American Society of Safety Engineers

Professional Development Conference & Exhibition

Conference | Exhibition | Technical Session | Networking Dinner

Special Feature:
Pre-seminar on ASP/CSP Exam Preparation - March 15th, 2016

THEME:
Safety Advocacy and Compliance for a Sustainable Society

DATE: 16th - 18th March, 2016
TIME: 8:00am - 6:00pm Daily
VENUE: External Ball Room, Federal Palace Hotel, Victoria Island, Lagos,
Trends of Oil & Gas Industries HSE performance and areas to be focused for further enhancement

By

Ashok Garlapati, CSP, QEP, CMIOSH
ASSE Global Region Vice President,
Presentation outline..

• An insight into the global upstream Oil & Gas sector industry operations
• Trends of HSE performance of Oil & Gas Sector over a decade
• HSE Initiatives taken by various companies
• Areas to be focused for further improving HSE performance
• Conclusion
Distribution of proven Oil Reserves (%)

Distribution of proved reserves in 1994, 2004 and 2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Middle East</th>
<th>S. &amp; Cent. America</th>
<th>North America</th>
<th>Europe &amp; Eurasia</th>
<th>Africa</th>
<th>Asia Pacific</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>1118.0</td>
<td>59.4%</td>
<td>12.6%</td>
<td>7.3%</td>
<td>7.6%</td>
<td>5.8%</td>
<td>3.5%</td>
</tr>
<tr>
<td>2004</td>
<td>1366.2</td>
<td>54.9%</td>
<td>10.3%</td>
<td>7.9%</td>
<td>7.6%</td>
<td>3.0%</td>
<td>2.5%</td>
</tr>
<tr>
<td>2014</td>
<td>1700.1</td>
<td>47.7%</td>
<td>19.4%</td>
<td>13.7%</td>
<td>16.4%</td>
<td>10.3%</td>
<td>7.6%</td>
</tr>
</tbody>
</table>
Total world proved oil reserves reached 1700.1 billion barrels at the end of 2014, sufficient to meet 52.5 years of global production. The largest addition to reserves came from Saudi Arabia, adding 1.1 billion barrels. The largest decline came from Russia, where reserves fell by 1.9 billion barrels. OPEC countries continue to hold the majority of the world's reserves, accounting for 71.6% of the global total. South & Central America continues to hold the highest R/P ratio, more than 100 years. Over the past decade, global proved reserves have increased by 24%, or more than 330 billion barrels.
Distribution of proven Gas Reserves

Distribution of proved reserves in 1994, 2004 and 2014
Percentage

- Middle East
- Europe & Eurasia
- Asia Pacific
- Africa
- North America
- S. & Cent. America

1994 Total 119.1 trillion cubic metres
2004 Total 156.5 trillion cubic metres
2014 Total 187.1 trillion cubic metres
Reserve to Production Ratios (N.Gas)

Reserves-to-production (R/P) ratios

2014 by region

World proven natural gas reserves at end-2014 stood at 187.1 trillion cubic metres (tcm), sufficient to meet 54.1 years of global production. Proved reserves grew by 0.3% relative to end-2013. Growth in Russia (+0.4 tcm), Azerbaijan (+0.3 tcm) and the US (+0.2 tcm) accounted for all of the gross increase in global proved reserves in 2014. Iran (34.0 tcm) and Russia (32.6 tcm) hold the largest proved reserves.
An insight into the upstream Oil & Gas sector

• Petroleum Industry is essential element any Region’s economy
• Even in Nigeria, oil & gas resources are contributing to its economy to a larger extent (incentives)
• Companies have enacted several international standards/regulations/HSEMS to ensure safe operations
• Appoints Contractors from around the World to complete the projects in time as well as to ensure their Operations
Trends of HSE Performance

International Association of Oil & Gas Producers

REPORT 2014S / JUNE 2015

DATA SERIES

Safety performance indicators – 2014 data
Trends of HSE Performance of upstream O&G sector

• International Association of Oil & Gas Producers Association, UK is consortium of 74 International Oil Companies & national associations releases Safety performance Reports every year

• The principal purpose of the data collection and analysis is to record the global safety performance of the contributing OGP member companies on an annual basis.
The key indicators presented are:

- Number of fatalities,
- Fatal accident rate,
- Number of lost work day cases and number of lost work days, lost time injury frequency etc,
- Number of restricted work day cases and restricted work day case days,
- Number of medical treatment cases and
- Total recordable injury rate.

Trends of HSE Performance
Statistics by Region

North America

Europe

Middle East

Asia/Australasia

Africa

FSU

South America
Statistics by category

• Type of Operations (upstream / downstream)
• Company
• Contractor
• Overall operations
Trends of O&G Industries HSE Performance (Fatal Accident rate)

The 2014 IOGP Safety Performance Indicators show that the fatal accident rate for reporting companies has decreased by 51% compared with 2013. The number of fatalities has decreased from 80 in 2013 to 45 in 2014.

Analysis of the 42 fatal incident descriptions in which there were 45 fatalities has shown that at least 78% of the fatal incidents reported in 2014 related to the OGP Life-Saving Rules published in March 2012, see IOGP Report 459.
Trends of O&G Industries HSE Performance

(Fatal Accident rate – Onshore/offshore)
Trends of O&G Industries HSE Performance (Fatal Accident rate)

Fatal accident rate by company & contractor (2005–2014)
## Trends of O&G Industries HSE Performance
(Fatal Accident rate by Region)

<table>
<thead>
<tr>
<th>Region</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>0.86</td>
<td>4.53</td>
<td>2.83</td>
<td>1.25</td>
<td>3.38</td>
</tr>
<tr>
<td>Asia/Australasia</td>
<td>1.02</td>
<td>0.87</td>
<td>1.35</td>
<td>3.28</td>
<td>4.14</td>
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<tr>
<td>Europe</td>
<td>1.04</td>
<td>2.26</td>
<td>0.52</td>
<td>0.87</td>
<td>0.97</td>
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<tr>
<td>FSU</td>
<td>0.81</td>
<td>1.25</td>
<td>0.55</td>
<td>1.59</td>
<td>2.17</td>
</tr>
<tr>
<td>Middle East</td>
<td>0.33</td>
<td>0.63</td>
<td>1.95</td>
<td>1.74</td>
<td>1.63</td>
</tr>
<tr>
<td>North America</td>
<td>1.56</td>
<td>2.03</td>
<td>7.50</td>
<td>1.50</td>
<td>5.08</td>
</tr>
<tr>
<td>South &amp; Central America</td>
<td>1.13</td>
<td>4.37</td>
<td>0.54</td>
<td>2.42</td>
<td>1.57</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>1.03</strong></td>
<td><strong>2.12</strong></td>
<td><strong>2.38</strong></td>
<td><strong>1.88</strong></td>
<td><strong>2.76</strong></td>
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</tbody>
</table>

Fatal accident rate by region (2010–2014)
Trends of O&G Industries HSE Performance (TRIR – Company / Contractor)

Figure 20: Total recordable injury rate by company & contractor (2005–2014)
Trends of O&G Industries HSE Performance (TRIR – Offshore/onshore)
## Trends of O&G Industries HSE Performance (TRIR by Region)

<table>
<thead>
<tr>
<th>Region</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>1.02</td>
<td>1.05</td>
<td>1.14</td>
<td>1.22</td>
<td>1.40</td>
</tr>
<tr>
<td>Asia/Australasia</td>
<td>1.01</td>
<td>0.97</td>
<td>1.37</td>
<td>1.46</td>
<td>1.30</td>
</tr>
<tr>
<td>Europe</td>
<td>2.58</td>
<td>2.58</td>
<td>2.64</td>
<td>2.81</td>
<td>3.05</td>
</tr>
<tr>
<td>FSU</td>
<td>0.59</td>
<td>0.81</td>
<td>0.99</td>
<td>0.99</td>
<td>1.08</td>
</tr>
<tr>
<td>Middle East</td>
<td>0.86</td>
<td>0.90</td>
<td>1.02</td>
<td>0.78</td>
<td>0.98</td>
</tr>
<tr>
<td>North America</td>
<td>2.40</td>
<td>2.58</td>
<td>2.82</td>
<td>3.19</td>
<td>2.89</td>
</tr>
<tr>
<td>South &amp; Central America</td>
<td>2.82</td>
<td>3.13</td>
<td>3.05</td>
<td>3.17</td>
<td>2.76</td>
</tr>
<tr>
<td>Overall</td>
<td>1.54</td>
<td>1.60</td>
<td>1.74</td>
<td>1.77</td>
<td>1.68</td>
</tr>
</tbody>
</table>

Total recordable injury rate by region (2010–2014)
Trends of O&G Industries HSE Performance (LTIF – offshore / onshore)
Trends of O&G Industries HSE Performance (LTIF – company / contractor)
## Trends of O&G Industries HSE Performance (LTIF by Region)

<table>
<thead>
<tr>
<th>Region</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
<th>2011</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>0.29</td>
<td>0.31</td>
<td>0.33</td>
<td>0.30</td>
<td>0.36</td>
</tr>
<tr>
<td>Asia/Australasia</td>
<td>0.17</td>
<td>0.15</td>
<td>0.26</td>
<td>0.30</td>
<td>0.29</td>
</tr>
<tr>
<td>Europe</td>
<td>0.81</td>
<td>1.02</td>
<td>0.91</td>
<td>1.08</td>
<td>1.06</td>
</tr>
<tr>
<td>FSU</td>
<td>0.18</td>
<td>0.33</td>
<td>0.28</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
<td>Middle East</td>
<td>0.17</td>
<td>0.21</td>
<td>0.24</td>
<td>0.18</td>
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<td>0.85</td>
<td>0.69</td>
<td>0.64</td>
<td>0.61</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>0.36</strong></td>
<td><strong>0.45</strong></td>
<td><strong>0.48</strong></td>
<td><strong>0.43</strong></td>
<td><strong>0.42</strong></td>
</tr>
</tbody>
</table>

Lost time injury frequency by region (2010–2014)
Trends of O&G Industries HSE Performance (TRIR and LTIF)

Lost time injury frequency vs. total recordable injury rate (2005–2014)
# Causal Factors of Fatal Incidents

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROCESS:</strong> Organizational: Inadequate work standards/procedures</td>
<td>18</td>
<td>15</td>
<td>15</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td><strong>PROCESS:</strong> Organizational: Inadequate hazard identification or risk assessment</td>
<td>18</td>
<td>13</td>
<td>17</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td><strong>PROCESS:</strong> Organizational: Inadequate training/competence</td>
<td>16</td>
<td>21</td>
<td>13</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td><strong>PEOPLE:</strong> Following procedures: Improper position (in the line of fire)</td>
<td>14</td>
<td>12</td>
<td>13</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td><strong>PEOPLE:</strong> Inattention/lack of awareness: Improper decision making or lack of judgement</td>
<td>13</td>
<td>16</td>
<td>11</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td><strong>PROCESS:</strong> Organizational: Inadequate supervision</td>
<td>13</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td><strong>PEOPLE:</strong> Following procedures: Violation unintentional (by individual or group)</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td><strong>PEOPLE:</strong> Use of protective methods: Personal Protective Equipment not used or used improperly</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td><strong>PEOPLE:</strong> Use of tools, equipment, materials and products: Improper use/position of tools/equipment/materials/products</td>
<td>6</td>
<td>10</td>
<td>7</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td><strong>PROCESS:</strong> Organizational: Inadequate communication</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td><strong>PROCESS:</strong> Protective systems: Inadequate/defective guards or protective barriers</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td><strong>PROCESS:</strong> Protective systems: Inadequate/defective warning systems/safety devices</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td><strong>PROCESS:</strong> Tools, equipment, materials &amp; products: Inadequate maintenance/inspection/testing</td>
<td>5</td>
<td>9</td>
<td>5</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td><strong>PEOPLE:</strong> Following procedures: Violation intentional (by individual or group)</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td><strong>PEOPLE:</strong> Use of tools, equipment, materials and products: Servicing of energized</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
Areas to be focused for further enhancement of HSE Performance

• As per OGP reports, there are many causal factors for the fatal & high potential incidents and top 5 are:
  – Inadequate Hazard Identification & Risk Assessment
  – Inadequate work standards & Procedures
  – Improper decision making or lack of judgment
  – Unintentional violation (by individual or Group)
  – Inadequate training / competencies
Areas to be focused for further enhancement of HSE Performance

• Barriers to control incidents
Areas to be focused for further enhancement of HSE Performance

• Scott Gellar Model on complimenting BBS to address Human Behavior issues
Areas to be focused for further enhancement of HSE Performance

• Work towards HSE excellence by
  – Top management is visibly committed
  – Engaging middle management
  – Focussing on front-line supervisors performance
  – Ensure participation of employees across organizations
  – Develop flexible systems to accommodate the culture
  – Ensure HSE systems / procedures are positively perceived by the workforce
A model for achieving HSE Excellence
Areas to be focused for further enhancement of HSE Performance

• Assess the conditions, culture, needs etc
  – Safety perception surveys
  – Interviews
  – Site visits
  – Engagement meetings

• Provides baseline information to begin improvement process
Areas to be focused for further enhancement of HSE Performance

• General contents of perception surveys:

- Attitude Towards Safety
- Awareness Programs
- Communication
- Discipline
- Employee Training
- Goals of Safety Performance
- Hazard Correction
- Incident Analysis
- Inspections
- Involvement of Employees
- Management Credibility
- New Employees
- Operating Procedures
- Quality of Supervision
- Recognition for Performance
- Safety Climate
- Safety Contacts
- Substance Abuse
- Supervisor Training
- Support for Safety
Areas to be focused for further enhancement of HSE Performance

• Build the plan
  – Review survey results and develop plans to address the gaps, needs etc
  – Create HSE Steering Committees
    • Develop communication plans
    • Prioritize improvements
    • Choose sub committee members
Areas to be focused for further enhancement of HSE Performance

• Steering committees are to:
  – Meet monthly to review the progress and support the plans & recommendations
  – Develop and promote a continuous improvement to focus on HSE starts with me attitude and to achieve Zero by Choice HSE cultures
  – Develop accountabilities with leading indicators
  – Communication across organizations
Areas to be focused for further enhancement of HSE Performance

• Support and engage HSE Steering Committees on continuous basis
  – Develop an on-going action that:
    • Maintains what is working well
    • Focuses improvement efforts on the weakest areas identified through perception surveys
    • Provides flexibility of where to focus improvement efforts
Areas to be focused for further enhancement of HSE Performance

- Develop leadership skills
  - Support / facilitate Steering committees
  - Conduct training workshops for the line management and front line supervisors
Areas to be focused for further enhancement of HSE Performance

• Steering Committee shall ensure:
  – Perform and conduct meaningful meetings on periodic basis
  – Actively participate and support in conducting investigations
  – Make quality assessment of an report on subordinate HSE accountability performance
  – Oversee the development and execution of the annual SMART HSE plans
Areas to be focused for further enhancement of HSE Performance

• Ensure training workshops are included:
  – Introductions and kick-off videos
  – Insights into effective HSE management
    • Why incidents happen
    • Criteria for HSE excellence
    • HSE accountability
    • What makes a difference
    • Results and success stories
    • Culture survey data review and improvements
    • Group discussions and feedback
Areas to be focused for further enhancement of HSE Performance

• Implement improvements
  – Pilot improved process within one area / facility
  – Implement improved process throughout organizations / multiple locations
Areas to be focused for further enhancement of HSE Performance

• Upstream activities drive downstream results
  – Error proof processes
  – Hold employees accountable for daily activities that deliver results
  – Develop total personnel involvement on continuous improvement
  – Perfect practice/ execution fetches perfect performance
Areas to be focused for further enhancement of HSE Performance

• Check results
  – Evaluate new processes
  – Evaluate progress within strategic plan
Areas to be focused for further enhancement of HSE Performance

• In a nutshell
  – Track the performance regularly, benchmark it within / external organizations
  – Analyze the areas/ gaps for improvement
  – Start HSE initiatives and develop improvement plans
  – Form Steering committees / implementation Teams
  – Ensure the implementation of the plans towards achieving the HSE excellence
  – Continue and sustain the achieved excellence status
Over the last decade, GCC Oil & Gas companies are playing a key role in achieving their HSE targets in line with international Standards and by benchmarking their performance. If companies are not measuring HSE performance effectively and using data trends to continuously improve, they will likely be left in the dark about their safety risks.

- By Cheryl MacKenzie, CSB Investigator, of BP GoM Incident
Thank you
For further information

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ASSE Global Region Vice President
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