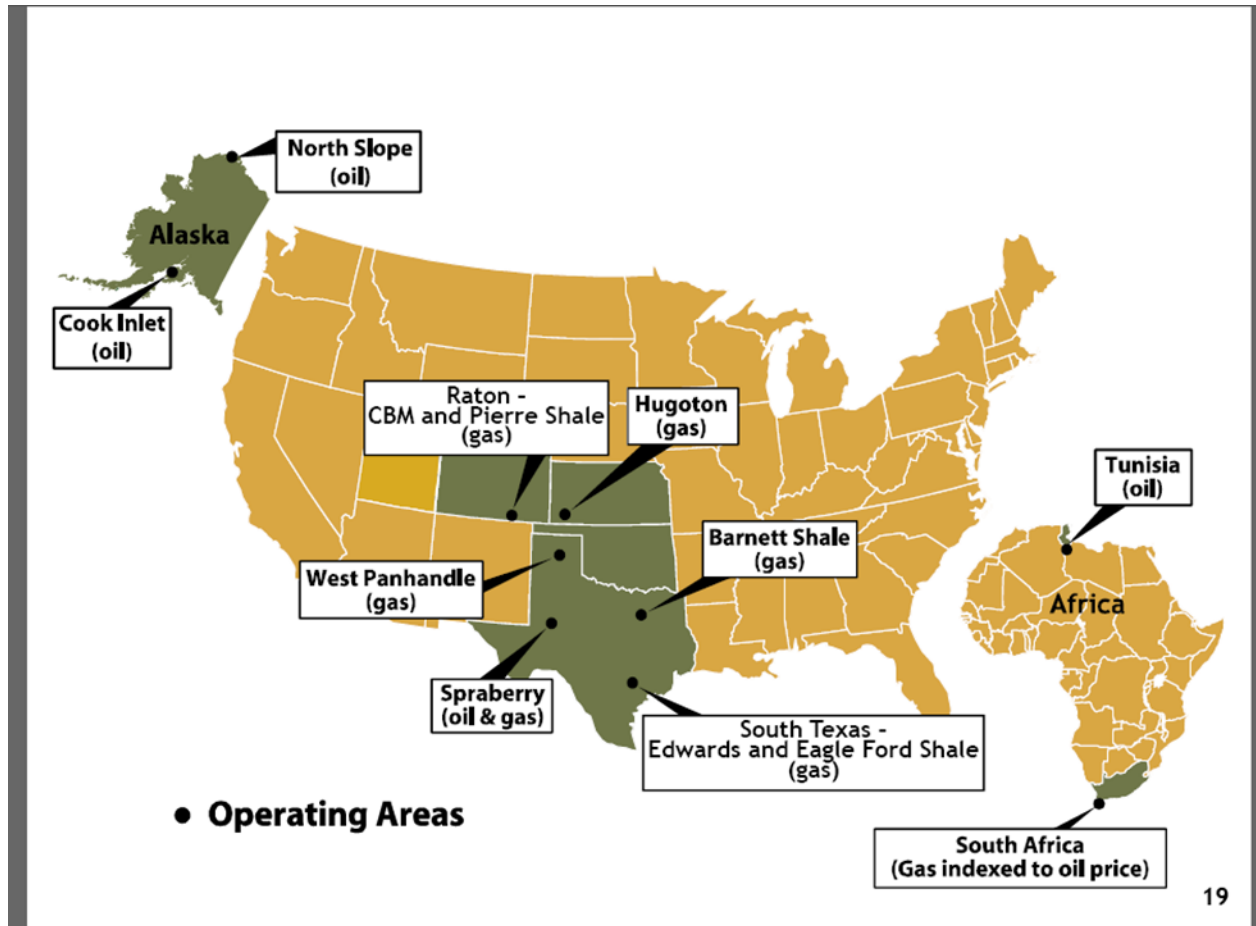


**PIONEER**  
NATURAL RESOURCES

# Company Information

- Founded in 1997, Pioneer is a large independent oil and gas exploration and production company with operations in the United States, South Africa and Tunisia.
- Competitively and profitably explore for, develop and produce oil and gas reserves.
- Executive offices are located in Irving, TX and maintains offices in Anchorage, Denver, Midland, London, Capetown, South Africa; and Tunis, Tunisia.
- At the end of 2008, the company had 1824 employees, 1128 of whom were employed in field and plant operations.
- Net income in 2008 was \$220 million. Produced 41.5 million barrels oil equivalent. About half of proved reserves are oil and other liquids; half of proved reserves are natural gas.

# Pioneer Operations



# Pioneer Operations Cont.

Oooguruk, North Slope, Alaska



Tunisia



Barnett Shale



South Texas gas fields



# Corporate Strategy

- 2004 – 2008 – Despite record investments in global oil drilling, few new oil resources were found.
- Develop low-risk strategy to deliver solid, consistent results by focusing on development drilling and resource expansion in core areas. In 2008 and 2009, were able to increase production despite sizable reduction in drilling activity because of long-lived assets with low decline rates. These assets require minimal maintenance capital and continue to perform at or above expectations/projections.
- In 2008, drilled more than 500 wells, increased production per share by 20% and added new proven reserves.

# Corporate Strategy Cont.

- September – crisis in the financial sector took a toll on the global demand for energy and the result was the most extreme market and commodity price instability in our history.
  - Response - November 2008 implemented initiatives to reduce capital spending and operating costs in response to the decline in oil and natural gas prices.
  - To reduce capital spending have minimized drilling activities and gone from operating 29 drilling rigs to 2. Will not restart drilling programs until have confidence that acceptable drilling economics can be sustained. A sustainable level of drilling occurs at \$60 per barrel and \$6 per Mcf. During the economic downturn, never stopped drilling in the Edwards Basin or Alaska.
  - **Update** – As of December 2009, Pioneer is ramping up drilling since the market is against at a production sustainable level.
- NYMEX spot price for oil fell from \$145 per barrel in early July to \$45 per barrel. NYMEX spot price for natural gas fell from \$13.50 per thousand cubic feet to \$6 at year's end.

# Relevant Policies and Laws and Pioneer's Response

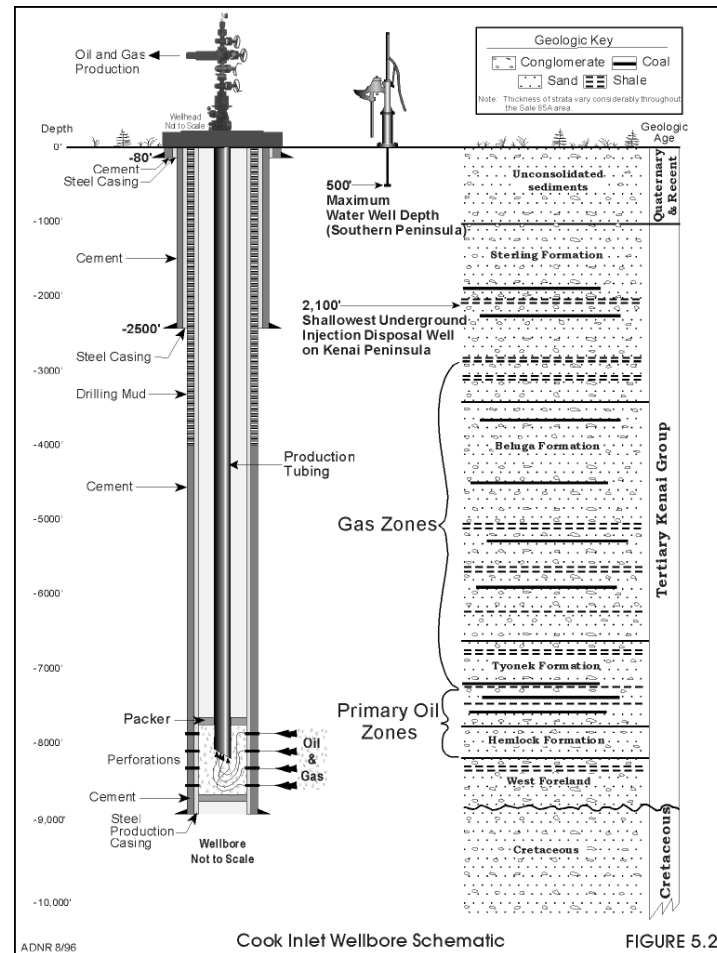


**HOW DO REGULATIONS AFFECT THE DAY-TO-DAY  
OPERATIONS OF AN OIL AND GAS COMPANY?**



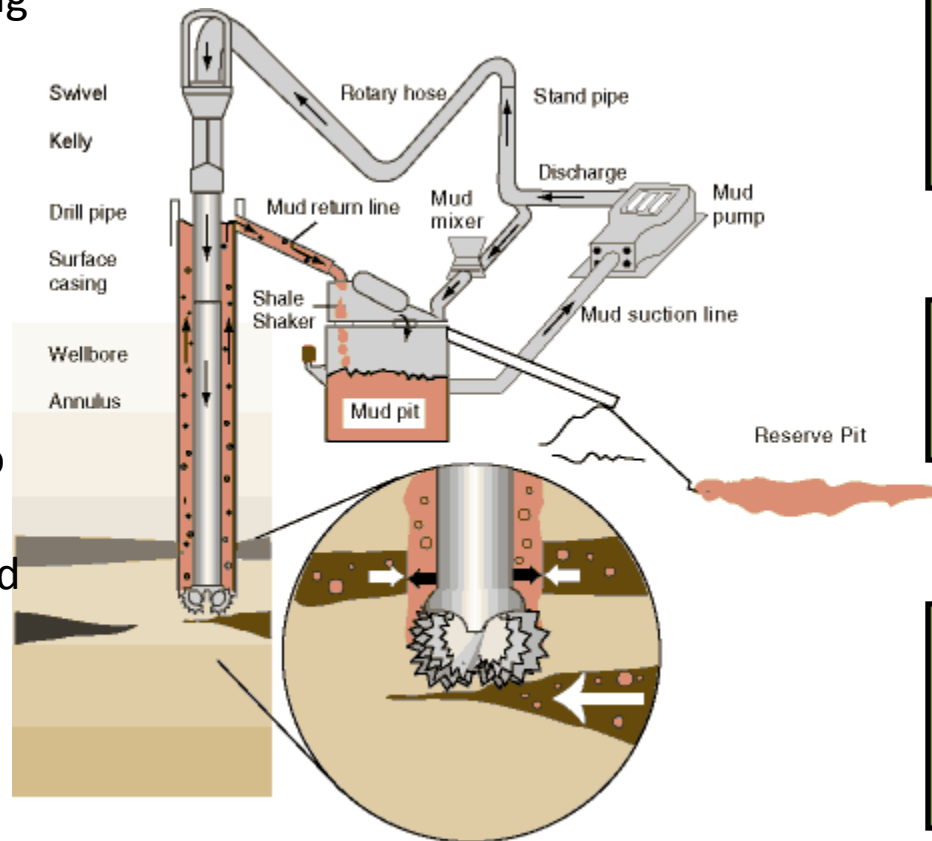
# If Pioneer can dig 500 wells in a year, we can dig 1 in 10 minutes.

- After geologists locate a promising geological formation, petroleum engineers devise a wellbore schematic.
- Based on the geological formations, a plan for casing is developed.



# Drill, Baby, Drill.

- A drill bit is selected and drilling begins.
- Based on the schematic, the team drills to a certain depth, before laying the first casing.
- The team drills to the next set depth and lays the second casing.
- Between the two cement is laid.
- Mud circulates over the drill bit to cool and remove debris.



What if an underground reservoir of water gets penetrated?

Where does that used mud go?

What if the well gets shut-in while drilling?

# Clean Water Act (CWA)

- Impose restrictions and strict controls with respect to the discharge of pollutants, including spills and leaks of oil and other substances, into the waters of the United States, unless authorized by an issued permit.
- Also prohibit the discharge of dredge and fill material into regulated waters, including wetlands, unless authorized by an issued permit.
- Spill prevention, control and countermeasure requirements of the federal law requires appropriate containment berms and similar structures to help prevent the contamination of navigable waters in the event of a spill, rupture or leak.
- Federal and state regulatory agencies can impose administrative, civil and criminal penalties for non-compliance with discharge permits or other requirements of the CWA.

# Resource Conservation and Recovery Act (RCRA)

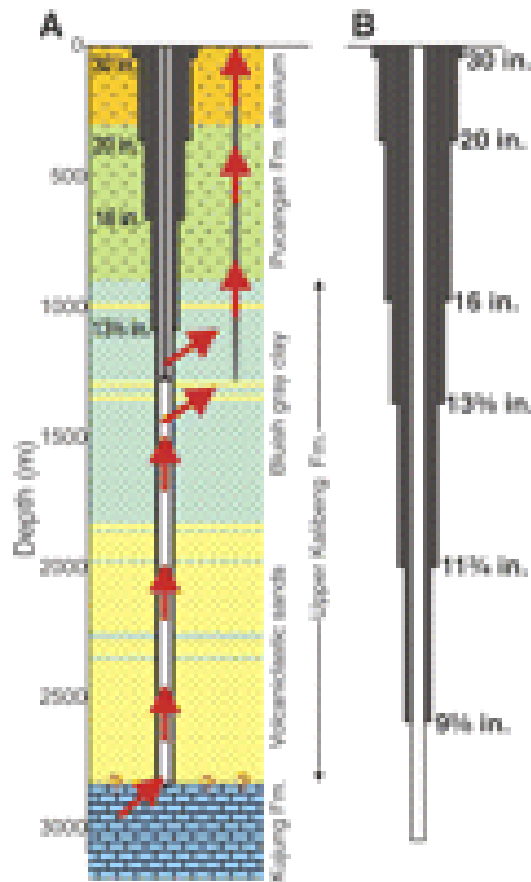
- Regulates the generation, transportation, treatment, storage, disposal and cleanup of hazardous and non-hazardous waste.
- Under the direction of the EPA, individual states regulate and administer to the Act.
- Drilling fluids, produced waters and most of the other wastes associated with the exploration, development and production of crude oil or gas are regulated under non-hazardous waste provisions.
- Also, in the course of ordinary business, some industrial waste is generated such as paint waste, waste solvents, and waste oils that might be regulated as hazardous wastes.
- Wastes containing naturally occurring radioactive materials may also be generated in connection with the operations of an oil or gas well.

# CWA and RCRA - Effect on Pioneer

- Unconventional shale plays are the new hot areas with horizontal drilling and hydraulic fracturing technology. There is large opposition to hydraulic fracturing because it may contaminate groundwater.
- Utilize a closed-loop system which eliminates the need for pits as it cleans and recycles the drilling mud. Waste is collected in portable tanks and removed to an appropriate disposal facility.
- Provide mandatory training in waste minimization, emergency response and compliance with federal and state regulations for necessary employees.
- Some of these wastes now classified as non-hazardous could be classified as hazardous in the future.
- Any such change would result in an increase in the Company's costs to manage and dispose of waste.

# Casing is Laid

- After the casing is complete, the engineers isolate the zones which they are going to produce.
- For natural gas, the wellbore will be fraced at the zones containing gas.
- For oil, the wellbore is constructed to reach the reservoir.



What if the casing is installed incorrectly?

What if the well produces water?

What happens if the well gets plugged and abandoned?

# Safe Drinking Water Act (SDWA)

- Operations associated with the company's properties also produce wastewaters that are disposed through injection in underground wells. These activities are regulated under this Act.
- Classifies produced waste waters and imposed restrictions on the drilling and operation of disposal wells as well as the quality of injected wastewaters.

# SDWA - Effect on Pioneer

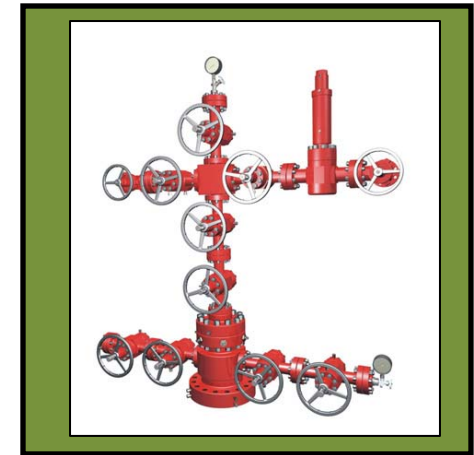
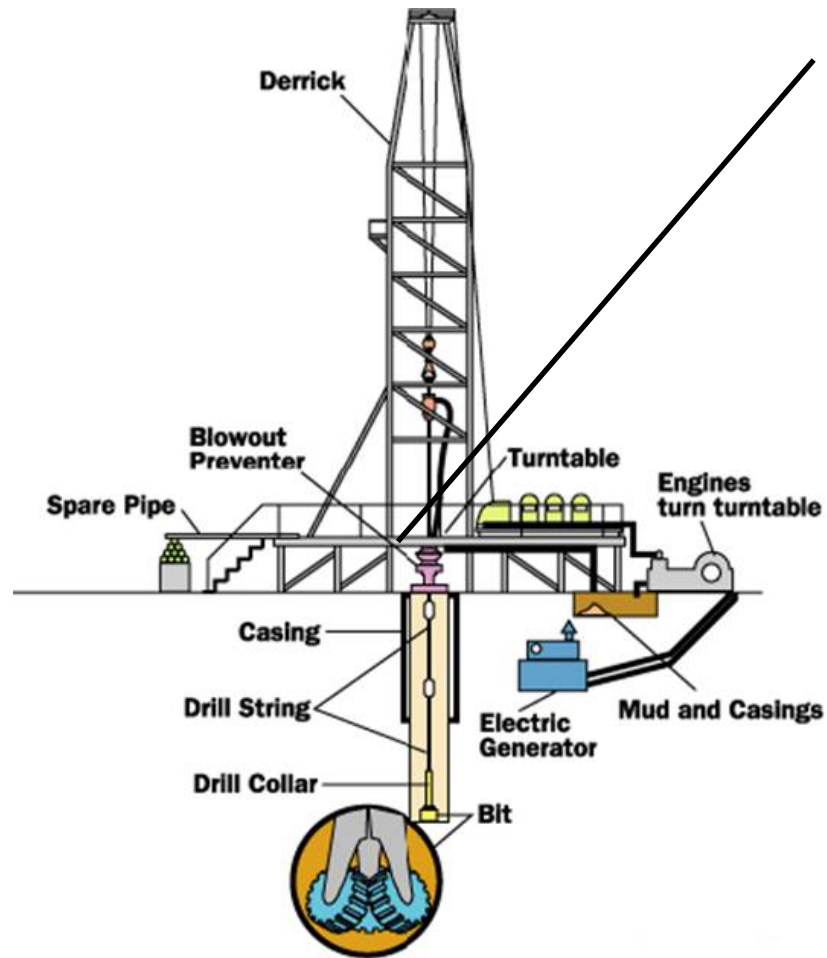
- Pioneer believes that disposal wells on their property comply with all applicable requirements under the Act.
- A change in the laws in the future or the inability to obtain permits for new injection wells in the future may affect the Company's ability to dispose of produced waters and ultimately increase the cost of the company's operations
- Waters produced by the company's CBM operations also may be subject to the laws of regulatory bodies and states regarding the ownership and use of the water.
- In connection with the CBM operations in the Raton Basin in Colorado, water is removed from coal seams to reduce pressure and to allow methane to be recovered.

# SDWA – Effect on Pioneer Cont.

- In a recent case brought by the owners of ranch land involving a CBM basin in Colorado, a state water court held that the use of water in CBM operations should be subject to water use regulation under an additional agency as is the case with other uses of water in the state.
- Unconventional shale plays are the new hot areas with horizontal drilling and hydraulic fracturing technology.
- There is large opposition to hydraulic fracturing because it may contaminate groundwater.

# Up and Running

- The drill bit is removed and replaced with production tubing.
- If the pressure gradient differential isn't enough, a plunger device is inserted to bring the oil and gas to the surface.
- A blowout preventer is used to cap the well.
- Once the well starts producing, it is connected to pipelines.



What happens if the well blows out or the wellhead leaks?

# Oil Pollution Act (OPA)

- Primary federal law imposing liability for oil spills.
- Sets minimum standards for prevention, containment and cleanup of oil spills.
- Applies to vessels, offshore and onshore oil facilities, including exploration and production facilities that may affect the waters of the United States.
- Under OPA, responsible parties, including owners and operations of onshore facilities may be subject to oil spill cleanup costs and natural resource damages as well as public and private damages that may result from oil spills.

# OPA - Effect on Pioneer

- Implement and maintain a system (Loss Control Management System) to track causes of spills and identify problem areas to better prevent future spills.
  - LCMS – logical and systematic way a company manages and controls HSE issues
  - Measure existing safety activities to provide a ‘yardstick’ for evaluation and proactive measures
- Implement and maintain the Safety and Environmental Management Plan for Pioneer's operations conducted in offshore areas.

# Processing and Transporting to Market

- After the well is producing and connected to the pipelines, it is sent to a gas processing plant or a refinery where the raw resource is converted into usable fuels.



What happens if a pipeline leaks?

How efficient are these processors?  
Are emissions released?

Where is the excess gas stored?

# Federal Clean Air Act (CAA)



- Regulate emissions of various air pollutants through air emissions permitting programs and the imposition of other requirements.
- May require a facility to obtain preapproval for the construction or modification of certain projects or facilities expected to produce air emissions or result in the increase of existing air emissions; obtain or strictly comply with air permits containing various emissions and operational limitations; or utilize specific emission control technologies to limit emissions of certain air pollutants.
- EPA continues to develop strict regulations for toxic emissions at specified sources and states can impose regulations that are stricter than those that the EPA sets.
- Federal and state regulatory agencies can impose administrative, civil and criminal penalties on those that are non-compliant.
- Permits and related compliance obligations under the CAA, as well as changes to state implementation plans for controlling air emissions in regional non-attainment areas, may require the company to incur future capital expenditures in connection with the addition or modification of existing air emission control equipment and strategies for gas and oil exploration and production operations.
- Additionally, some gas and oil production facilities may be included within the categories of hazardous air pollutant sources, which are subject to increasing regulation under the CAA. Failure to comply with these requirements could subject a regulated entity to monetary penalties, injunctions, conditions or restrictions on operations.

# CAA - Effect on Pioneer

- Pioneer owns interests in 4 gas processing plants and 13 treating facilities, damage or misoperation of which could result in the release of toxic gases.
- Maintain an active and experienced environmental department and gas plant supervisors to oversee environmental compliance.
- Frequently inspect surface facilities, repairing leaks as soon as possible. Cameras can be used down hole.
- Pioneer has a couple of vapor recovery units (VRUs) in Permian Basin.
- The VRUs can be used on pipelines and condensate tanks to capture the vapors and put them back in the sales line to prevent fugitive emissions.

# End of the Well Lifecycle

- After a well is done producing, the blowout protector is removed and the well is capped.
- Any waste or machinery around the well should be removed.

What happens if someone is injured on the site of an abandoned well or attributes an injury or health concern to the well?

# Comprehensive Environmental Response, Compensation and **Liability** Act (CERCLA)

- Imposes joint and several **liability**, without regard to fault or legality of conduct, on classes of persons who are considered to be responsible for the release of hazardous substances into the environment.
- These persons include the current and past owner or operator of the site where the release occurred, and anyone who disposed or arranged for the disposal of a hazardous substance released at the site.
- Subject to **liability** for the costs of cleaning up the hazardous substances that have been released into the environment, for damages to natural resources and for the costs of certain health studies.
- Additionally, it is not uncommon for adjacent landowners or third parties to file claims for personal injury and property damage allegedly caused by the hazardous substance that was released into the environment.



# CERCLA - Effect on Pioneer

- Company currently owns or leases numerous properties that have been used for oil and gas exploration and production for many years.
- Although a company may believe that it has followed all procedures that were standard in the industry at the time to prevent wastes, hazardous substances, wastes or hydrocarbons may have been released on or under the properties owned or leased by the company or other off-site location used for waste disposal.
- There is evidence that petroleum spills or releases have occurred in the past at some of the properties owned or leased by the company.
- Under these laws, the company will be required to remove previously disposed substances and wastes, remediate the contaminated property or perform remedial plugging or pit closure operations to prevent future contamination.

# CERCLA – Effect on Pioneer Cont.

- Conduct standard environmental due diligence procedures related to acquisitions, existing properties and areas of potential environmental impacts to soil, water or air.
- Conduct annual environmental inspections on all major facilities and plants.
- Maintain a firmly established chain-of-command to react to environmental problems and emergency responses that may arise.
- Pioneer is not fully insured against environmental incidents which gives them a cost-reduction incentive to prevent them.

# Further Environmental Responsibilities of Pioneer

- Maintain an active membership in the TxOGA Environmental and Regulatory Committees and the EPA's Natural Gas STAR Program.
- Engage environmental consultants for specific expertise on an "as needed" basis.
- Maintain continuous dialog with federal, state and international agencies.
- Maintain an active participation in the voluntary remediation of properties in the voluntary clean-up program of several states.
- In some areas, Pioneer's operations may have the potential to affect indigenous communities inhabiting those areas. Pioneer strives in its operations to protect human rights, minimize impacts to native lands and culture and demonstrate respect for the cultural, social and religious beliefs and traditions of others.



# Pioneer's Outlook for 2010 and Beyond



**PIONEER**  
NATURAL RESOURCES

# *Massachusetts v. EPA*

- Recent scientific studies have suggested that emissions of certain gases, commonly referred to as 'greenhouse' gases' and including carbon dioxide and methane, may be contributing to the warming of the Earth's atmosphere.
- In response to such studies, the Congress is actively considering legislation to reduce emissions of greenhouse gases. Additionally, several states have already taken legal measures to reduce emissions of greenhouse gases.
- Texas, Colorado, Kansas, Oklahoma, and Alaska (the states in which Pioneer operates) sided with the EPA in *Massachusetts v. EPA*, hoping to convince the Supreme Court that the federal agency should not regulate carbon dioxide and other GHGs as pollutants.

# How does Pioneer view the issue of climate change?



# Ears and Eyes to Congress

- As of a few months ago, Pioneer employed an International Environmental Specialist.
- This person distributes a weekly newsletter to the VPs at Pioneer concerning the status of climate change regulation and legislation and recent judicial hearings.



# A Driver of the Industry's Environmental Bandwagon

- Pioneer is a member of the America's Natural Gas Alliance to promote the usage of natural gas:

*"As the US looks for ways to address our nation's most challenging energy and environmental issues, our mission is to communicate to all current and potential natural gas users, as well as policy makers, the many positive impacts that natural gas can have on our environment and on our clean energy future.*

*"We believe that utilizing North America's abundant supplies of natural gas will help to improve air quality, create thousands of jobs and reduce our growing dependence on foreign oil."*

**Rod Lowman, President and CEO  
America's Natural Gas Alliance**

**FOSSIL FUEL EMISSION LEVELS**  
Pounds per Billion Btu of Energy Input

POLLUTANT	NATURAL GAS	COAL
Carbon Dioxide	117,000	208,000
Carbon Monoxide	40	208
Nitrogen Oxides	92	457
Sulfur Dioxide	1	2,591
Particulates	7	2,744
Mercury	0.000	0.016

# Texas Commission on Environmental Quality Find-It and Fix-It Program

- Techniques have been developed to identify and easily fix leaks from the wellhead.
- Able to conduct aerial or ground-based leak detection using laser and/or infrared technology.
- This program randomly surveys oil and gas facilities to detect leaks and penalizes violators.
- Such voluntary steps to reduce its emissions has been recognized on numerous occasions by the EPA.



# EPA Natural Gas STAR Program

- Natural Gas STAR is a voluntary partnership that encourages oil and natural gas companies to adopt proven, cost-effective technologies and practices that improve operational efficiency and reduce methane emissions. Methane is emitted by oil production and all sectors of the natural gas industry, from drilling and production, through processing and storage, to transmission and distribution.



- » Pioneer is the largest operator in the Spraberry oil and gas field in West Texas and one of the largest operators in the Hugoton gas field in Kansas and the West Panhandle gas field. Pioneer joined the Program through the encouragement of the EPA and the Gas Processors Assoc.

# Changes Implemented

- Modified compressor shutdown logic from automatic to manual to prevent blowdowns.
- Reduced number of NRU (nitrogen rejection unit) shutdowns since methane is vented at each shutdown.
- Installed heat tracing on control valves preventing them from freezing open and releasing gas into the atmosphere.
- Installed gas condensate pipeline to relieve the trucking and vaporizing of the gases.
- Installed vapor recovery units to recycle captured gas back into the plant inlets.

# Benefits of the STAR Program

- Since joining Natural Gas STAR, Pioneer has reported methane emissions reductions of nearly 2 billion cubic ft.
- Enhanced emissions reduction tracking and recordkeeping system, provided a permanent record of ghg reductions.
- Formalized Pioneer's commitment to environment.
- Helped the company set additional reduction goals and reap associated financial benefits.
- Helped reduce the company's environmental **liabilities**.

# What does Pioneer plan to do to address future regulations on climate change?



# Future Climate Change Regulation – Sen. Reid

- Last month, Majority Leader Henry Reid confirmed that he plans to bring up the energy and climate bill on the floor next spring after work is done on both health care and financial regulatory reform.

# Future Climate Change Regulation – Sen. Kerry

- Along with Sens. Graham and Lieberman, leading a separate track of negotiations on climate policy and seeking to unveil a draft of this proposal before the talks begin in Copenhagen.
- This bill should protect the climate but also allow for more offshore drilling (among other things).
- The bill should also include a plan to allocate emission credits to businesses.
- Should this bill become law, Pioneer could revisit offshore drilling in the Gulf of Mexico and other zones cleared by the legislation.

## Sen. Kerry's Bill Cont.

- Includes a list of offset project types that the President should consider as eligible under a domestic offset program.
- Capturing of venting, flaring and fugitive emissions from oil and natural systems is 3<sup>rd</sup> on list.
- For Pioneer this would apply to VRUs that capture vented methane emissions off of oil, condensate and/or produced water tanks.

# Kyoto Protocol Carbon Credits

- The London branch office has been working to get carbon credits certified for a project planned to replace the diesel-fired generators with natural gas-fired electrical generators at the production facility in Tunisia.
- There is also a project planned to build a pipeline to market. If the gas is brought to market instead of venting or flaring it, Pioneer could qualify for carbon credits that could be sold on the European Climate Exchange (ECE).

# Final Thoughts

- Offsets are the next technology that Pioneer is looking to.
- While Pioneer has a couple of vapor recovery units (VRUs) in Permian Basin, they are not yet on board with calculating, registering, and banking these as offsets. Evaluating software to manage and calculate GHG data.
- The VP of Public Relations/Communication is working with the ANGA to increase the demand for natural gas because of its obvious importance and prominence to the Company's portfolio.
- Keys to Success – Secure active management support, engage personnel at all levels, and maintain program momentum.
- Further Research – How does Pioneer compare among its peers in the regulation of oil and gas production? What are the flagship corporations in regards to environmental regulation and what lessons can be learned and applied?