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Minimizing Environmental and Safety Risks to Sustain Resource Recovery – A Case Study

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The views expressed in this presentation are those of the author, and do not necessarily reflect those of the State Lands Commission or its staff.
Outline

• Global benefits of risk management
• State of California’s risk prevention programs
• Case study of pipeline rupture and oil spill
• Impacts and consequences of failed risk plan
• Lessons learned
Global Benefits of Risk Management

- Personnel well-being and safeguard asset value
- Protect natural surroundings
- Avoid interruption or shutdown of operations
- Prevent substantial clean-up cost or penalties
- Secure corporate standing and reputation
- Extend project life and maximize resource recovery
Financial Impacts From Environmental Incident

• Company incurs all costs

• Company responsible to reimburse costs
  – Clean up and remediation costs, fines, mitigation
  – Settlement & legal costs, civil and criminal penalties

• Executive terminations and company bankruptcy risk

• Consequences high for weak risk management plan
Incorporating Risk Management in the Business Plan

- Management buy-in
- Realistic objectives
- Top down accountability for achieving goals
- Quantify and dedicate funding
- Risk management program based on infrastructure
- Utilize expertise and train personnel
Examples of Risk Management Programs

- California State Lands Commission Oversight Program
  - Offshore facilities only
  - Government and Industry collaboration
  - Worldwide application

- Onshore pipeline oil spill case study
Components of California’s Risk Prevention Programs

- Facility safety and pollution inspection
- Innovative facility safety auditing
- Engineering oversight
- Oil spill and emergency incident assessment
Facility Inspections

- Testing of safety components
- Crude oil quality measurement
- Royalty verification
Facility Safety Audits

- Adequacy of equipment
- Piping & instrumentation
Engineering Oversight

- Drilling
- Platforms
- Pipelines
- Facilities
Effectiveness of California’s Offshore Risk Prevention Program

- 48% Reduction in audit deficiencies since 1999
- Less than 1/2 barrel total volume spilled per year
- Improved platform safety equipment performance
- Continued low incidence of spills and accidents
- Zero pollution or safety related downtime
Evolution of Risk Management Systems

- 1970’s & 80’s: Improved Engineering
- 1990’s thru 2000: Improved HSEMS
- 2000 to Current: Incorporation of Human Factors

Source: Bradshaw ABS Consulting 2012
Collaboration of Inspection & Safety Audit Programs

Sources: B. Poblete et al on Human Factors, 2002 & 2010

Inspection Program

Safety Audit Program

Facilities & Equipment
work space design, physical characteristics, maintenance and reliability

People
human characteristics & behavior
(physical & mental)
fitness
stress
fatigue

Management Systems
management commitment,
incident investigation,
hazard identification, risk assessment and procedure training
Beneficial Applications

- Worldwide application
- Onshore and offshore
- Exploration and development companies
- Pipeline transmission companies
- Government and Industry stakeholders
Cost of Complacency in Risk Management

• Minimizing the importance of a risk management plan can backfire

• Implementation costs can be high, but consequences can be higher

• Some operators are already paying the price
Case Study: California Oil Spill From Onshore Pipeline Rupture

- 24 Inch Pipeline ruptured, Santa Barbara County, CA
- 123,000 gallons oil spilled 200 yards from coast
- 21,000 gallons flowed to beach and ocean
Pipeline Rupture and Spill Location

Source: Santa Barbara County Energy Division, 2013
Oil Spill Site Initial Discovery

Spill next to Highway 101

Culvert under Highway
Spill Location

Source: www.geog.ucsb.edu
Oil Spill Impacts
Aerial View of Oil Spill at Refugio Beach
Pipeline Failure and Excavation

Hot Tap to remove oil left in pipeline after failure

Failed pipeline - removed section

Pipeline failure point wrapped, in preparation for transport to Lab for testing
Pipeline Failure and Excavation

Point of Failure

Source: Santa Barbara Independent Newspaper
Pipeline Failure Onsite Inspection

Source: Santa Barbara Independent Newspaper
Pipeline Failure Section Preparation for Shipping
Pipeline Failure Analysis

- External corrosion was root cause
- Moisture found between external insulation and pipe wall
- Smart Pig inspection results showed corrosion depth penetration at 47%
- Independent lab analysis revealed corrosion depth penetration to be 86%
- Pipeline failed at 750 psi; 56% of maximum operating pressure
- Cathodic protection did not prevent pipeline corrosion
Operating Impacts From Pipeline Spill

- Seven California offshore platforms shut down
- 40,000 B/D oil production shut in since May, 2015
- 138 miles of onshore pipelines out of service
- Complete evacuation of oil in pipelines
- Pipeline operator to conduct pipeline integrity assessment
- Offshore operators remain shut in until assessment completed
Financial Impacts From Pipeline Spill

- Pipeline company responsible for all costs
- $280 Million cost through March 2017
- Offshore oil revenue losses approx. $1.5 million/day
- State and federal royalty losses approx. $200,000/day
- Local government losses approx. $74 Million if down three years
Lessons Learned

Need a Strong Risk Prevention Program Worldwide

• Average risk prevention practices is not good enough

• Review of all possible risk scenarios is imperative

• Strong risk management plan can assure protection

• All safety components must be addressed
Lessons Learned Cont’d

Need a Strong Risk Prevention Program Worldwide

• Consequences of spill can be extensive and permanent

• Resources recovery can be jeopardized

• Corporation financial health and solvency can be a risk

• Global application is essential for Industry welfare
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