



Annual Performance Report for 2013 Reporting Year

April 2015



NOTICE

Data published in the Center for Offshore Safety's (COS) Annual Performance Report for the 2013 Reporting Year are based on data voluntarily reported by exploration and production Operators and Contractors operating in the United States. Although COS reviews reported data to identify internal inconsistencies and unusual period-to-period changes, in general COS is not able to verify the accuracy of reported data. COS therefore cannot guarantee the accuracy of the data, and disclaims any liability in connection with the data.

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1.0 INTRODUCTION

The Center for Offshore Safety is designed to promote the highest level of safety for offshore drilling, completions, and operations through leadership and effective management systems addressing communication, teamwork, and independent third-party auditing and certification. COS will achieve operational excellence in part by enhancing and continuously improving industry's safety and environmental performance and stimulating cooperation within industry to share and learn from each other.

This COS Annual Performance Report (APR) provides information shared by its members under three COS programs:

- Safety Performance Indicators (SPI)
- Learning from Incidents (LFI)
- Safety & Environmental Management System (SEMS) Auditing and Certification

The scope of this APR covers COS member wells, projects, and production facilities and operations in the US Gulf of Mexico (GoM) deepwater in 2013 for SPI data and includes areas outside the US for the LFI data. COS Operators shared both Operator and Contractor SPI and LFI data relative to activities that occurred on their facilities and within 500 meters of their facilities. COS Contractors and Service Companies shared SPI and LFI data relative to activities occurring outside 500 meters of Operators' facilities. In the context of this report, the term safety is inclusive of personal safety, process safety, health, security, and the environment. Additionally, the scope of this APR covers information regarding the first cycle of COS SEMS Audits (2011-2013).

SPI Program

In December 2013, COS published the SPI Program User Guide for the US GoM offshore industry. The objectives of this program are twofold. First, it provides a means for sharing data related to key safety performance indicators and second, it assesses past performance to identify potential opportunities which could lead to improvements in future performance.

Publications by the American Petroleum Institute, UK Health and Safety Executive, Center for Chemical Process Safety, International Association of Oil and Gas Producers, and the Organization of Economic Cooperation and Development, as well as the experience shared by COS members, were valuable to the development of this program.

The SPI used in this program were selected from assessments of major hazards in the offshore industry which originated from major hazard bow ties developed within COS. The information can be used for driving improvement, and when effectively acted upon, contribute to reducing risk of major incidents by identifying weaknesses in barriers intended to prevent the occurrence or recurrence of incidents and mitigate consequences. Most of the SPI are outcomes or consequences of the failure of prevention and/or mitigation barriers. Over time, the intent of this program is to move SPI focus to prevention barriers and activities that measure proactive management performance.

Unless otherwise specified, all frequencies stated in this report are normalized by total work hours multiplied by 200,000. Work hours are reported based on a 12-hour work day offshore.

To maintain data confidentiality, letters used to designate member companies are uniquely assigned for each individual chart and graph.

LFI Program

In December 2013, COS published the LFI Program User Guide for the US GoM offshore industry. The objective of the program is to provide members a mechanism for sharing timely information from incidents selected from the SPI Program and High Value Learning Events (HVLE). This information is analyzed and shared to enable industry learning and reduce the risk of recurrence of similar or potentially more severe incidents.

SEMS Auditing and Certification Program

In 2012, COS published a number of documents addressing COS SEMS Auditing and Certification requirements, including audit reporting to COS. There are several primary objectives for this program: assess a company's SEMS performance at a point in time, provide method for sharing data related to a company's SEMS, and identify potential opportunities to drive improvements in SEMS performance. COS Operator members submitted their BSEE SEMS I Audit Survey results which are reported in this report. The information was analyzed, including comparison to the SPI and LFI data, to provide insights that may help industry identify areas for improvement or areas that can be shared as good practices.

2.0 2013 COS MEMBERS AND PARTICIPANTS

COS MEMBERS

<u>Operators</u>	<u>Rig Contractors</u>	<u>Service Companies</u>	<u>Associations</u>
Anadarko	Diamond Offshore	Baker Hughes	IADC
BHP Billiton	Ensco	Cameron	NOIA
BP	Noble	Halliburton	
Chevron	Pacific Drilling	Oceaneering	
Cobalt	Sadrill	Schlumberger	
ConocoPhillips	Transocean		
ExxonMobil			
Hess			
Marathon Oil			
Murphy			
Shell			
Statoil			
TOTAL E&P			

Twelve Operators and eight Rig Contractors and Service Companies shared SPI data used in this APR. All twelve eligible COS member Operators provided data on the first cycle of SEMS audits. Associations are members of COS but do not provide data.

Please note: As of publication of this APR, the following additional companies have joined COS but did not participate in the data collection process for the SPI and LFI sections of this APR:

GE Oil & Gas	OOC
Helmerich & Payne	OPITO
United Fuels	MSRC

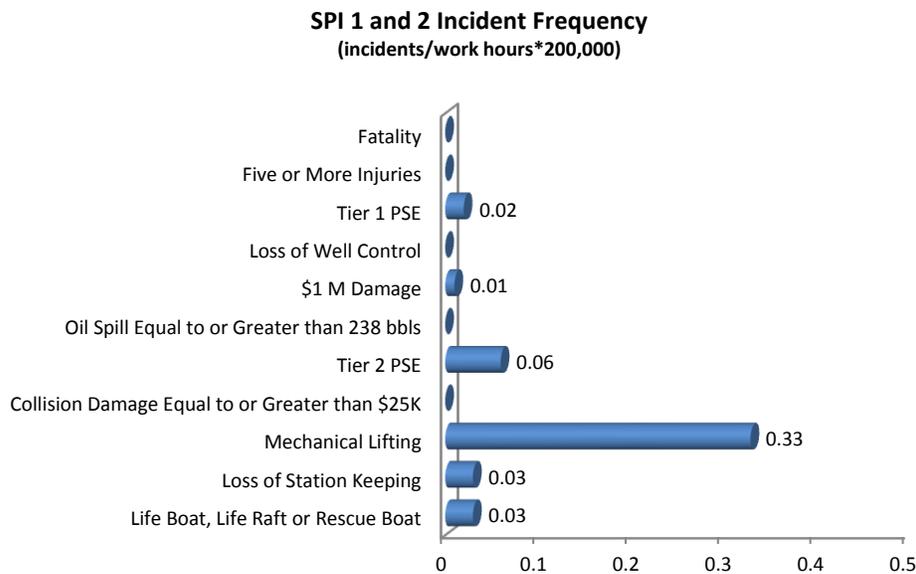
3.0 EXECUTIVE SUMMARY

The SPI and LFI Programs began implementation in 2014 and this report provides the associated program information for 2013. This report also provides the information from the first cycle of SEMS audits. These audits were required by regulation and due by November 2013. The results from the data collected, analyzed and presented in this report represent a baseline for future year-to-year performance comparisons and continuous improvement in member performance and these programs.

- **No fatalities or loss of well control incidents were reported by COS participating members in 2013.**

The 2013 SPI data show that no fatalities, no incidents resulting in five or more injuries, no loss of well control incidents, and no oil spills equal to or greater than 10,000 gallons (238 barrels) occurred in the GoM deepwater operations covered by the activity of COS participating members. Participating companies did report five Tier 1 process safety events and two incidents causing at least \$1 million direct damage to a facility, vessel, or equipment.

Participating members reported 13 Tier 2 process safety events and six loss of station keeping incidents resulting in a drive off or drift off. The type of incident among the SPI that occurred most frequently was mechanical lifting. The frequency of all SPI 1 and SPI 2 incidents are shown below.



Equipment failures were a contributing factor in 68% of the SPI 1 and SPI 2 incidents, 64% of which were attributed to lifting equipment. Seven of the COS participating members that owned facilities and equipment reported a combined completion of planned critical maintenance, inspections, and testing on time of 96.3%, ranging from 90.5% to 100.0%.

The combined DART and RIIIF for the participating companies was 0.29 and 0.58, respectively. Participating companies reported 19 oil spills equal to or greater than one barrel.

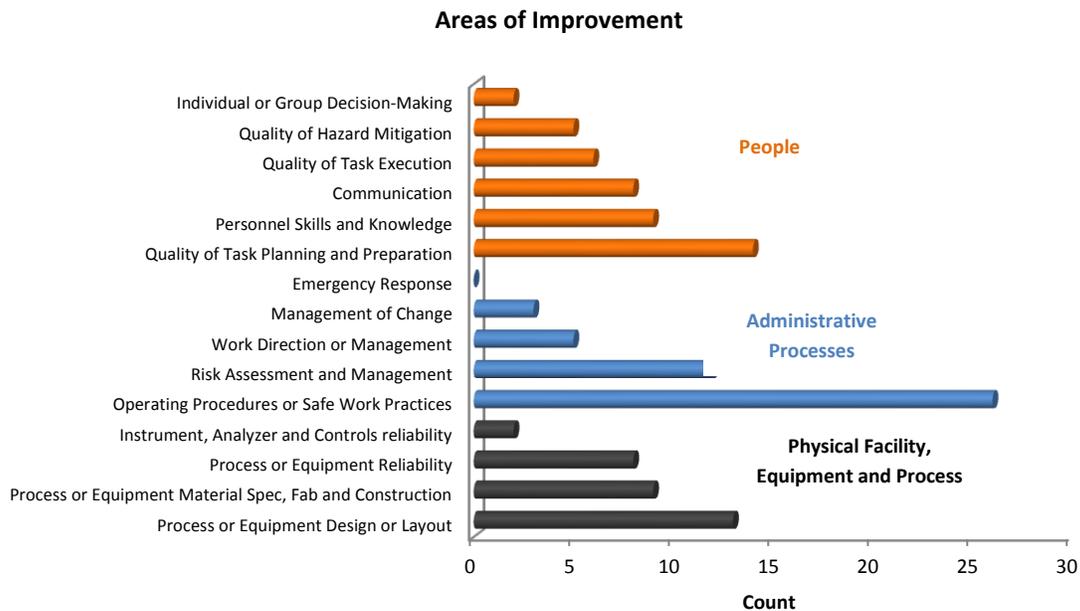
This first year of LFI data included information and learnings from 48 incidents and HVLE (two-SPI 1, 39-SPI 2, and seven-HVLE). The incidents and HVLE were distributed across multiple operation and facility types.

A holistic review of the 48 incidents resulted in the identification of noteworthy trends and potential learning opportunities, especially relating to:

- Mechanical Lifting (23 incidents)
- Process safety (five events)
- Loss of Station resulting in drive off or drift off (five incidents)
- Life boat, life raft, or rescue boat (four incidents)

Areas for improvement were identified and demonstrated a relatively even distribution across the three general categories of 1) Physical Facility, Equipment, and Process, 2) Administrative Processes, and 3) People, with the following noted most frequently:

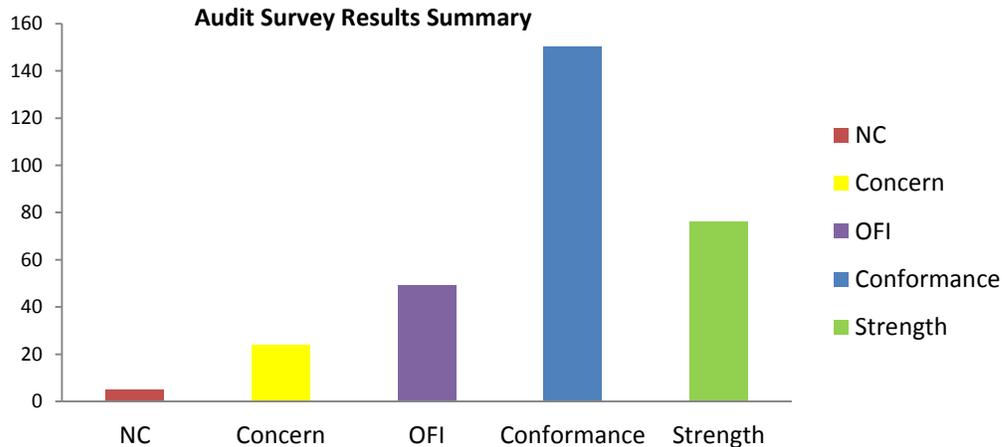
- Operating Procedures or Safe Work Practices – 54%
- Quality of Task Planning and Preparation – 29%
- Process or Equipment Design or Layout – 27%
- Risk Assessment and Management – 25%



Note: This is the first cycle of data sharing by COS members. Not every SPI has an associated LFI, and not every LFI has an associated SPI. Analyses and trends of similar data from the SPI and LFI programs largely align, but can diverge due to the timing of the data submittal (e.g. incident investigation was still ongoing).

The purpose of the BSEE SEMS I Audit Survey for COS was to collect summary-level data about the COS Operator members' BSEE SEMS I Audits and develop aggregate analysis for inclusion in this report.

100% (12) of the COS member companies eligible to participate provided a survey response. Each Operator provided the count of conformances, non-conformances (NC), concerns, opportunities for improvement (OFI), and strengths at the element level based upon the results of their audit for each of the SEMS Elements required by the audit. The following figure illustrates the breakdown of the twelve audit survey responses in total.



150 conformances were reported across the SEMS Elements; in contrast, only five non-conformances were reported in the responses. These non-conformances were identified in the following elements:

- General (Element 1) - 1
- Management of Change (Element 4) - 2
- Operating Procedures (Element 5) – 1
- Emergency Response and Control (Element 10) – 1

Other notable COS Accomplishments

- **SEMS Audit Service Provider (ASP) Accreditation Program**
 - *SEMS Audit Service Provider (ASP) Accreditation Program* facilitates the rigorous review of third-party audit service providers (ASP) in order to qualify or “accredit” them to conduct COS SEMS audits. Once accredited, COS ASP can issue COS SEMS certificates to Operators and Contractors upon successful completion of a SEMS audit using the COS documented and published process.
 - Several COS publications are available via the COS website outlining details of this program:
 - *COS-2-01 Auditor Qualification and Competence Requirements*
 - *COS-2-02 Training Program Requirements for Auditors*
 - *COS-2-04 Accreditation Requirements*
 - As of the publication of the APR, four ASP have been accredited by COS to perform COS SEMS Certification audits:
 - ABS Quality Evaluations
 - Bureau Veritas Certification
 - DNV Business Assurance
 - ERM Certification and Verification Services

- **COS SEMS Audits and Certification Program**
 - *SEMS Audit and Certification Program* lays out the required process for companies to follow who wish to have their SEMS earn a COS SEMS Certificate.
 - Several COS publications are available via the COS website outlining details of this program:
 - COS-2-03 *Certification Requirements*
 - COS-2-03-A *Standard Audit Report Template*
 - COS-2-03-B *Standard SEMS Audit Report without protocol questions*
 - COS-2-03-C *Standard SEMS Audit Report with all protocol questions*
 - All eligible COS Operator members successfully completed the first round of BSEE SEMS Audits.
 - In addition to the BSEE SEMS Audits, COS Operator member companies have also agreed to pursue a separate COS SEMS Certificate.
 - All eligible COS Operator members have either earned, or are in the process of earning, this certificate.
 - To date, the following COS Operator members have earned a COS SEMS Certificate:
 - Statoil Gulf Services, Inc.
 - BHP Billiton Petroleum (Deepwater) Inc.
 - BP Exploration & Production Inc.
 - Hess Corporation
 - Shell Exploration & Production Company
 - Marathon Oil Company
 - Anadarko Petroleum Company
 - ExxonMobil Production Company
 - COS Contractor members are also expected to pursue a COS SEMS Certificate. To date, the following COS Contractor member has earned a COS SEMS Certificate:
 - Pacific Drilling Services, Inc.

- **COS External Outreach**
 - **COS External Stakeholders Group (ESG) Program**
 - COS established an External Stakeholders Group (ESG) Program, the purpose of which is to facilitate communication of key COS activities with the Bureau of Safety and Environmental Enforcement (BSEE), United States Coast Guard (USCG), and the Department of Transportation (DOT).
 - COS is represented at ESG meetings by COS staff and a delegation of COS Board members.
 - Meetings with the ESG are held semi-annually.
 - **COS Annual Forum**
 - First held in 2013, as part of COS' commitment to "sharing industry knowledge", the COS Annual Forum has become a premier safety-focused event for industry and regulatory agency engagement. The COS has found that a successful mix of presentations and panel discussions, as well as a mix of presenters, creates an engaging and informative event for the attendees.
 - The Third Annual COS Forum is scheduled for September 22-23, 2015 in Houston, Texas.
 - **COS Sessions at the annual Offshore Technology Conference (OTC)**
 - COS participation with OTC began in 2013 with a SEMS Special Session, including a lunch with BSEE and USCG as keynote speakers.

- In 2014, as part of COS' commitment to "sharing industry knowledge", COS was recognized as a Supporting Organization of OTC. As part of this designation COS yearly plans a half-day of programming during OTC including a breakfast, technical session and lunch. The focus of these sessions is primarily SEMS. Speakers at these events include industry leaders and government representatives.
- COS has created an annual COS Safety Leadership recognition program, with winners announced during an annual COS luncheon held at OTC.
- **Additional COS Outreach to Industry**
 - As part of COS' commitment to "sharing industry knowledge", COS has presented at or participated with the following organizations and events, among others:
 - National Academy of Sciences
 - International Regulators Forum
 - World Petroleum Congress

- **COS Published Documents**

- **Leadership Site Engagement Guidelines:** From Section 1: Scope: *The intent of the guidance is to help ... industry understand the value of engaging personnel at offshore sites in delivering and improving safety performance.*
- **Skills and Knowledge Management System Guidelines:** From Section 1.0: Purpose: *This Center for Offshore Safety (COS) publication is a guideline to help the US Offshore Oil and Gas Industry understand, develop and implement an effective Skills and Knowledge Management System (SKMS) based on company-specific needs. It is not the purpose of this document to provide prescriptive processes, practices, or procedures related to a SKMS.*

4.0 SAFETY PERFORMANCE INDICATORS

4.1 Introduction

COS expects its members to share SPI data with COS through its SPI Program. The data is confidential and blinded. The SPI shared in this report are from the 2013 reporting year. This is the first year that COS members are sharing SPI data; therefore, no comparisons of year-to-year performance are available. Benchmarks with other data sources are shown where definitions and metrics are comparable.

SPI 1, SPI 2, SPI 3, and SPI 5 were selected based on structured assessments of major hazards facing the offshore industry. SPI 7-9 are indicators that have been reported historically by industry but were not directly related to the assessment work.

- SPI 1 is the frequency of incidents that resulted in one or more of the following:
 - A. Fatality
 - B. Five or more injuries in a single event
 - C. Tier 1 process safety event
 - D. Loss of well control
 - E. \geq \$1 million direct cost from damage to or loss of facility, vessel and/or equipment
 - F. Oil spill \geq 10,000 gallons (238 barrels)
- SPI 2 is the frequency of incidents that do not meet the SPI 1 definition but have resulted in one or more of the following:
 - A. Tier 2 process safety event
 - B. Collision resulting in property or equipment damage \geq \$25,000
 - C. Crane or personal/material handling operations incident
 - D. Loss of station keeping resulting in a drive off or drift off
 - E. Life boat, life raft, rescue boat event
- SPI 3 is the frequency of SPI 1 and SPI 2 incidents that involved failure of one or more piece of equipment as a contributing factor.
- SPI 4 is reserved for future use.
- SPI 5 is the percentage of planned critical maintenance, inspections and testing (MIT) completed on time.
- SPI 6 is the total number of work-related fatalities.
- SPI 7 is the frequency of lost time and restricted work day injuries and illnesses.
- SPI 8 is the frequency of recordable injuries and illnesses.
- SPI 9 is the frequency of oil spills \geq 1 barrel.

There are characteristics of the data reported for SPI 1 and SPI 2 incidents that limit some aspects of the analyses and trending. An incident may have consequences that meet both SPI 1 and SPI 2 definitions but are not counted in both metrics. The higher consequence drives the classification. For example, a collision that results in \geq \$1 million direct cost meets the SPI 1E definition but also meets the SPI 2B consequence of collision resulting in \geq \$25,000 in damage. Yet by definition, it is only counted as a SPI 1E incident. Therefore, the analysis does not count the incident as a SPI 2B collision.

Unless otherwise specified, all frequencies stated in this report are normalized by total work hours multiplied by 200,000.

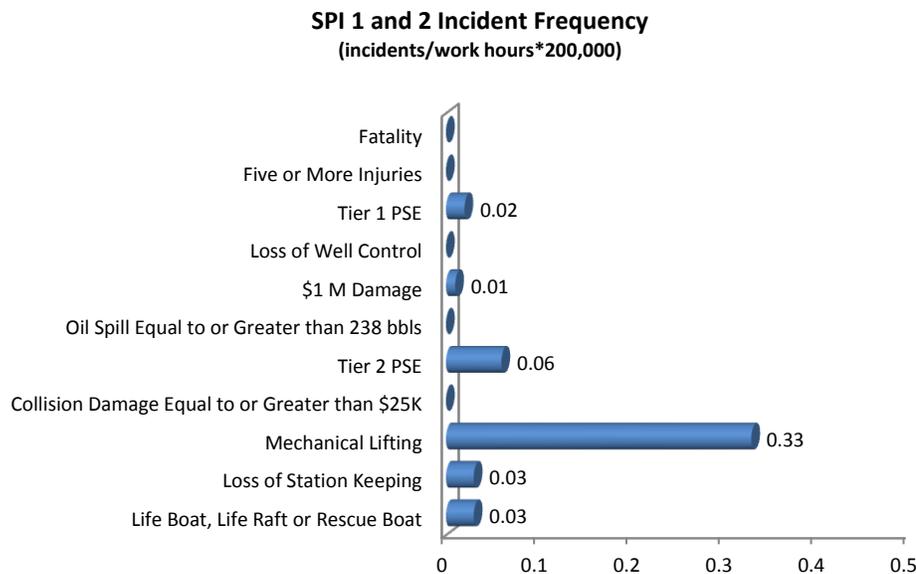
4.2 Summary

The SPI Program began implementation in 2014 and this report provides information for 2013. There are no comparisons of year-to-year performance. This will be available in future reports. The data is representative of over 42 million work hours in the deepwater GoM. Four participating companies make up 86% of the work hours.

No fatalities or loss of well control incidents were reported by COS participating members in 2013.

The 2013 SPI data show that no fatalities, no incidents resulting in five or more injuries, no loss of well control incidents, and no oil spills equal to or greater than 10,000 gallons (238 barrels) occurred in the GoM deepwater operations covered by the activity of COS participating members. Participating companies did report five Tier 1 process safety events and two incidents causing at least \$1 million direct damage to a facility, vessel, or equipment.

Participating members reported 13 Tier 2 process safety events and six loss of station keeping incidents resulting in a drive off or drift off. The type of incident among the SPI that occurred most frequently involved mechanical lifting. The frequency of all SPI 1 and SPI 2 incidents are shown below.



Equipment failures were a contributing factor in 68% of the SPI 1 and SPI 2 incidents, 64% of which were attributed to lifting equipment.

Seven of the COS participating members that owned facilities and equipment reported a combined completion of planned critical maintenance, inspections, and testing on time of 96.3%, ranging from 90.5% to 100.0%.

The combined DART and RIIIF for the participating companies was 0.29 and 0.58, respectively.

Participating companies reported 19 oil spills equal to or greater than one barrel.

4.3 SPI 1 and 2 Results and Trends

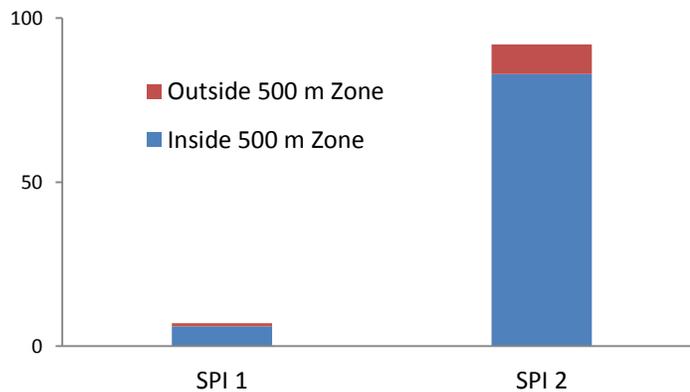
SPI 1 is the frequency of incidents that resulted in one or more of the following:

- A. Fatality
- B. Five or more injuries in a single event
- C. Tier 1 process safety event
- D. Loss of well control
- E. \geq \$1 million direct cost from damage to or loss of facility, vessel and/or equipment
- F. Oil spill \geq 10,000 gallons (238 barrels)

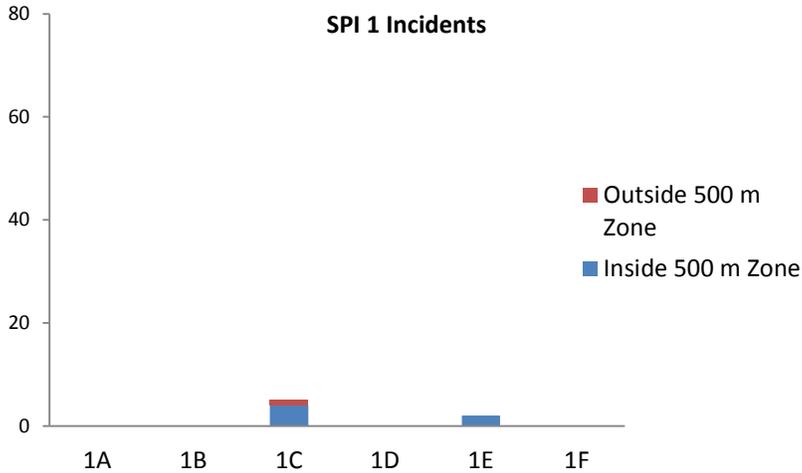
SPI 2 is the frequency of incidents that do not meet the SPI 1 definition but have resulted in one or more of the following:

- A. Tier 2 process safety event
- B. Collision resulting in property or equipment damage \geq \$25,000
- C. Crane or personal/material handling operations incident
- D. Loss of station keeping resulting in a drive off or drift off
- E. Life boat, life raft, rescue boat event

SPI 1 and 2 Incidents

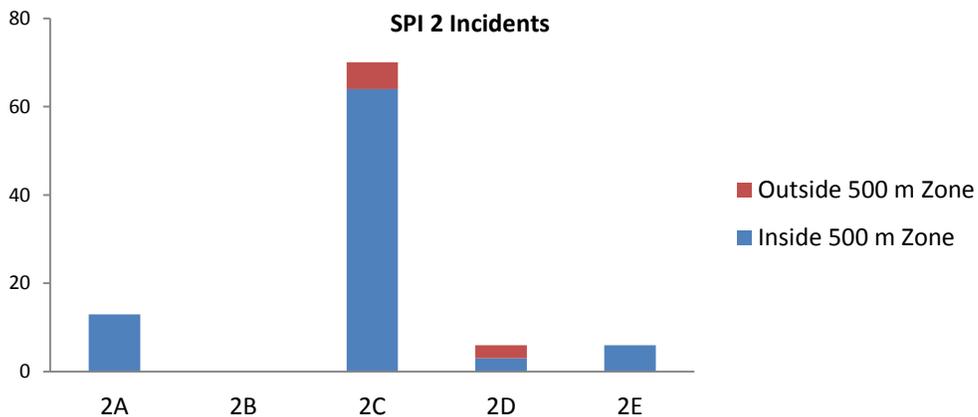


- Seven SPI 1 incidents were reported at a frequency of 0.03. Six of the incidents occurred on a facility or within 500 meters of a facility, and one occurred outside the 500 meter zone.
- Ninety-two SPI 2 incidents were reported at a frequency of 0.43. Eighty-three of the incidents occurred on a facility or within 500 meters of a facility, and nine occurred outside the 500 meter zone.



Year	Fatal Incidents (1A)	Incidents with 5 or More Injuries (1B)	Tier 1 PSE (1C)	Loss of Well Control (1D)	≥ \$1M Damage (1E)	Oil Spill ≥ 10,000 Gallons (238 bbls) (1F)
2013	0	0	5	0	2	0

- Of the seven SPI 1 incidents reported, five (71%) were Tier 1 process safety events (1C) and two were incidents resulting in ≥ \$1 million direct cost from damage to facility, vessel and/or equipment (1E).
- No incidents were reported that resulted in a fatality, five or more injuries in a single incident, or an oil spill ≥ 10,000 gallons (238 barrels).
- No loss of well control incidents were reported in deepwater operations by participating COS members. As a reference, 9 such incidents were reported in the entire GoM OCS in 2013 as reported by BSEE.
- Six of the seven SPI 1 incidents occurred on a facility or within 500 meters of a facility.



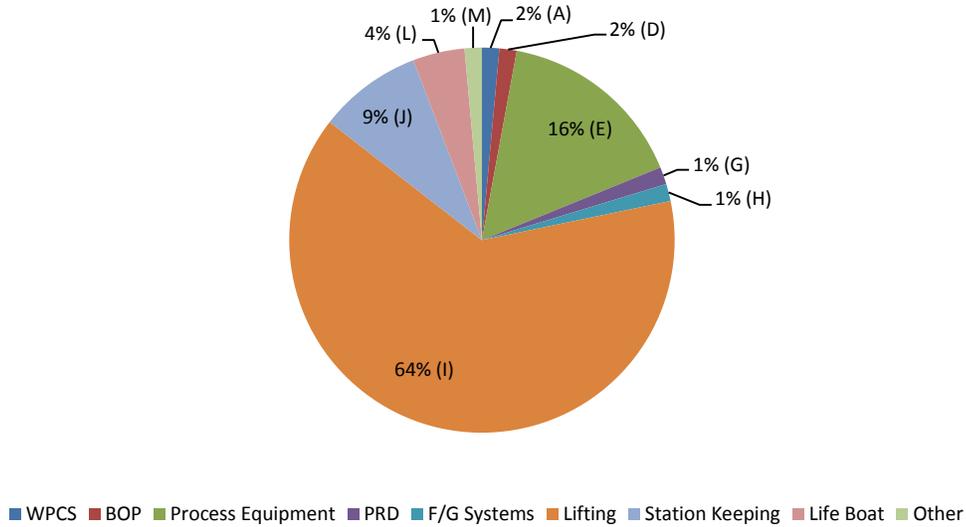
Year	Tier 2 PSE (2A)	Collisions ≥ \$25K (2B)	Mechanical Lifting (2C)	Station Keeping (2D)	Life Boat, Life Raft, Rescue Boat (2E)
2013	13	0	70	6	6

- Of the 92 SPI 2 incidents reported, 70 (76%) involved mechanical lifting or personnel/material handling operations (2C). The frequency of lifting incidents was 0.33. Per BSEE, 168 such incidents occurred in the GoM OCS in 2013.
- Members reported 13 Tier 2 process safety events (2A) and six loss of station keeping incidents (2D).
- Members reported six life boat, life raft, or rescue boat events (2E), three of which were also lifting incidents (2C).
- No collisions were reported that met the SPI 2 definition of \geq \$25,000 damage. As a reference, 19 collisions were reported per BSEE for the entire GoM OCS in 2013.
- 92% of SPI 2 incidents occurred on a facility or within 500 meters of a facility.

4.4 SPI 3 Results and Trends

SPI 3 is the number of SPI 1 and SPI 2 incidents that involved failure of one or more piece of equipment as a contributing factor.

Equipment Failures Contributing to SPI 1 and 2 Incidents

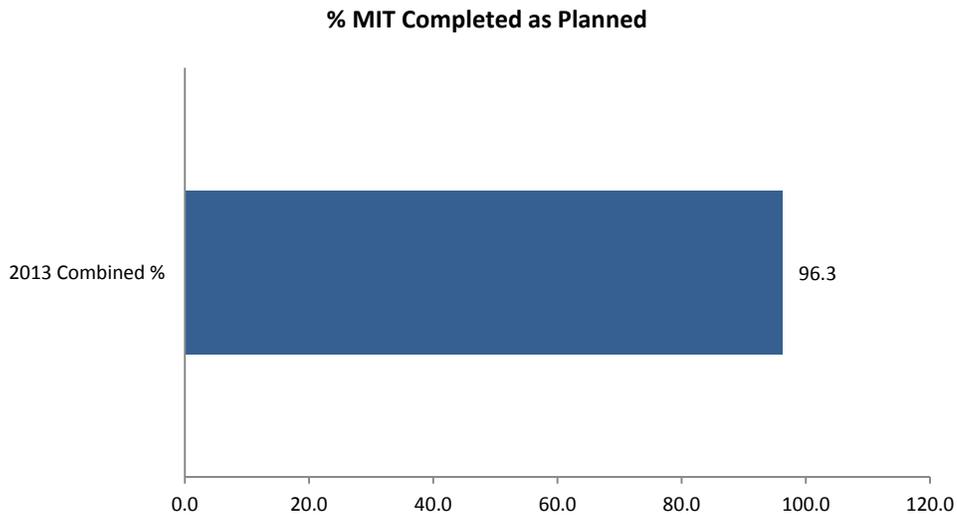


- 68% of the 99 SPI 1 and SPI 2 incidents involved failure of equipment as a contributing factor.
- 64% of the failures were attributed to mechanical lifting equipment.
- Process equipment, pressure vessels, and piping failures made up 16% of the total failures followed by station keeping systems at 9%.

Equipment	Failures
A - Well Pressure Containment System	1
B - Christmas Trees	0
C - Downhole Safety Valves	0
D - Blowout Preventers and Intervention Systems	1
E - Process Equipment / Pressure Vessels / Piping	11
F - Shutdown Systems / Automated Safety Instrumented Systems	0
G - Pressure Relief Devices / Flares / Blowdown / Rupture Disks	1
H - Fire/Gas Detection and Fire Fighting Systems	1
I - Mechanical Lifting Equipment / Personnel Transport Systems	44
J - Station Keeping Systems	6
K - Bilge / Ballast Systems	0
L - Life Boat / Life Raft / Rescue Boat/ Launch and Recovery Systems	3
M - Other	1

4.5 SPI 5 Results and Trends

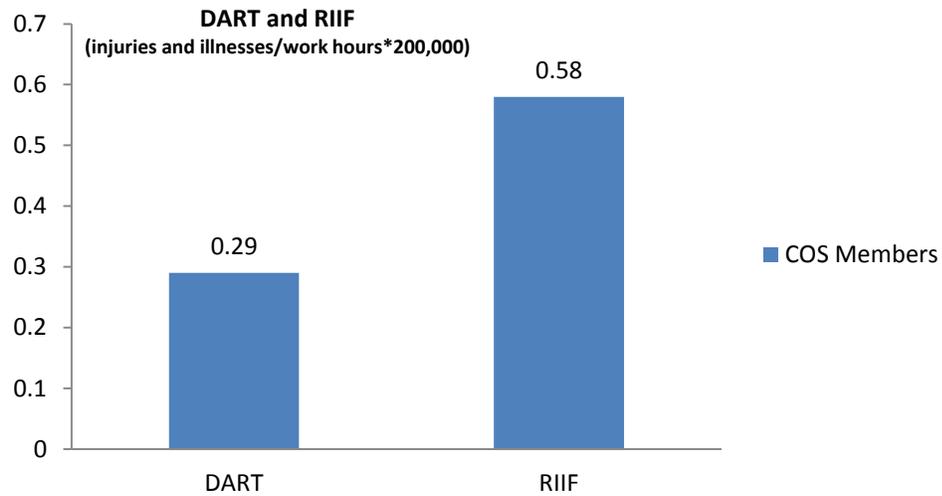
SPI 5 is the percentage of planned critical MIT completed on time. Planned critical MIT deferred with a formal risk assessment and appropriate level of approval is not considered overdue.



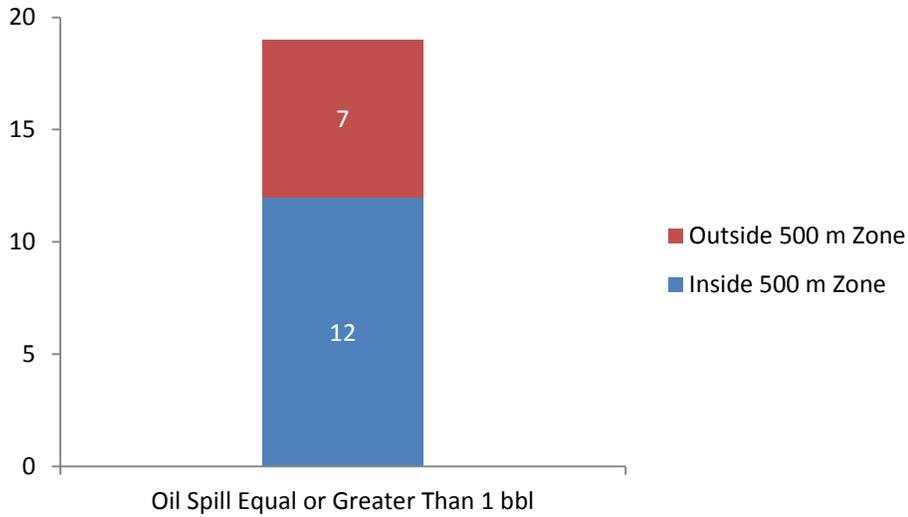
- Ten of 12 Operators that shared SPI data included critical MIT data. Of these, three Operators reported zero MIT tasks, suggesting no ownership of facilities or equipment. The seven remaining Operators' MIT data is reflected in the chart above.
- Of the seven Operators that reported critical MIT data, the combined percentage was 96.3%, ranging from 90.5 % to 100.0%.
- Rig Contractors and service companies will begin sharing SPI 5 data in 2015 for the 2014 reporting year.

4.6 SPI 6-9 Results and Trends

- SPI 6 is number of work-related fatalities.
- SPI 7 is the frequency of lost time and restricted work day injuries and illnesses
- SPI 8 is the frequency of recordable injuries and illnesses
- SPI 9 is the frequency of oil spills to water greater to or equal to 1 barrel

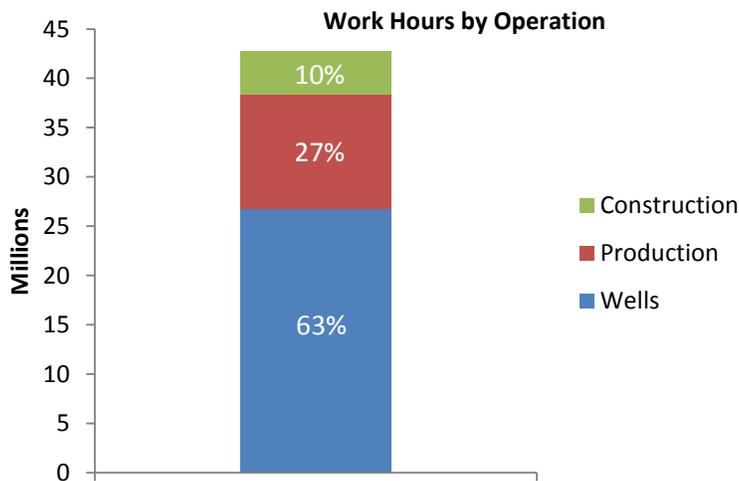


- There were no fatalities reported (SPI 6) by COS participating members in 2013. As a reference, three fatalities were reported in the GoM OCS in 2013 per BSEE.
- The combined DART (SPI 7) was 0.29 for participating members, ranging from zero to 1.57. There were 61 DART cases reported.
- The RIIF (SPI 8) was 0.58 for participating members, ranging from zero to 1.57. There were 124 recordable injuries and illnesses reported.



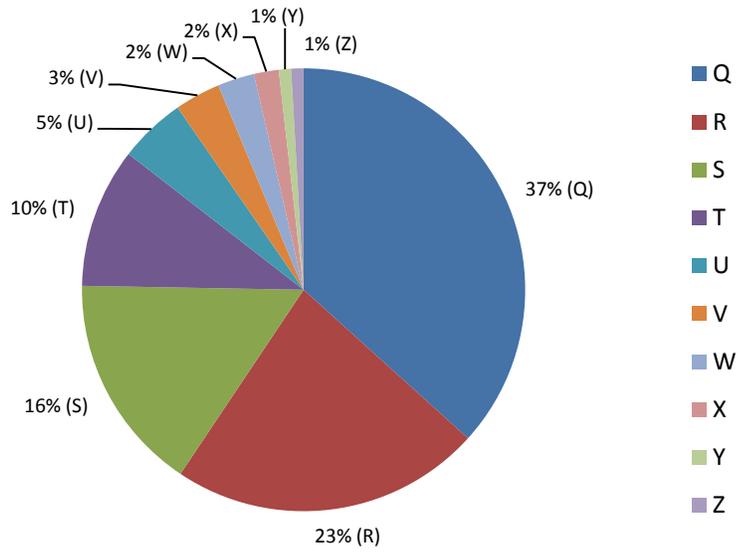
- Nineteen oil spills equal or greater than one barrel (SPI 9) were reported by participating members.
- The oil spill frequency was 0.09.
- 63% occurred on a facility or within 500 meters of a facility.

4.7 Normalization Factor



- 42,681,316 work hours were reported by participating members.
- Well activity made up 63% of the hours, followed by production at 27% and construction at 10%.
- Work hours were reported by the COS Operators and include both Operator and Contractor activity.
- Four Operators with their Contractors made up 86% of the work hours represented in the APR. The eight other participating Operators with their Contractors made up the remaining 14%.

Work Hours by Company



5.0 LEARNING FROM INCIDENTS AND HVLE

5.1 Introduction

The Learning from Incidents and HVLE (LFI) Program was established to provide a process for COS Members to share and learn from safety incidents and HVLE that occur in offshore operations throughout the world. Reporting is voluntary and data confidentiality is maintained through a blinding process administered by a 3rd party before submittal to COS. Data reporting is intended to be timely to facilitate prompt sharing of information across the COS membership.

The information shared in this report represents incidents and HVLE whose investigations were concluded during the 2013 calendar year by the submitting organizations. The data is comprised of SPI 1 and SPI 2 incidents and HVLE which are defined as follows:

SPI 1 is the frequency of incidents that resulted in one or more of the following:

- Fatality
- Injury to 5 or more persons in a single incident
- Tier 1 Process Safety Event
- Loss of Well Control
- \$1 million or greater direct cost from damage to or loss of facility / vessel / equipment
- Oil spill to water > or equal to 10,000 gallons (238 barrels)

SPI 2 is the frequency of incidents that do not meet the SPI 1 definition but have resulted in one or more of the following:

- Tier 2 Process Safety Event
- Collisions that result in property or equipment damage \geq \$25,000
- Incident involving crane or personnel/material handling operations
- Loss of station keeping resulting in drive off or drift off
- Life boat, life raft, or rescue boat event

HVLE is defined as “An event that may be considered by a COS Member or the industry for use as a reference in process hazard analyses, management of changes, project design, risk assessments, inspections, operating procedures reviews and / or training.” HVLEs should meet 1 or more of the criteria below:

- A. Identify a previously unknown risk, situation, operational or mechanical hazard, or critical equipment failure.
- B. Identify a previously unknown combination of factors that resulted in an unexpected condition or events
- C. Identify a routine operation or activity that created a previously unidentified risk or consequence.
- D. Identify a situation where established industry designs, controls or procedures failed to prevent an event (e.g. well kick, loss of wall thickness).
- E. An event that is part of a pattern in industry events which could indicate that certain hazardous conditions are not well understood.

Submitted forms included three key fields: Description of the Incident or HVLE, Areas for Improvement and Lessons Learned:

- Description of the Incident or HVLE: A brief explanation of activities, conditions, and acts leading up to, during and after the incident or HVLE, including sufficient details to facilitate clear understanding.
- Areas for Improvement: A selection of pre-determined general categories and subcategories. Submitters had the option to add comments to provide further clarity and content.
- Lessons Learned: Companies outlined their incident investigation conclusions with the goal being to reduce the likelihood of similar incidents for other COS members.

For in-depth LFI program details, please refer to LFI Program User Guide.

This first annual reporting of LFI information provides an analysis of the SPI 1, SPI 2, and HVLE information submitted, and summarizes key learnings for COS Members to share within their organizations to help prevent recurrence of similar or potentially more severe incidents.

5.2 Summary

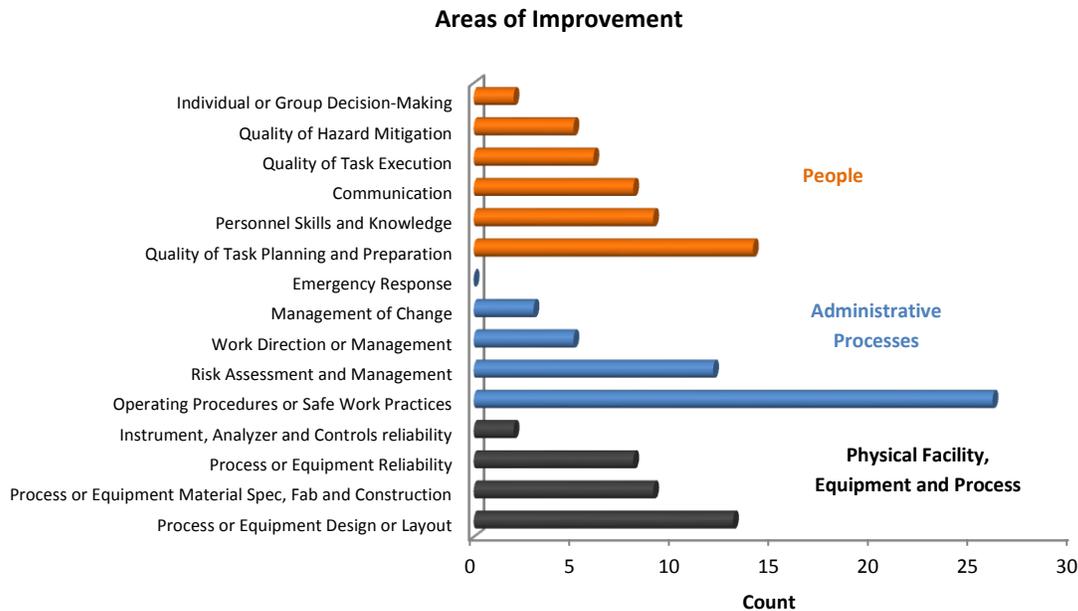
The effectiveness of this program is dependent on active participation by COS Members to facilitate maximum learning opportunity through:

- timely sharing of quality information for incidents and HVLE that meet the reporting criteria; and
- reviewing submitted incidents and HVLE, and this COS APR in its entirety, in an effort to identify and implement applicable learnings within their own organizations.

This first year of LFI data included information and learnings from 48 incident and HVLE (2-SPI 1, 39-SPI 2, and seven-HVLE). Forty-six of the 48 reported incidents and HVLE occurred in U.S. OCS deepwater. The remaining two occurred in non-deepwater international areas. The incidents and HVLE were distributed across multiple operation and facility types, and spanned a variety of consequence categories including personal safety, process safety, environmental impacts, and property damage.

Areas for improvement were identified and demonstrated a relatively even distribution across the three general categories of 1) Physical Facility, Equipment, and Process, 2) Administrative Processes, and 3) People, with the following noted most frequently:

- Operating Procedures or Safe Work Practices – 54%
- Quality of Task Planning and Preparation – 29%
- Process or Equipment Design or Layout – 27%
- Risk Assessment and Management – 25%



Throughout the submitted reports, there were frequent mentions of dropped objects, as well as references to the adherence, or lack thereof, to industry standards or recognized practices. Dropped objects were noted in 30% of all reported incidents and HVLE. This prevalence reinforces the need for appropriate barriers to address hazards and risks associated with mechanical lifting operations. Many of the reported incidents and HVLE were associated with activities covered by industry standards and recognized practices. This observation

highlights the importance of effectively integrating existing industry standards and practices into local company processes, where applicable.

A holistic review of the 48 incidents resulted in the identification of noteworthy trends and potential learning opportunities, especially relating to:

- Mechanical Lifting (23 incidents)
- Process Safety (5 events)
- Loss of Station resulting in drive off or drift off (five incidents)
- Life boat, life raft, or rescue boat (four incidents)

These noteworthy trends and potential learnings are detailed in Section 5.3, along with the cited corresponding Areas for Improvement and examples of consequences.

In one HVLE case, specific potential learnings were identified and are captured in Section 5.3, under the heading *Incident and HVLE-Specific Potential Learning Opportunities*.

Appendix 6 provides additional charts and supporting information regarding the distribution of incidents and HVLE across various categories.

5.3 Learnings

The 48 incidents and HVLE evaluated for this APR encompassed numerous offshore activities and identified a wide variety of potential learnings applicable to the COS membership. Trends and potential learnings were identified in relation to the following topics:

- Mechanical Lifting (23 incidents)
- Process Safety (five events)
- Loss of Station resulting in drive off or drift off (five incidents)
- Life boat, life raft, or rescue boat (four incidents)

5.3.1 Mechanical Lifting

The review of the mechanical lifting incidents and HVLE information highlight the importance of **ensuring adequate procedures are in place, work is carefully planned, and personnel are qualified to perform the work**. Additionally, maintaining barricade zones around suspended loads, proper selection and use of slings and rigging hardware, and control of suspended loads are measures that can reduce the likelihood and/or severity of incidents.

The most cited areas for improvement for these mechanical lifting and lowering incidents and HVLE were found to involve opportunities in:

- Operating procedures or safe work practices
- Quality of task planning and preparation
- Personnel skills or knowledge

Examples from LFI submittals that support the above areas of improvement include:

- **Example 1** - As a blowout preventer (BOP) was being moved back into the stored position, the multiplex fiber optic control line (MUX) was damaged when it became pinched between the MUX house and the BOP frame. *Lessons Learned:* "Supervisors that assign tasks to workers should ensure

that the required risk assessments are conducted to identify the hazards and determine the hazard mitigations...”

- **Example 2** - A 3/4 inch by 25 foot long galvanized wire rope sling fractured while offloading two bundles of 6 5/8 inch drill pipe from a marine vessel to a MODU using a two-part sling formation. Lessons Learned: “The design of a lift... should consider the orientation of slings and sling movement and the potential impact of overloading...”
- **Example 3**- Work crew was lifting a 6000 pound valve using a series of 5 ton chain falls attached to overhead beams using beam clamps. During this process the crew began 'floating' the load across the deck and began transferring the weight off of the first chain fall so that the weight was only on the second and third chain falls. After this occurred, the beam clamp for the second chain fall parted and the second chain fall fell approximately 9 feet landing on top of the valve body. Lessons Learned: “Lifts involving use of [beam] clamps should consider the potential risk of side loading...”
- **Example 4**- While lifting a wooden crate containing a BOP bonnet using two slings basketed around it, the crate began to swing aft toward the moon pool and contacted some pipework causing the crate to swing back forward. While slacking off the crate contacted a deluge pipe which shifted the contents of the crate breaking the crate wall. The contents fell out of the crate contacting handrails a BOP skid cart and another structure before coming to rest on the deck. Lessons Learned: “Changes in weather should be considered in risk assessments [and] task planning...”

The most commonly cited consequences and physical causes for these incidents were:

Dropped Objects	This category includes uncontrolled descent of loads and/or hardware, with physical causes most often related to sling or rigging failures. Two of these cases were related to improper use of beam clamps, and two others involved the use of wooden crates. One of the reports noted the use of a man basket with a hoist that was not rated for personnel use.
Struck By / Caught Between	Reported incidents included suspended loads striking personnel or other stationary objects, and rigging hardware becoming entangled in adjacent structures.
Slinging / Rigging Failure	Most of the failures were attributed to improper sling and/or rigging configuration, or overloading (excessive load weight or binding of load).

5.3.2 Process Safety Events

A review of the process safety events highlighted the importance of early and adequate hazard identification and risk assessment. Appropriate hazard identification and risk assessments by competent personnel can drive improvements in operating procedures and safe work practices, and ensure the use of the appropriate safe work practices. Additionally, routine preventative maintenance, inspection and testing of critical equipment are other themes associated with these process safety events.

The most cited areas for improvement were:

- Operating procedures or safe work practices
- Process or equipment reliability

Examples from submitted LFI reports which support the learning:

- **Example 1** – Two subsea personnel injured when high pressure piping ruptured at composite air pressure vessels (CAPV) resulting in a fire in the derrick. Personnel were equalizing a third composite compressed air canister in the Crown Mounted Compensator system. The explosion started in the canister, traveled down the piping and ruptured the CAPV. *Lesson Learned:* “Move the actuators for any compressed air bottles to a remote location so that human/equipment interface is prevented. Do not use composite compressed air bottles but instead use steel bottles in CMC system. Make sure work instruction is more specific as to the rate of opening the pressure valve when equalizing the compressed air bottles on the CMC system.”
- **Example 2** – Supply line to equipment not currently in use ruptured. Hydraulic oil was spilled to and recovered from the deck and moonpool. *Lessons Learned:* “Consider revising operating procedures to check unused equipment that may be affected or hooked up to live oil lines.”
- **Example 3** - Stainless steel braided flexible gas lift hose failed resulting in gas release in wellbay. *Lesson Learned:* “Replaced all flexible metal hoses constructed of crimped metal ribbon with high pressure gas service hoses with JIC fittings that are fit for service.”
- **Example 4** – 3/4" stainless tubing separated from 3/4" tube fitting on gas lift line resulting in a release of methane gas. *Lessons Learned:* “Inspected similar fittings on facility to ensure installed per manufacturer's recommendations. Developed work aid for installation of similar fittings. Recognized linkage between training and proper installation.”
- **Example 5** - The platform prepared for return to production by pumping methanol to the sub-sea safety valve. Shortly after startup of the methanol pumps, a leak was discovered in the methanol supply header. The pumps were immediately shut down and the methanol tank was isolated and the leak stopped. *Lessons Learned:* “The methanol piping was previously considered low risk utility piping and was only subject to a paint inspection and had not been subject to the piping external inspection process.”

5.3.3 Loss of Station Keeping Resulting in Drive Off or Drift Off

A review of the loss of station keeping incidents highlighted the importance of: **the reliability of critical equipment and the potential need for redundancy; clear and concise operating procedures, and effective communication across individuals, groups and integrated systems.** The other areas for improvement included the following: process or equipment design; risk assessment and management; task planning and preparation; and personnel skills and knowledge.

Examples from submitted LFI reports which support the learning:

- **Example 1** – Loss of thrusters due to engine overhaul. Engineers conducting asymmetric operations. One thruster went down, other thruster assumed entire engine load. Switchboard lost power and 3 and 6 thrusters lost power. *Lesson Learned:* “Revise procedure for DP and engine work so that one engine does not take full load if other engine goes down.”
- **Example 2** – Lost communication with the power management system on all of the VMS consoles. *Lessons Learned:* “Redundancy in Communication System.”
- **Example 3** - Emergency generator tripped offline while engineers were conducting monthly load testing PMs. DP switched to a status as needed in a blackout or any single fault of the distribution system that may result in the loss of position. *Lesson Learned:* “Have backup generator and engine online.”

- **Example 4** – Frac vessel was working in dynamic positioning alongside a semi-submersible drilling rig. The frac vessel suffered an uncontrolled DP drive off. As the vessel moved away from the rig, the hose connected to the semi was pulled taut until the reel anchor points broke. The frac hose reel came off the stern of the vessel and ended up suspended from the pipe hanger on the rig. *Lessons Learned:* “Clear, concise communication is essential between DPO and frac control room; ensure that the systems critical components are included in the preventative maintenance program; ensure that the 3rd party procedures are aligned with primary company’s expectations.”
- **Example 5** – An offshore supply vessel was operating in dynamic positioning mode alongside a drillship. The OSV was connected to the rig by two hoses. A second DP OSV was positioned close astern. The additional propulsion wash resulted in heading adjustments to be made. An error by the DPO on the primary OSV resulted in a loss of DP. The DPO regained control in manual mode. The DPO attempted to reinstate automatic DP mode but before resolving the situation, the primary OSV collided with the drillship. *Lesson Learned:* “The DP system software was updated to reduce the chance of DP error; ensure all relevant personnel are fully aware of the system operating procedures; where practical and relevant, avoid dual OSV operations taking place in close proximity.”

5.3.4 Life Boat, Life Raft, or Rescue Boat Events

A review of the information included with Life Boat, Life Raft, or Rescue Boat related events highlighted trends associated with the importance of **safely executing the planned or unplanned deployment and retrieval of the equipment**. Maintenance and testing of the equipment is necessary and essential to assure readiness. As can be seen in the examples below, these activities have risks that went unrecognized related to both the task planning, and execution and design aspects. Routine preventative maintenance, inspection and testing of this critical life-saving equipment are essential to assure it will function as designed as a key mitigation barrier.

The most cited Areas for Improvement for the Life Boat, Life Raft, or Rescue Boat events were:

- Process Equipment Design / Reliability
- Quality of Task Execution

Examples from submitted LFI reports which the above areas of improvement include:

- **Example 1** - While lowering the lifeboat, the release pin on the aft stabilizing chain failed to release, causing the lifeboat to invert and shock load the forward hook which also failed and the lifeboat fell into the sea. *Lesson Learned:* “Ensure the processes...utilized to capture...changes such as maintenance and [inspections] are indeed robust enough to prevent system failure.”
- **Example 2**- During quarterly launch of fast response craft, team was testing the brake by lowering the boat approximately 10 feet down allowing it to reach its full speed of descent. When the brake lever was released, the boat came to a stop. The boat was recovered back into the rack and the launch proceeded with personnel in the boat. The boat descended to approximately 3-5 feet above the water and the brake was released. However, the boat continued its descent to the water. *Lessons Learned:* “Brake lever handle was restricted by paint chips and rust.”
- **Example 3**- While launching lifeboats as part of 90-day requirement, the masterlink on the forward lifeboat fall became fouled. When the weight of the boat came down on the fall due to the boat heaving in the swells, one of the d-ring grab handles broke off and fell into the water. *Lessons Learned:* “Welds securing d-ring handles should have deep penetration. Preventative maintenance procedure should cover visually checking ... hardware for signs of corrosion and deterioration.”

- **Example 4** - While lifting a life raft to set it into its launcher, the facility caught a swell causing the load to swing. The life raft came into contact with a pad-eye in the area, causing damage to the shell of the life raft. *Lessons Learned:* “Ensure that changes in weather are appropriately addressed in task risk assessments and in task planning and preparation.”

The most commonly observed consequences and physical causes for these incidents were:

Vessel Damage and Dropped Objects	Incidents included freefall or the uncontrolled descent of life boat, life raft, or rescue boat, with causes most often related to either component failures that were due to maintenance and reliability issues or loss of integrity resulting in damage to components, and the vessel shell and hull.
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5.3.5 Incident and HVLE - Specific Potential Learning Opportunities

Among the 48 incidents and HVLE reported, one was singled-out as having a noteworthy learning opportunity in addition to those covered in previous sections. It is summarized below, along with the potential learning opportunities.

Incident Summary – Personnel were preparing to enter a vessel to perform a task which required the use of supplied breathing air. After a few minutes inside the vessel, the affected employee complained of difficulty breathing and was instructed to sit down and catch his breath. The work area was examined and it was discovered that the affected employee had connected the welding gas line to the hood, instead of breathing air.

- **Potential Learning Opportunity** – 1) Each fitting on any hose supplying breathing air should be unique and impossible to connect with other types of hoses (see *API 2015* which states, “Employers shall provide breathing airline couplings that are not compatible with outlet connections for other air or gas systems in the facility, including, but not limited to, nitrogen, industrial air, hydrogen, and oxygen).” 2) Color blindness should be considered when color coding is a barrier.

5.4 Areas for Improvement

This section provides a summary of the improvement areas identified for the 48 reported incidents and HVLE. The following information can be used by COS Members to gain insight into potential improvement opportunities for their own operations.

The LFI reporting process allows COS Members to identify Areas for Improvement associated with reported incident and HVLE. Submitters chose from three general categories and 15 sub-categories. Multiple Areas for Improvement could be selected for a single incident or event. The three general categories were:

- Physical Facility, Equipment, and Process
- Administrative Processes
- People

A total of 122 Areas for Improvement were selected by submitters for the 48 incidents and HVLE. Multiple improvement areas relating to a single incident or HVLE is consistent with industry experience, and clearly demonstrates that a majority of incidents and HVLE can have multiple factors and associated barrier failures.

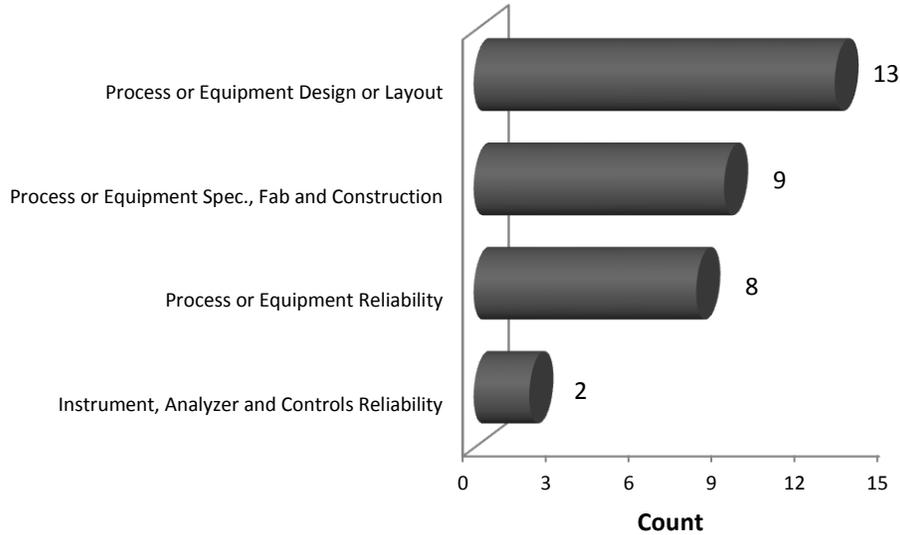
The Areas for Improvement data demonstrated a relatively even distribution across the three general categories listed above. Among the 15 sub-categories, there were four improvement areas that stood out among the data set (number in parenthesis indicates number of times chosen and percentage of reports that selected this improvement area):

- Operating Procedures or Safe Work Practices (26/48 - 54%),
- Quality of Task Planning and Preparation (14/48 - 29%),
- Process or Equipment Design or Layout (13/48 - 27%), and
- Risk Assessment and Management (12/48 - 25%)

These results indicate an opportunity to enhance the effectiveness of prevention and/or mitigation barriers for the listed improvement areas.

Charts 1 through 3 graphically represent the specific Areas for Improvement identified under each of the three general categories. As indicated in the following charts, improvement opportunities were cited in every sub-category, with the exception of Emergency Response.

Chart 1 – Areas for Improvement – General Category: Physical Facility, Equipment, and Process



- Process or Equipment Design or Layout was the most frequently identified Area for Improvement in this category (cited in 27% of the 48 incidents and HVLE)

Chart 2 – Areas for Improvement – General Category: Administrative Processes

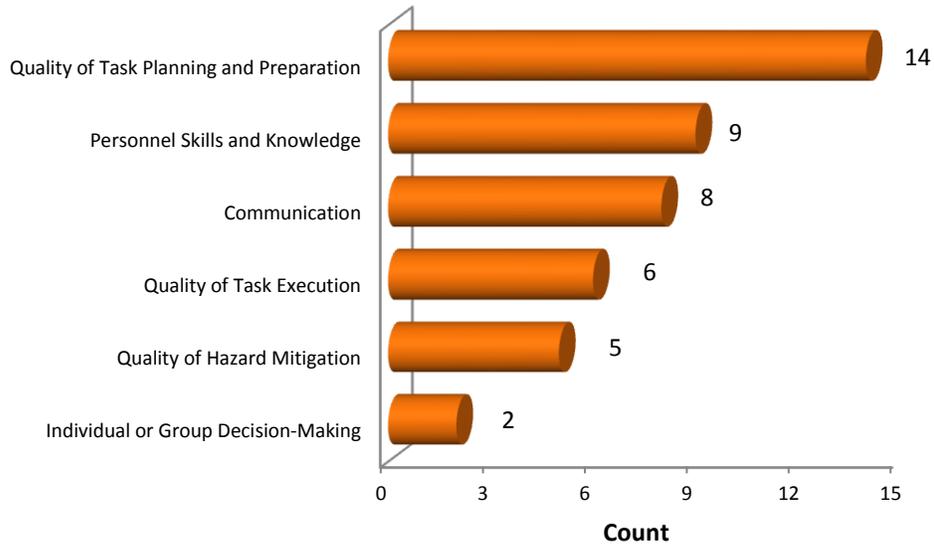


- Operating Procedures or Safe Work Practices was the most frequently identified improvement area (cited in 54% of the 48 incidents and HVLE).

Note: The “Operating Procedures or Safe Work Practices” sub-category, listed here as part of the “Administrative Processes” general category, refers to the existence and quality of procedures or practices,

and not whether they were followed or executed properly (execution is covered in the “People” category, below).

Chart 3 – Areas for Improvement – General Category: People



- Quality of Task Planning and Preparation accounted for almost one third of the “Areas for Improvement” in the People category.

6.0 SEMS AUDITS AND CERTIFICATION

6.1 Introduction

BSEE issued regulations in 2010, requiring all U.S. OCS Operators develop, implement and audit their Safety and Environmental Management Systems (SEMS), incorporating the elements of API RP 75 and several COS documents. All U.S. OCS Operators were required to complete a BSEE SEMS Audit by November 15, 2013. 100% of COS members complied with this deadline.

COS developed the COS SEMS Audits and Certification Program and COS SEMS Audit Service Provider (ASP) Accreditation Program in support of its mission. These programs include third-party auditing and certification of a COS member company's SEMS, and accreditation of the organizations providing audit services. Third-party audits are performed to ensure that COS member companies are effectively implementing and maintaining a SEMS throughout their U.S. OCS operations.

COS has established a program to certify COS members who conduct their SEMS audit utilizing COS audit requirements and COS accredited ASP. To qualify for COS SEMS Certification, members must share the results of their audit and any corrective actions with COS. The COS SEMS audit reports are anonymous and provided via the ASP to COS. The audit reports are analyzed to identify lessons learned that may be used by the industry and individual members to improve SEMS, and ultimately safety and environmental performance. A description of the COS ASP accreditation and member certification programs is published on the COS website, CenterForOffshoreSafety.org.

Additionally, COS developed a confidential survey for the COS Operator member companies to complete summarizing the results of their BSEE SEMS audits required to be completed by November 2013. The purpose of this survey was to enable COS member companies to share SEMS audit data even if their COS SEMS Certification process was still underway at the time of the survey.

At the time of publication,

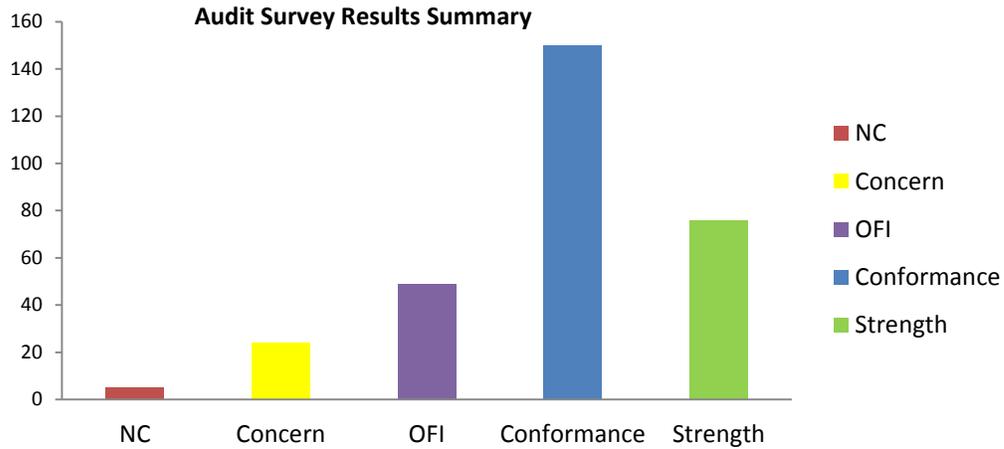
- Four (4) ASP companies were accredited by COS, and
- Eight (8) COS Operator member companies received COS SEMS Certification.

6.2 Summary

The purpose of the BSEE SEMS I Audit Survey for COS was to collect summary-level data about the COS Operator members' BSEE SEMS audits and develop aggregate analysis for inclusion in this report.

100% (12) of the COS member companies eligible to participate provided a survey response. Each Operator provided the count of conformances, non-conformances, concerns, opportunities for improvement, and strengths at the element level based upon the results of their audit for each of the SEMS Elements required by the audit. The survey consisted of four questions across the 13 SEMS Elements, resulting in 624 data points in total from the twelve responses; 156 data points were gathered for each of the four survey questions.

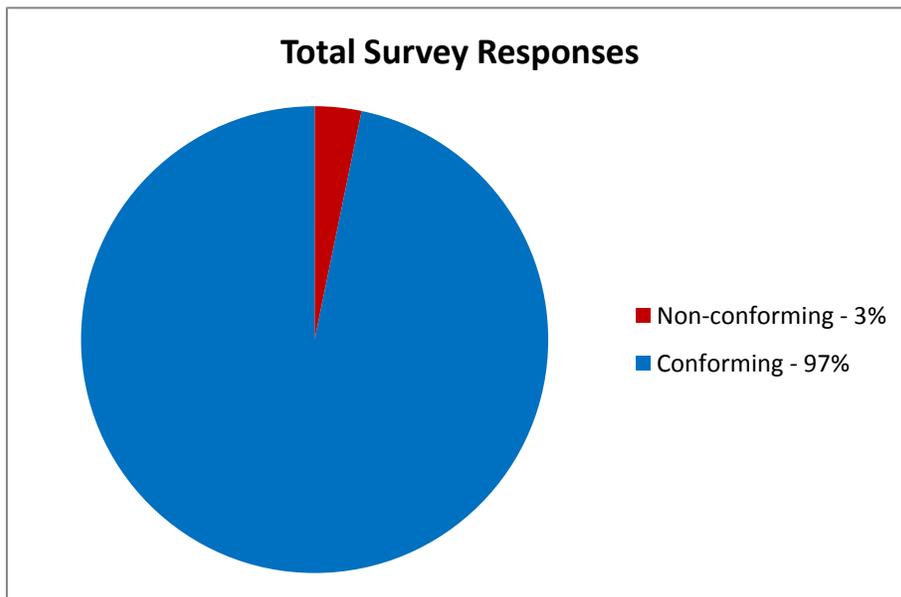
The following figure illustrates the breakdown of the twelve audit survey responses in total.

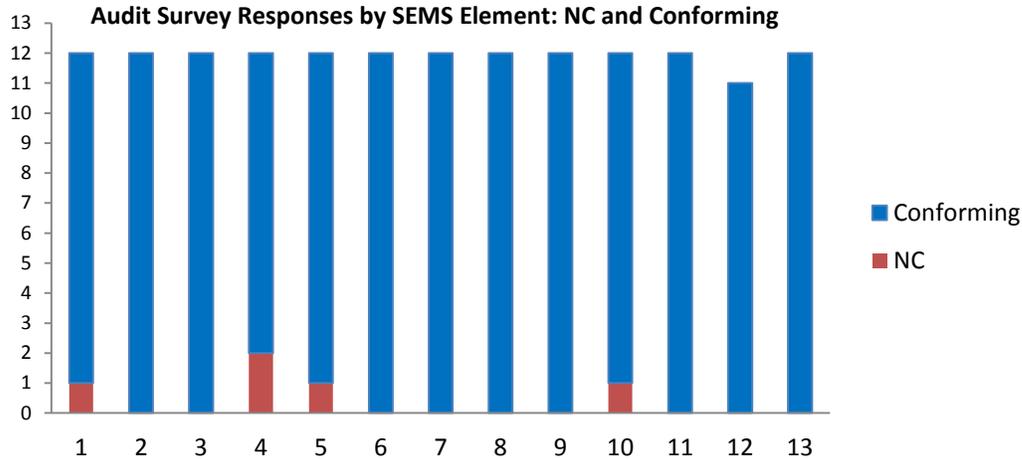


150 conformances were reported across the SEMS Elements; in contrast, only five non-conformances were reported in the responses. These non-conformances were identified in the following elements:

- General (Element 1) - 1
- Management of Change (Element 4) - 2
- Operating Procedures (Element 5) - 1
- Emergency Response and Control (Element 10) – 1

The following figure illustrates the number of non-conforming and conforming SEMS Elements as reported in the survey responses.

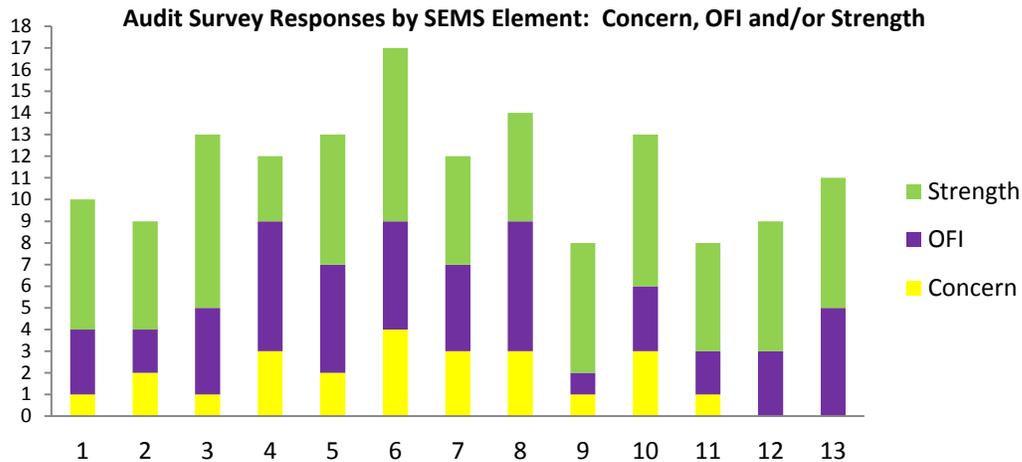




Note: The number on the horizontal axis represents the SEMS Element number.

1 – General	8 - Mechanical Integrity of Critical Equipment
2 - Safety and Environmental Information Required	9 - Pre-startup Review
3 - Hazards Analysis	10 - Emergency Response and Control
4 - Management of Change	11 -Investigation of Incidents
5 - Operating Procedures	12 - Audit of SEMS Program Elements
6 - Safe Work Practices & Contractor Selection	13 – Recordkeeping
7 - Training	

The following figure illustrates the frequency of each SEMS Element reported as a concern, and/or opportunity for improvement, and/or strength in the survey.



Note: The number on the horizontal axis represents the SEMS Element number.

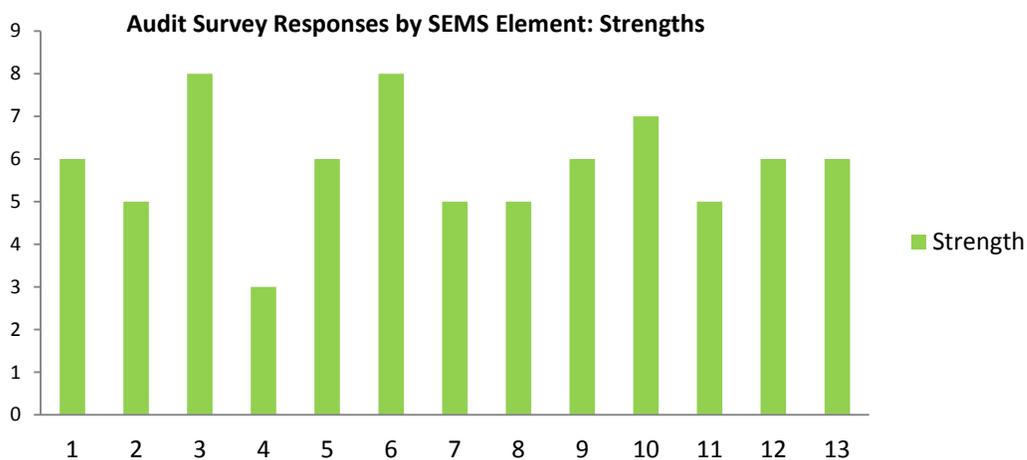
1 – General	8 - Mechanical Integrity of Critical Equipment
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3 - Hazards Analysis	10 - Emergency Response and Control
4 - Management of Change	11 -Investigation of Incidents
5 - Operating Procedures	12 - Audit of SEMS Program Elements
6 - Safe Work Practices & Contractor Selection	13 – Recordkeeping

7 - Training	
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Where non-conformances, concerns and/or opportunities for improvement were reported, they are primarily associated with the following elements:

- Management of Change (Element 4) - 11
- Safe Work Practices & Contractor Selection (Element 6) - 9
- Mechanical Integrity of Critical Equipment (Element 8) – 9
- Operating Procedures (Element 5) - 8

The following figure illustrates the frequency of each SEMS Element reported as an area of strength in the survey.



Note: The number on the horizontal axis represents the SEMS Element number.

1 – General	8 - Mechanical Integrity of Critical Equipment
2 - Safety and Environmental Information Required	9 - Pre-startup Review
3 - Hazards Analysis	10 - Emergency Response and Control
4 - Management of Change	11 -Investigation of Incidents
5 - Operating Procedures	12 - Audit of SEMS Program Elements
6 - Safe Work Practices & Contractor Selection	13 – Recordkeeping
7 - Training	

Each of the SEMS Elements had strengths identified by at least three survey respondents. Where strengths were identified in the survey, they are most frequently associated with the following elements:

- Hazards Analysis (Element 3) – 8
- Safe Work Practices & Contractor Selection (Element 6) – 8
- Emergency Response & Control (Element 10) - 7

6.3 Observations and Analysis

The next sections of this document provide additional observations and analysis of key SEMS Elements identified in section 6.2.

- Hazards Analysis (Element 3)
- Management of Change (Element 4)
- Operating Procedures (Element 5)
- Safe Work Practices & Contractor Selection (Element 6)
- Mechanical Integrity of Critical Equipment (Element 8)
- Emergency Response and Control (Element 10)

6.3.1 Hazards Analysis (SEMS Element 3)

Hazards Analysis was identified as a concern in one of the twelve responses and an opportunity for improvement in four of the twelve responses. However, it had identified strengths in eight of the twelve responses.

6.3.2 Management of Change (SEMS Element 4)

Management of Change (MOC) was identified as a non-conforming SEMS element in two of the twelve survey responses, a concern in three of the twelve responses, an opportunity for improvement in six of the twelve responses and an area of strength in three of the twelve responses. MOC was mentioned as an area of improvement in several of the Learning from Incidents Forms shared with COS.

6.3.3 Operating Procedures (SEMS Element 5)

Operating Procedures was identified as a non-conforming SEMS element in one of the twelve survey responses, a concern in two of the twelve responses, an opportunity for improvement in five of the twelve responses and an area of strength in six of the twelve responses. It is significant to mention that Operating Procedures and/or Safe Work Practices was mentioned in 30 of the 48 Learning from Incidents Forms shared, frequently as an area for improvement during mechanical lifting. Operating Procedures and Safe Work Practices are combined in the LFI Form.

6.3.4 Safe Work Practices and Contractor Selection (SEMS Element 6)

In the COS Survey, Safe Work Practices and Contractor Selection was identified as a concern in four of the twelve responses, an opportunity for improvement in five of the twelve responses and as an area of strength in eight of the twelve responses. It is unclear if the Safe Work Practices or the Contractor Selection part of this element was the subject of the concerns, OFI and strengths.

6.3.5 Mechanical Integrity of Critical Equipment (SEMS Element 8)

In the COS Survey, Mechanical Integrity of Critical Equipment was identified as a concern in three of the twelve responses, an opportunity for improvement in six of the twelve responses and an area of strength in 5 of the twelve responses.

The SPI 3 data included herein reflects:

- 68% of the 99 SPI 1 and SPI 2 incidents involved failure of equipment as a contributing factor and
- 64% of the failures were attributed to mechanical lifting equipment.

In addition, the LFI Forms included herein frequently mention “Equipment Reliability” as an area for future improvements involving loss of station keeping, process safety events, or life boat/raft or rescue boats.

6.3.6 Emergency Response and Control (SEMS Element 10)

In the COS Survey, Emergency Response and Control was identified as a non-conforming SEMS element in one of the twelve responses, a concern in three of the twelve responses, an opportunity for improvement in three of the twelve responses and as an area of strength in seven of the twelve responses.

7.0 APPENDICES

Appendix 1 DEFINITIONS

Note: please reference **Appendix 3: SPI Definitions and Metrics** for detail on the SPI, their minimum-release threshold values and specific normalization factors for each SPI. Please reference **Appendix 4: Equipment Definitions** for specific definitions of equipment.

Barrier: A constraint on a hazard that reduces the probability of an incident or its consequences. There are two types of barriers: Prevention and Mitigation.

Concern: A condition that marginally meets requirements but could lead to non-conformity if sufficient controls are not in place to maintain the management system identified during SEMS audit.

Conformance: Satisfactory fulfillment of requirement identified during SEMS audit.

Consequence: The harm that could result from an incident.

Contractor: An individual, partnership, firm or corporation retained by the Owner or Operator to perform work or to provide supplies or equipment. The term Contractor shall also include Subcontractors.

Deepwater: Exploration and production activity occurring in 1000 feet or deeper water depth.

Facility: All types of offshore structures permanently or temporarily attached to the seabed (mobile offshore drilling units, floating production systems, floating production, storage and offloading facilities, tension-leg platforms, and spars) used for exploration, development, production, and transportation activities for oil and gas from areas leased in the OCS, including pipelines regulated by the Department of Interior (DOI).

Formation Fluid: The subterranean fluid trapped by a reservoir formation; can include natural gas, liquid and vapor petroleum hydrocarbons, and interstitial water.

Hazard: Types of chemical, thermal, toxic, kinetic, or potential energy with the ability to harm to people, the environment, or facilities.

High Value Learning Event: An event that may be considered by a COS Member or the industry for use as a reference in process hazard analyses, management of change, project design, risk assessments, inspections, operating procedures reviews, and/or training. HVLEs should meet 1 or more of the criteria below:

- A. Identify a previously unknown risk, situation, operational or mechanical hazard, or critical equipment failure.
- B. Identify a previously unknown combination of factors that resulted in an unexpected condition or event.
- C. Identify a routine operation or activity that created a previously unidentified risk or consequence.
- D. Identify a situation where established industry designs, controls, or procedures failed to prevent an event (e.g. well kick, loss of wall thickness).
- E. An event that is part of a pattern in industry events which could indicate that certain hazardous conditions are not well understood.

Incident: A work-related event that has one or more consequences.

Loss of Primary Containment (LOPC): An unplanned or uncontrolled release of any material from primary containment, including non-toxic and non-flammable materials (e.g. steam, hot condensate, nitrogen, compressed CO₂ or compressed air).

Major Hazard: a **Hazard** that can reasonably be foreseen as having the potential to cause a major incident.

Mitigation Barrier: Barrier that can reduce or minimize the severity and probability of a consequence of an incident. For example, active fire protection is a mitigation barrier.

Non-conforming: Less than satisfactory fulfillment of a requirement identified during SEMS audit.

Operator: The individual, partnership, firm, or corporation having control or management of operations on the leased area or a portion thereof. The Operator may be a lessee, designated agent of the lessee(s), or holder of operating rights under an approved operating agreement.

Opportunity for Improvement (“OFI”): A condition that meets requirements, but based on auditor experience and knowledge, can be more effectively implemented using a modified approach or using good practices identified during SEMS audit.

Prevention Barrier: Barrier that can prevent or reduce the probability of an incident. For example, a safety instrumented system is a prevention barrier.

Production: Production covers petroleum and natural gas production activities including flow lines and pipelines.

Projects: Projects include all offshore construction activities.

Safety Performance Indicator (SPI): A measurement that provides insights into the strength of barriers. SPI are inclusive of those that measure performance with respect to protection of personnel, the environment, and offshore facilities and property.

Safety Performance Indicator Program: A program developed, implemented and continually improved through which Safety Performance Indicators are established, collected, analyzed, and reported for specific safety issues of concern so that actions can be taken by relevant stakeholders to improve safety performance.

Strength: A policy, standard, practice, process, procedure or control identified during SEMS audit by auditor as exceeding requirements.

Wells: Wells include all exploration, appraisal and production drilling, wireline, completion, workover, and intervention activities.

Appendix 2 ACRONYMS

API – American Petroleum Institute

APR – Annual Performance Report

BSEE – Bureau of Safety and Environmental Enforcement

COS – Center for Offshore Safety

DART – Days Away From Work, Restricted Work, and/or Transfer Injury and Illness Frequency

F/G – Fire/Gas

GoM – Gulf of Mexico

HVLE – High Value Learning Event

LFI – Learning from Incidents and HVLE

LOPC – Loss of Primary Containment

MIT – Maintenance, Inspection, and Testing

NC – Non-conformance

OCS – Outer Continental Shelf

OFI – Opportunity for Improvement

PRD – Pressure Relief Device

RIIF – Recordable Injury and Illness Frequency

SEMS – Safety and Environmental Management System

SPI – Safety Performance Indicator

WPCS – Well Pressure Containment System

Appendix 3 SPI Definitions and Metrics

SPI Number	SPI Definition	SPI Metric	Reporting Entity
SPI 1	<p>Number of work-related incidents resulting in one or more of the following consequences:</p> <p>A. Fatality: One or more fatalities.</p> <p>B. Injury to 5 or more persons in a single Incident</p> <p>C. Tier 1 Process Safety Event: (API RP 754 Tier 1 Process Safety Event) An unplanned or uncontrolled release of any material, including non-toxic and non-flammable materials (e.g., steam, hot condensate, nitrogen, compressed CO2, compressed air), from a process that results in one or more of the consequences listed below:</p> <ul style="list-style-type: none"> ○ an employee, Contractor or Subcontractor “days away from work” injury and/or fatality; ○ a hospital admission and/or fatality of a third-party; ○ an officially declared community evacuation or community shelter-in-place; ○ a fire or explosion resulting in greater than or equal to \$25,000 of direct cost to the Company; ○ a pressure release device (PRD) discharge to atmosphere whether directly or via a downstream destructive device that results in one or more of the following four consequences: <ul style="list-style-type: none"> ▪ liquid carryover ▪ discharge to a potentially unsafe location ▪ an onsite shelter-in-place ▪ public protective measures and a PRD discharge quantity greater than the threshold quantities in Table A-C in any one-hour period; or ○ A release of material greater than the threshold quantities described in Tables A-C in any one-hour period. <p>D. Loss of well control. “Loss of well control” means:</p> <ul style="list-style-type: none"> ○ Uncontrolled flow of formation or other fluids. The flow may be to an exposed formation (an underground blowout) or at the surface (a surface blowout); <ul style="list-style-type: none"> ▪ Flow through a diverter; or ▪ Uncontrolled flow resulting from a failure of surface equipment or procedures. <p>E. \$1 million or greater direct cost from damage to or loss of facility / vessel / equipment (excludes costs associated with downtime or production loss).</p> <p>F. Oil spill to water > or equal to 10,000 gallons (238 barrels)</p>	# of SPI 1 incidents/ total work hours * 200,000	<p>COS Operator inside 500 meters</p> <p>COS Contractor owner of vessel / equipment outside 500 meters offshore</p>
SPI 2	<p>Frequency of work-related incidents that do not meet the definition of a SPI 1 incident but have resulted in one or more of the following:</p> <p>A. Tier 2 Process Safety Event: (API RP 754 Tier 2 Process Safety Event) An unplanned or uncontrolled release of any material, including non-toxic and non-flammable materials (e.g., steam, hot condensate, nitrogen, compressed CO2, compressed air), from a process that results in one or more of the consequences listed below and is not reported as a Tier 1 PSE:</p> <ul style="list-style-type: none"> ○ An employee, Contractor or Subcontractor recordable injury; ○ A fire or explosion resulting in greater than or equal to \$2,500 of direct cost to the Company; ○ A pressure release device (PRD) discharge to atmosphere whether directly or via a downstream destructive device that results in one or more of the following four consequences: <ul style="list-style-type: none"> ▪ liquid carryover ▪ discharge to a potentially unsafe location ▪ an onsite shelter-in-place ▪ public protective measures and a PRD discharge quantity greater than the threshold quantity in Tables D-F in any one-hour period; or ○ a release of material greater than the threshold quantities described in Tables D-F in any one-hour period. <p>B. Collision that results in property or equipment damage > \$25,000</p> <p>C. Crane or personnel/material handling operations defined as a failure of the crane itself (e.g., the boom, cables, winches, ball ring), other lifting</p>	# of SPI 2 incidents / total work hours * 200,000	<p>COS Operator inside 500 meters</p> <p>COS Contractor owner of vessel / equipment outside 500 meters offshore</p>

SPI Number	SPI Definition	SPI Metric	Reporting Entity
	<p>apparatus (e.g., air tuggers, chain pulls), the rigging hardware (e.g., slings, shackles, turnbuckles), or the load (e.g., striking personnel, dropping the load, damaging the load, damaging the facility).</p> <p>D. Loss of station keeping resulting in drive off or drift off defined as a malfunction or improper operation of the dynamic positioning system</p> <p>E. Life boat, life raft, or rescue boat event that resulted in a recordable injury or equipment damage or malfunction during life boat, life raft, or rescue boat operations or that take it out of service.</p>		
SPI 3	<p>Number of SPI 1 and SPI 2 incidents that involved failure of one or more of equipment as a contributing factor.</p> <p>COS Equipment categories:</p> <ul style="list-style-type: none"> A. Well pressure containment system B. Christmas trees C. Downhole safety valves D. Blow out preventer and intervention systems E. Process equipment/pressure vessels, piping F. Automated safety instrumented systems / shutdown systems G. Pressure relief devices, flare, blowdown, rupture disks H. Fire/gas detection and fire-fighting systems I. Mechanical lifting equipment/personnel transport systems J. Station keeping systems K. Bilge/ballast systems L. Life boat, life rafts, rescue boats, launch and recovery systems M. Other 	Number of SPI 1 and 2 incidents involving failure of equipment / total number of SPI 1 and 2 incidents * 100	COS Operator inside 500 meters COS Contractor owner of vessel / equipment outside 500 meters offshore
SPI 4	Reserved for Future Use	Reserved	Reserved
SPI 5	<p>Number of planned critical maintenance, inspections and tests completed on time.</p> <ul style="list-style-type: none"> • A planned task can be deferred if a proper risk assessment was completed and approved, and a new due date set. • COS Equipment: <ul style="list-style-type: none"> ○ Well pressure containment system ○ Christmas trees ○ Downhole safety valves ○ Blow out preventer and intervention systems ○ Process equipment/pressure vessels, piping ○ Automated safety instrumented systems / shutdown systems ○ Pressure relief devices, flare, blowdown, rupture disks ○ Fire/gas detection and fire-fighting systems ○ Mechanical lifting equipment/personnel transport systems ○ Station keeping systems ○ Bilge/ballast systems ○ Life boat, life rafts, rescue boats, launch and recovery systems ○ Other 	Number of critical maintenance, inspections and tests tasks completed on time / number of critical maintenance, inspections and tests tasks planned * 100	COS Owner of Equipment
SPI 6	Number of work-related fatalities	Number of work-related fatalities	COS Operator inside 500 meters COS Contractor owner of vessel / equipment outside 500 meters offshore
SPI 7	Number of lost time and restricted work day injuries and illnesses	# of LTIs and RWCs / total work hours * 200,000	COS Operator inside 500 meters
SPI 8	Number of recordable injuries and illnesses	Number of recordable injuries and illnesses/ total work hours * 200,000	COS Operator inside 500 meters
SPI 9	Number of spills greater or equal to 1 barrel that enter the water	Number of spills > or equal to 1 barrel / total	COS Operator inside 500 meters

SPI Number	SPI Definition	SPI Metric	Reporting Entity
		work hours * 200,000	COS Contractor owner of vessel / equipment outside 500 meters offshore
Work Hours	<p>For offshore workers, the hours worked are calculated on a 12-hour work day. Work hours are collected in the following categories:</p> <ul style="list-style-type: none"> • Total deepwater construction workforce hours inside 500 meters • Total deepwater well workforce hours inside 500 meters • Total deepwater production workforce hours inside 500 meters • Total deepwater workforce hours inside 500 meters 		COS Operator inside 500 meters

Appendix 4 Equipment Definitions

Equipment	Equipment Definition
Well Pressure Containment System	The casing and wellhead (with cement support and isolation where applicable) and tubing, tubing hardware and tubing hanger represent the equipment below the BOP or Christmas Tree comprise the "well pressure containment system", and as such represent the ability to contain pressure when a BOP or Christmas Tree has been closed.
Christmas Trees	Equipment attached to the uppermost connection of the wellhead or tubing spool to contain wellbore fluids in both the tubing and in the annular space between the casing and tubing during producing operations. The subsea tree may provide locations where nitrogen and chemical additives can be injected into the annulus or tubing string. The tree consists of assembled equipment that includes a wellhead connector, valves, choke, tree cap, and control system to operate the various components.
Downhole Safety Valves	<ul style="list-style-type: none"> Downhole safety valve: A device installed in a well below the wellhead with the design function to prevent uncontrolled well flow when actuated, e.g. SSCSV or SCSSV. Subsurface controlled subsurface safety valve (SSCSV): An SSSV actuated by the pressure characteristics of the well. Surface controlled subsurface safety valve (SCSSV): An SSSV controlled from the surface by hydraulic, electric, mechanical, or other means.
Blow Out Preventer and Intervention Systems	Equipment installed on the wellhead or wellhead assemblies to contain wellbore fluids either in the annular space between the casing and the tubulars, in the tubulars or in an open hole during well drilling, completion, and testing operations. For the purposes of SPI data collection, this also includes pressure control equipment used in intervention operations, such as wireline and coiled tubing BOPs, lubricators etc.
Process Equipment, Pressure Vessels and Piping	<ul style="list-style-type: none"> Process Equipment/Pressure Vessel: A container associated with drilling, production, gathering, transportation, and treatment of liquid petroleum, natural gas, natural gas liquids, associated salt water (brine) designed to withstand internal or external pressure above ambient conditions. This definition includes containers used for pressurized storage of toxic and hazardous chemicals. Piping System: An assembly of interconnected pipes that are used to convey, distribute, mix, separate, discharge, meter, control, or snub flows of hydrocarbons or toxic and hazardous chemicals.
Automated Safety Instrumented Systems / Shutdown Systems	<ul style="list-style-type: none"> Automated Safety Instrumented System - a system implementing one or more safety functions, with specified safety integrity level(s), that detect abnormal process conditions and take automatic, necessary actions to achieve or maintain a safe state for the process with respect to a hazardous event. Shutdown Systems - a system of manual stations that, when activated, will initiate the shutting in (isolation and cessation) of all process stations of a platform production process and all support equipment for the process. May also be integrated with Fire and Gas Detection systems for automatic initiation.
Pressure Relief Devices, Flare Systems, Blowdown Systems, Rupture Disks	<ul style="list-style-type: none"> Pressure Relief Device – A device actuated by inlet static pressure and designed to open during emergency or abnormal conditions to prevent a rise of internal fluid pressure in excess of a specified design value. The device also may be designed to prevent excessive internal vacuum. The device may be a pressure relief valve, a non-reclosing pressure relief device, or a vacuum relief valve. Flare System – used to safely dispose of relief gases in an environmentally compliant manner through the use of combustion. Blowdown System - a collection of controls, valves and pipes that allow controlled depressurization of liquid or gas pressure contained within a process, piping, or pressure vessel to reduce or eliminate pressure induced stresses during a time of potential heat weakening of vessels and piping, as well as a reduction of the inventory of fuel present on the facility. Rupture Disk – A pressure containing, pressure and temperature sensitive element of a rupture disk device. A rupture disk device is a non-reclosing pressure relief device actuated by static differential pressure between the inlet and outlet of the device and designed to function by the bursting of a rupture disk. A rupture disk device includes a rupture disk and a rupture disk holder.
Fire and Gas Detection and Fire Fighting Systems	<ul style="list-style-type: none"> Manual fire alarms (pull stations), call stations, and audible alarms / beacons Automatic Fire Detection Systems - The primary function of an automatic fire detection system is to alert personnel of the existence of a fire condition and to allow rapid identification of the location of the fire. The detection system(s) may be used to automatically activate emergency alarms, initiate Emergency Shutdown (ESD), isolate fuel sources, start fire water pumps, shut-in ventilation systems, and activate fire extinguishing systems such as gaseous agents, dry chemical, foam or water. The types of fire detectors commonly used on offshore platforms are as follows: <ul style="list-style-type: none"> Flame Detectors - e.g., Infrared (IR) Detectors, Ultraviolet (UV) Flame Detectors,

Equipment	Equipment Definition
	<p>Combination IR/UV</p> <ul style="list-style-type: none"> ○ Heat Detectors – e.g., Fusible Plugs or links, Heat-pneumatic or Theronistor Sensors, Rate of Rise Detectors, Fixed Temperature Detectors ○ Products of Combustion / Smoke Detectors – e.g., Ionization Detector, Photoelectric Detector <ul style="list-style-type: none"> ● Gas Detection System – The primary function of a fixed gas detection system is to alert personnel to the presence of flammable gases, toxic gases, or a combination of both. <ul style="list-style-type: none"> ○ Flammable Gas Detection – designed to respond to a broad range of hydrocarbon gases / vapors (e.g., methane, ethane, propane and vapors from the evaporation of hydrocarbon liquids). The predominant sensors for flammable gas detection in general, normally occupied spaces are the infrared (IR) sensor or the catalytic bead sensor. ○ Toxic Gas Detection – many gas detection systems include both flammable gas and toxic gas detection for hydrogen sulfide, sulfur dioxide, and fluorine in the same system. The semiconductor and electrochemical sensors are most commonly used for the detection of the toxic gases. ○ Excludes portable gas monitoring instruments. ● Fixed fire-fighting systems include the following: fire water pumps & drivers, distribution piping, fire hoses, stations, and nozzles, water spray systems / monitors, foam systems (fixed or portable), dry chemical systems, gaseous systems (e.g., CO2, Halon, FM-200 & FE-13, Inergen), and water mist / fine water spray systems. ● Fire water systems are installed on offshore platforms to provide exposure protection, control of burning, and/or extinguishment of fires. The basic components of a fire water system are the fire water pump, the distribution piping, the hose / nozzle, and deluge / sprinkler system. Additives such as foaming agents may be included to aid in extinguishing flammable liquid fires. ● Excludes portable fire extinguishers
Mechanical Lifting Equipment / Personnel Transport Equipment	<ul style="list-style-type: none"> ● Crane (includes base mounted drum winches) - a type of machine, generally equipped with a hoist, wire ropes or chains, and sheaves, that can be used both to lift and lower materials and to move them horizontally. Includes: <ul style="list-style-type: none"> ○ Boom chords, foot pins, hoist (hydraulics and brakes),lift cylinder, sheave assembly, stops, tip extension or jib, pendant lines ○ Counterweights ○ Gantry, mast or A-frame pins ○ Hook block ○ Overhaul ball ○ Main hoist (hydraulics and brakes) ○ Auxiliary hoist (hydraulics or brakes) ○ Pedestal or crane base ○ Load management system (MIPEG, CCM-7000 etc.) ○ Crane safety system (anti two block, high & low angle kick outs) ● Top Drive - a device used on a drilling rig to actually rotate the drill pipe in order to drill the well. Includes main drill line hoist (hydraulics or brakes), crown-o-matic, top drive track, assembly rollers or wheels and bearings, hydramatics or hydromatics. ● Pipe racking system (PRS) including main hoist (hydraulics or brakes), track, hydraulic system, claws or fingers. ● Drawworks, Air Hoists, Tuggers ● Chain fall - a type of hoist with a chain attached to a fixed raised structure or beam and used to lift very heavy objects. Includes clutch, brake and sprocket. ● Rigging Accessories including hooks, chains, shackles, slings (below the hook), wire rope, D-ring, elevators, bails
Station Keeping Systems	<p>The station keeping systems for a floating structure are typically a single point mooring, a spread mooring, vertical tension legs, or a dynamic positioning (DP) system.</p> <ul style="list-style-type: none"> ● Single point mooring components may include but not limited to: hoisting system, hawser, swivels, roller bearings, risers, u-joint connectors, counter weights, chain, chain table, wire rope, synthetic rope, connecting hardware, clump weight, buoy, and anchor. ● Spread mooring components: winch / windlass, chain jack, brakes, power, fairlead, wire rope, synthetic rope, connecting hardware, clump weight, buoy, and anchor ● Vertical tension leg moorings are used by TLPs or tension leg platforms and are comprised of: mooring tendons, seafloor foundations ● Dynamic positioning system consists of components and systems acting together to achieve reliable position keeping capability. The Dynamic-positioning system includes the power system (power generation and power management), thruster system and Dynamic Positioning control system.
Bilge/Ballast Systems	<p>The vessel structure, machinery, piping, or controls related to ballast movement, watertight integrity and stability.</p>

Equipment	Equipment Definition
Life Boat, Life Rafts, Rescue Boats and Launch and Recovery Systems	<ul style="list-style-type: none"> • Life Boat / Survival craft is a craft capable of sustaining the lives of person in distress from the time of abandoning the ship. • Rescue boat is a boat designed to rescue persons in distress and to marshal survival craft. • A life raft is an inflatable appliance which depends upon non-rigid, gas filled chambers for buoyancy and which is normally kept not inflated until ready for use. • Launch and Recovery Systems - systems used to deploy or retrieve a lifeboat, life raft, or rescue boat. Components may include but not limited to: Winch, fall wire (lifting wire), sheaves (pulleys), davits, davit arms, connecting hardware, secondary securing method (gripes, safety pendants), cradle, lifting points, releasing hook(s), brake, brake release, power source to winch / davit / davit arm, free fall railing.

Appendix 5 LFI Category Descriptions

Site Type: The primary site where the incident or event occurred. Only one selection can be made.

- Aircraft
- Diving Vessel
- Drilling Rig on Production Facility
- Fixed Production Facility
- Floating Production Facility
- Floating Storage and Offloading Facility
- Mobile Offshore Drilling Unit
- Offshore Supply or Support Vessel
- Offshore Construction Vessel
- Seismic Vessel
- Subsea Production System
- Other

Operation Type: The primary operation that was underway at the time of the incident or event. Only one selection can be made.

- Aviation
- Marine-diving, seismic, transportation, rig moves, etc.
- Production-petroleum/natural gas production, flow lines, pipe lines
- Projects-includes offshore construction activities
- Wells-exploration, appraisal/prod drilling, wireline, completion, workover, abandonment, intervention activities
- Other

Activity Type: The primary (most closely linked to incident or event) activity that was occurring at the time of the incident or event. Only one selection can be made.

- Confined Space Entry
- Diving
- Drilling Activities - Normal, Routine
- Energy Isolation
- Emergency Response (Actual or Drill)
- Helicopter Flight
- Helicopter Landing or Take-Off
- Hot Work
- Maintenance, Inspection and Testing
- Marine Vessel - In-Transit
- Marine Vessel - Station Keeping
- Material Transfer or Displacement
- Mechanical Lifting or Lowering
- Production Activities - Normal, Routine
- Simultaneous Operations
- Start-up or Shut-down Operations

- Working at Height
- Other

Areas for Improvement: All of the Areas for Improvement that apply to the incident or event being shared. The Areas for Improvement cover three general categories: Physical Process and Equipment; Administrative Process; or People. Multiple Areas for Improvement can be selected across the general categories.

- **Physical Facility, Equipment and Process:** Enhancements in the quality of the physical process and equipment design, layout, material specification, fabrication, or construction were highlighted for improvement, including:
 - **Process or Equipment Design or Layout:** The design or layout of the process or equipment was highlighted for improvement. Include cases where issues with the design or layout were significant contributors to subsequent human actions.
 - **Process or Equipment Material Specification, Fabrication and Construction:** The quality and compatibility of the material specification, fabrication or construction of the process or equipment, prior to its use was highlighted for improvement, including process or equipment provided by vendors or third parties on a permanent or temporary basis.
 - **Process or Equipment Reliability:** The ability of the process or equipment to function without defects or breakdown was highlighted for improvement, including improvement in maintenance, inspection, testing and operating requirements.
 - **Instrument, Analyzer and Controls Reliability:** The ability of instrumentation, analyzers, and control systems, including software, to function without defects or breakdown was highlighted for improvement including improvement in maintenance, inspection, testing and operating requirements.
- **Administrative Processes:** Enhancements in the quality, scope or structure of administrative processes for managing various aspects of work execution were highlighted for improvement, including:
 - **Risk Assessment and Management:** The process for systematic identification and evaluation of potentially significant risks was identified for improvement. This includes but is not limited to HAZOPS and facility hazard assessments.
 - **Operating Procedures or Safe Work Practices:** The procedures or practices for correctly and safely performing the relevant work were identified for improvement. This includes specific operations, maintenance, testing, Contractor selection or other procedures and practices.
 - **Management of Change:** The process for identifying, approving, and managing significant technical, administrative or organizational changes was identified for improvement.
 - **Work Direction or Management:** The process for directing work activities or managing the number or types of work allowed at a given time or location was identified for improvement. This includes but is not limited to Permit-to-Work, Job Safety Analyses (JSA) processes and supervision of the area or work team.
 - **Emergency Response:** The capability or processes for responding to a situation to prevent the escalation of incident or event consequences was identified for improvement.
- **People:** Enhancements to the personnel actions linked to the execution of work tasks were highlighted for improvement, including:
 - **Personnel Skills or Knowledge:** Personnel knowledge of the relevant tasks or the ability of personnel to execute the task correctly and safely was identified for improvement.

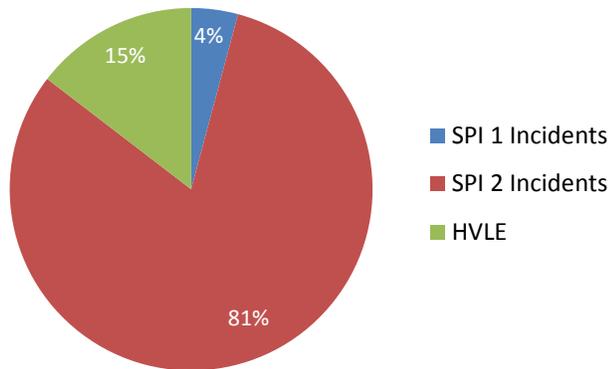
- **Quality of Task Planning and Preparation:** Personnel planning and preparation of the task prior to initiating the activity were identified for improvement, including team actions such as JSA, toolbox talks, or job walkthroughs.
- **Individual or Group Decision-Making:** Decisions made by one or more people involved in the execution of the task were identified for improvement. This may be selected only if personnel involved in the task had sufficient skills and knowledge, but chose to execute the task in a manner different than the documented procedure or practice.
- **Quality of Task Execution:** The quality or thoroughness of executing the intended task procedure or practice was highlighted for improvement. This applies where the person or personnel were attempting to follow the prescribed procedures or practices, but errors or incomplete execution contributed to the incident or event.
- **Quality of Hazard Mitigation:** Person or personnel either failed to put in place barriers or the quality, number, or location of barriers were insufficient to mitigate the potential impacts of relevant hazards was highlighted for improvement.
- **Communication:** The effectiveness of communication was identified for improvement. This includes communication between team members and between the team and other individuals or groups. Also included are difficulties with language or terminology.

Appendix 6 LFI DATA CHARTS

Refer to the charts listed in this appendix for additional details on the distribution of incidents and HVLE across reporting fields contained in the LFI Report Form (and not previously displayed in the body of the report). The following charts are contained in this Appendix:

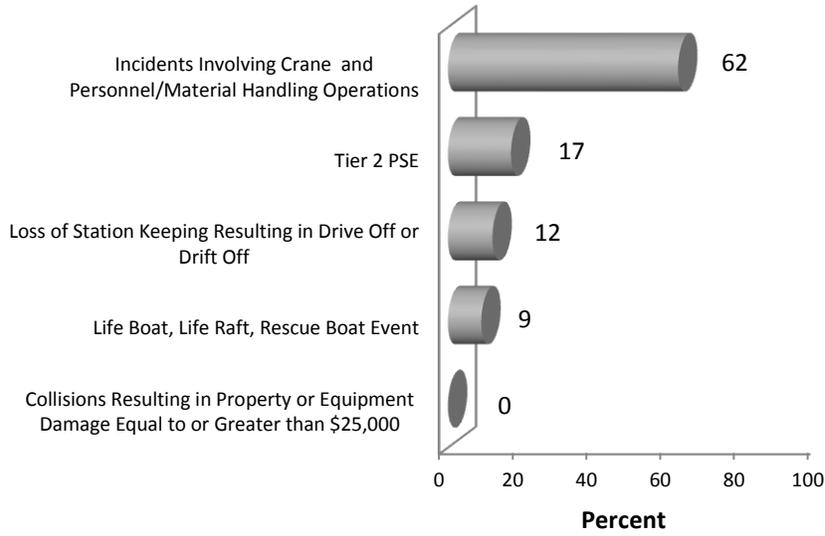
- Chart 1 – LFI Incidents and HVLE Category Distribution
- Chart 2 – SPI 2 Incidents Distribution
- Chart 3 – Incidents and HVLE by Site Type
- Chart 4 – Incidents and HVLE by Operation Type
- Chart 5 – Incidents and HVLE by Activity Type
- Chart 6 – Mechanical Lifting – Areas for Improvement – General Categories
- Chart 7 – Mechanical Lifting – Areas for Improvement – Physical Facility, Equipment and Process
- Chart 8 – Mechanical Lifting – Areas for Improvement – Administrative Processes
- Chart 9 – Mechanical Lifting – Areas for Improvement – People
- Chart 10 – HVLE – Areas for Improvement – General Categories

Chart 1 – LFI Incidents and HVLE Category Distribution



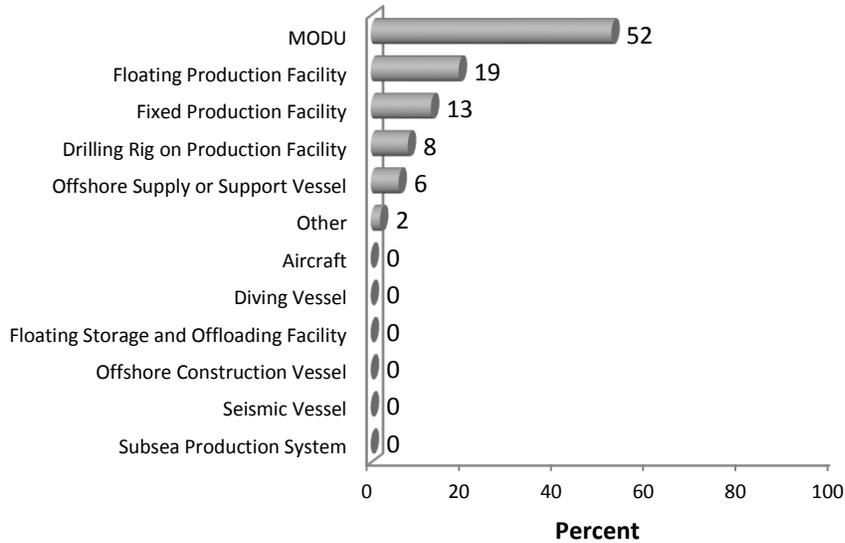
- Both SPI 1 incidents were in the category “≥ \$1 Million Direct Cost from damage to or loss of facility, vessel and/or equipment”
- 15% were categorized as HVLE

Chart 2 – SPI 2 Incidents Distribution



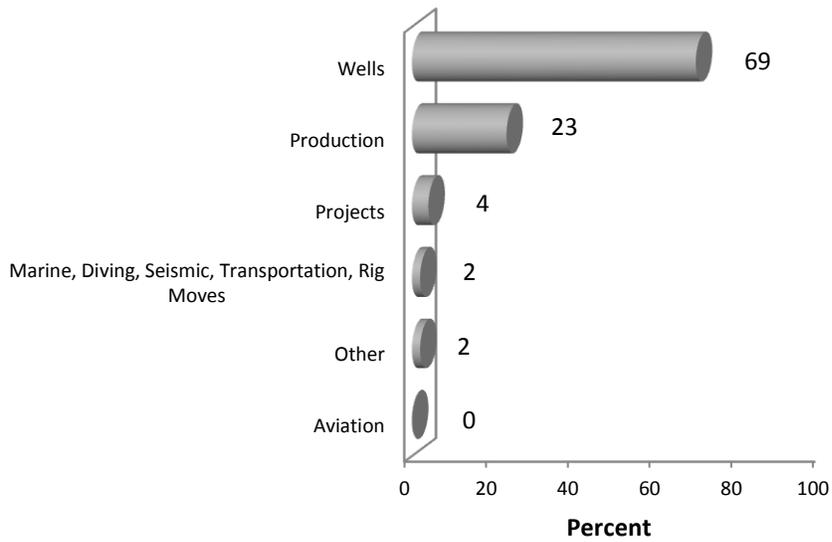
- 62% of the incidents related to Crane and Personnel/Material Handling Operations

Chart 3 – Incidents and HVLE by Site Type



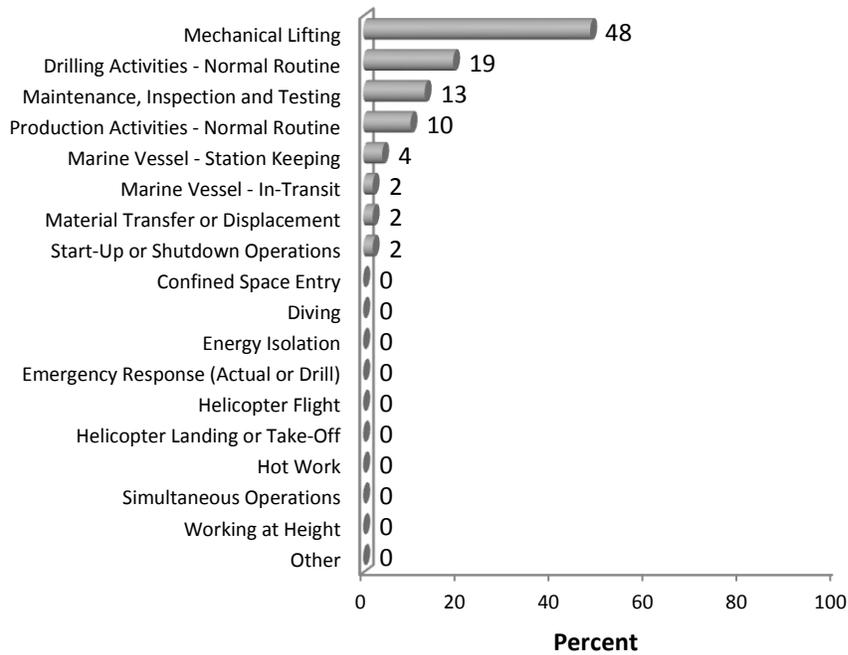
- MODUs accounted for over half of the reported incidents and HVLE.

Chart 4– Incidents and HVLE by Operation Type



- 69% of the incidents and HVLE were associated with well operations

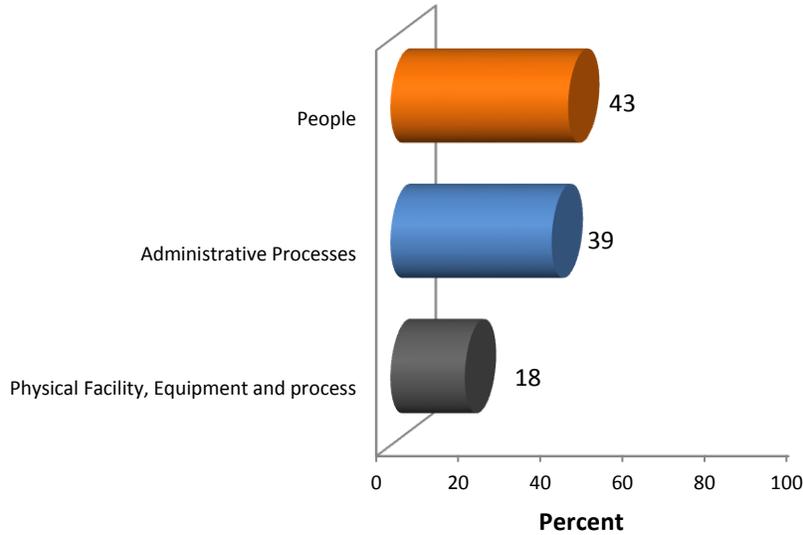
Chart 5 – Incidents and HVLE by Activity Type



- Mechanical Lifting was involved in 48% of the reported incident and HVLE.

- Due to potential misinterpretation in definitions, there could be cases where ‘Drilling Activities – Normal Routine’ was selected when ‘Mechanical Lifting’ may be the more appropriate activity, i.e., tripping pipe.

Chart 6 – Mechanical Lifting– Areas for Improvement – General Categories



- “People” and “Administrative Processes” account for over 80% of the Areas for Improvement.
- Within the “People” category, “Quality of Task Planning and Preparation” was the most frequently identified improvement area.

Chart 7 – Mechanical Lifting – Areas for Improvement - Physical Facilities, Equipment, and Process

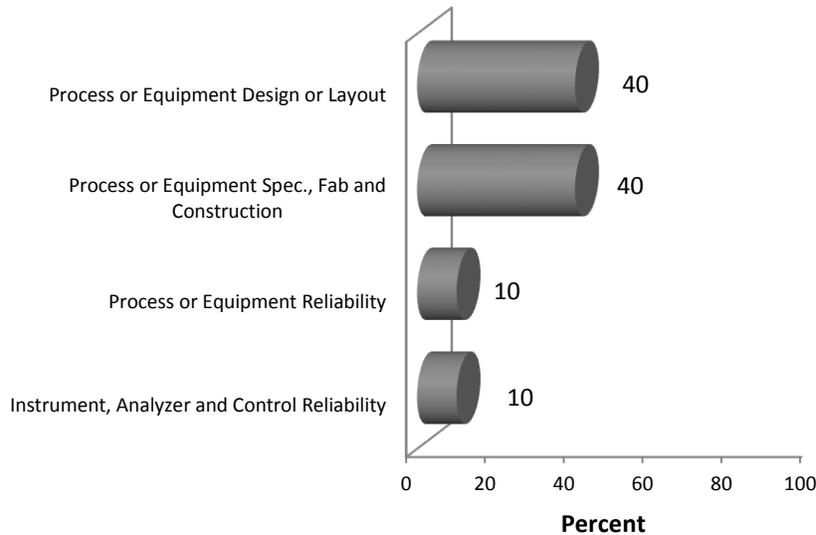


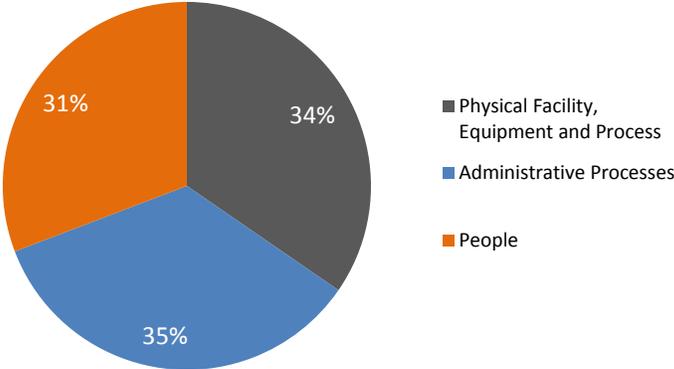
Chart 8 – Mechanical Lifting – Areas for Improvement – Administrative Processes



Chart 9 – Mechanical Lifting – Areas for Improvement - People



Chart 10 – HVLE – Areas for Improvement – General Categories



- Distribution is similar to that observed for the entire LFI data set.