THE THREAT OF OPERATIONAL RISK TO THE OIL INDUSTRY

Time for the industry to rethink its risk mitigation process and revitalize its safety roadmap

4 December 2017

DuPont Sustainable Solution

Devendra Katiyar, Oil & Gas
DuPont Sustainable Solutions - we have served leading Oil & Gas companies

- Our oil and gas clients are among the top 10 oil producers in the Forbes list and among Fortune 500 companies of 2015. Members of the International Association of Oil & Gas Producers

- Global footprint with operations across different geographies and countries (diverse and multi-cultural working environment).
Sharp drops in crude prices is not new... however the emergence of unconventional producer will tend to shorten cycles in the future.

BRENT MONTHLY AVERAGE
US$/BBL

1996, OPEC 10% quota increase and Asian financial crisis resulting - 53% in oil price till end 1998

12 years
3 years
1 y
2 years

-63%

-69%

Financial crisis
Tepid Economy
Arab spring

Companies have not taken the opportunity to transform themselves during this period

New technologies in unconventional development have spurred significant growth in the industry, particularly in the United States. Oil production has risen 80 percent in the U.S. since 2008, from an average of 5 million barrels per day to 9.2 million barrels per day as of December 2015.

Impact of US Light Tight oil production on industry cycles

Reactivity

• 6-12 months lead time to production
• 50%+ natural production decline rate in year 1

Source: EIA, DSS Analysis

Copyright © 2016 DuPont. All rights reserved.
O&G companies are taking more than 4 years to adjust OPEX to market deflation due to inherent portfolio and operating constraint.

**BRENT MONTHLY AVERAGE**
US$/BBL

**ANTICIPATED DEFLATION IN A 60$/BBL WORLD**
UOCI (UPSTREAM OPERATING COST INDEX)
Modeling of UOCI based on Brent price levels and variations ($R^2=0.96$)

The UOCI measures cost changes in the oil and gas field operations arena. UOCI is similar to the consumer price index (CPI) in that it provides a clear, transparent benchmark tool for tracking and forecasting a complex and dynamic environment.

Source: EIA, HIS UOCI, DSS Analysis
Since 2 years, companies have been working extensively on achieving various cost-cutting measures to protect their Cash Flow.

As companies seek to monetize every drop of oil taken out of the ground in response to falling prices, it is inevitable that certain risk management initiatives are re-prioritized as capital is transferred from one part of the business to another.

**ADJUSTMENT LEVERS TO INDUSTRY CYCLES**
Qualitative Assessment

- **Structural**
  - Lower cost base line

- **Operational**
  - Lower cost base line
  - Transform cost profile

- **Cyclical**
  - Lower time to adjustment

**Accelerate cost base adjustment**: quicker reaction in the first phase is more likely to generate impact on CFO rather than outgrowing market deflation in the second phase.

**Accelerate early production growth**: early barrels are high margin barrels as they benefit from OPEX adjustment lag & tight market supply.

Source: DSS Analysis
During this period cost-cutting measures, important risk management efforts are neglected leading to disturbing weaknesses

It is during these times of price instability that operational risk management – the identification, evaluation and control of hazards based on potential levels of severity and likelihood of occurrence – should remain a top priority for companies in the oil and natural gas industry. Taking such steps will enable companies to avoid costly incidents and high insurance premiums, and thus continue to drive profitability, ensure the safety of their workers, and maintain their future right to operate.

How will you qualify your Operational Risk Management system after 2 years of cost-cutting measures?

<table>
<thead>
<tr>
<th>Inadequate</th>
<th>Weak</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification / evaluation of operational risks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrity of facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competing priorities, i.e., production, quality, costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resources, both quantity and capabilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management of change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compliance-to-procedures culture, operational discipline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity to manage process safety risks differently from workplace safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leadership &amp; risk culture</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: DSS discussions with O&G clients
Our client experience indicates that most O&G companies have reasonably good Operational Risk Management systems in place.

**THE CHALLENGE IS MAKING IT WORK TO ACHIEVE INCIDENT FREE OPERATIONS**

ILLUSTRATIVE

DuPont recognises that there are four key components for achieving Process Safety Excellence:

1. **Culture of Anticipation** (how risks are understood by people and systematically addressed)

2. **Culture of Openness and Collaboration** (how people work together and support each other)

3. **Operational Discipline** (how following the rules is transformed into organizational pride)

4. **Integrated Management System** (cultural and risk based elements meshing together)
There is a ~2 years time lag between the point at which oil prices begin to fall and when reflected in safety performance indicators.

Looking back to the past, there is an alarming correlation between declining crude oil prices and rising safety violations and injury rates in the oil industry. When oil prices dropped between 2000 and 2002, there was a 6 percent rise in LTIF rates from 2002 to 2003. After crude oil prices rebounded but fell sharply during 2008-2009, the industry experienced a 14 percent increase in LTIF rates in 2012, as compared to 2010.
Time has come for O&G companies to rethink their risk mitigation model and to revitalize their safety roadmap

**Differentiated Risk Approach**

**Focus on Top Risks:**
- To Critical Assets / Processes / Activities
- Along the entire Value Chain

Differentiate between short-term Risk Containment vs. long-term sustainable Risk Reduction

**Integrated Capabilities**

Effective risk governance to overcome risk management silos and foster integration with core asset & operations management processes.

**Move from individual capabilities to a learning organizational process**

**Risk Culture & Operational Discipline**

Embed a strong and aligned risk culture and operational discipline to drive the implementation of risk management efforts
How Can Organizations ACHIEVE MAXIMUM RISK REDUCTION AT MINIMUM COST?

Apply an integrated approach addressing all the components of an Operational Risk Management System
DSS INTEGRATED APPROACH

PEOPLE

MANAGING PROCESSES
To keep focus on what really matters with the right people

TECHNICAL MODEL
Standard tools and practices to drive focused operational risk reduction

CAPABILITIES ENGINES
To ensure the right skills and effective coaching on operational risks

MINDSETS & BEHAVIORS
To align organization on the purpose and objectives of operational risk reduction

EXPECTED BUSINESS OUTCOME

DuPont Sustainable Solutions
DIFFERENTIAL RISK APPROACH

Specific company risk profile

Risk Governance

Risk Tolerance
HOW TO ASSESS AND MITIGATE RISKS

Measure of Risk

- Treat?
- Transfer?
- Terminate
- Unsustainable

Competitive Advantage

Frequency

Consequence

HIGH

LOW
ORGANIZATIONS MUST DEFINE THEIR “RISK TOLERANCE”

*Take into account…*

- Protection of People
- Assets
- Environment
- Business Implications
RISK GOVERNANCE

*Additionally takes into account…*

- Regulatory Requirements
- Insurance
- Stakeholder’s Expectations
- “Risk Tolerance”
THE PEOPLE DIMENSION TO RISK
EFFECTIVE ORM SYSTEMS

should consider the following dimensions of...

Human Factors

- Organizational Change
- Human Factor Integration
- Human Reliability
- Human Error & Risk Awareness
- Learning and Development
- Pressure & Stress
In order to move to a higher state of CULTURAL MATURITY

Leadership and Operations need to shift their Values, Attitudes & Beliefs towards

...more holistic Operational Risk Management & Safety Culture Improvement approach...
DUPONT BRADLEY VALUE CURVE™
for Operational Risk Management & Safety Culture Improvement

Incident & Injury Rates
LEADERSHIP

Risk Reduction & Control
SHIFT in VALUES, ATTITUDES & BELIEFS

STABILIZE & MAXIMIZE EFFICIENCY
INTERDEPENDENT

Value Generation & Operational Discipline
OPERATIONAL EXCELLENCE

DUPONT BRADLEY VALUE CURVE™
for Operational Risk Management & Safety Culture Improvement

DuPont Sustainable Solutions
Questions + COMMENTS
Many large incidents occur after lower oil prices

Top 100 losses in 2015 were more than US$33 billion, average loss above $130MM

Source: Marsh Report on 100 largest losses
90 days approach to secure cash from operations and prepare O&G companies for the industry rebounds

**Phase 1 – Assessment**

- **Assess the Current State**
  - Where are the gaps?
  - Operational risk profile
  - DuPont Safety Perception Survey
  - Process Safety Management 22 elements
  - CFO, OPEX, CAPEX Production targets
- **Envision the Future State**
  - Where do you want to go?
  - Focus areas and ambitions
  - Quick wins
  - Short term and long term actions
  - Business case scenarios
- **Plan the Transition**
  - How do you want to get there?
  - High level Roadmap
  - Basis for the next 1 – 3 years
  - Detailed action plan
  - Readiness for change

**Phase 2 – Implementation**

- **Implement the change**
  - How to get rapid impact?
  - Strengthen Governance Structure
  - Build Organizational Capability
  - Strengthen Operational Discipline
  - Coach & develop leadership competences
- **Sustain and Improve**
  - How to make it sustainable?
  - Develop Sustainability Plan
  - Develop Perfor. Management Process
  - Develop Auditing Process
  - Create a Learning & Development Curriculum

---

**Days**

- 1 day: Assess the Current State
- 30 days: Envision the Future State
- 90 days: Plan the Transition

---

**Duration**

- Phase 1: 30 days
- Phase 2: 90 days
- Total: 120 days

---

**Key Actions**

- Strengthen Governance Structure
- Build Organizational Capability
- Strengthen Operational Discipline
- Coach & develop leadership competences
- Develop Sustainability Plan
- Develop Perfor. Management Process
- Develop Auditing Process
- Create a Learning & Development Curriculum
DSS Supported an Upstream O&G Company to Design and Implement a Risk-based PSM System Across Disciplines

**Situation**
Client realized additional systems were required to improve management of significant risks; Client lacked the necessary safety culture; Client not successful in securing the buy-in for PSM across drilling and subsurface disciplines.

**DuPont Approach**
Designed risk-based PSM system, across BUs and disciplines based on client risk portfolio; Prioritized implementation across 13 sites. Assessed drilling and subsurface processes for applicability / integration to PSM:
- Identified key PSM tasks across workflows;
- Developed best practices and identified check points to ensure completion of tasks.

**Outcome**
Integrated process safety across disciplines (e.g. drilling and subsurface workflows); Employee LTIF dropped from 0.17 to 0.04 as a result of improved risk culture.
Companies have not taken the opportunity to transform themselves during this period.

Oil price cycle

New cost structure

New operating models

ORM Systems performance

LTIF cycle vs. oil price
Since 2 years, companies have been working extensively on achieving various cost-cutting measures to protect their CFO

As companies seek to monetize every drop of oil taken out of the ground in response to falling prices, it is inevitable that certain risk management initiatives are re-prioritized as capital is transferred from one part of the business to another.

ADJUSTMENT LEVERS TO INDUSTRY CYCLES
Qualitative Assessment

- **Long**
  - **Structural**
    - Lower cost base line
  - Standardization
  - Predictive maintenance

- **Impact sustain on Cash Flow**
  - **Cyclical**
    - Lower time to adjustment
  - Production Excellence
  - Head office costs
  - Contractual strategy
  - Lean operations
  - Maintenance optimization
  - Logistics optimization
  - 3rd party rates
  - Headcount lay-off, pre-retired
  - Contractor headcount & rates

- **Short**
  - Flexibility during price cycles
  - Operating model specialization
  - Analytics
  - Digital Oilfield
  - Collaborative Supply Chain
  - Production portfolio change
  - Activity cancellation & delay
  - Contractor headcount & rates

1. **Accelerate cost base adjustment**: quicker reaction in the first phase is more likely to generate impact on CFO rather than outgrowing market deflation in the second phase.
2. **Accelerate early production growth**: early barrels are high margin barrels as they benefit from OPEX adjustment lag & tight market supply.