



# 2023

# ANNUAL PERFORMANCE REPORT

SEPTEMBER 2024



CENTER FOR  
OFFSHORE  
SAFETY







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September 2024

## Center for Offshore Safety

Dear Colleagues,

It's been a milestone year for the Center for Offshore Safety (COS). At a time marked by an unprecedented surge in energy demand, the U.S. offshore oil and natural gas industry has demonstrated remarkable resilience and innovation, achieving steady growth while expanding our influence to the offshore wind industry.

### More Work Hours - Fewer Serious Incidents

Work hours reported by COS Member Operators for 2023 topped 55.5 million, up 800,000 from 2022 and nearly 10 million from 2021. This represents more than 75% of all U.S. Outer Continental Shelf (OCS) work hours for the year. And the total number of serious incidents dropped for a fourth consecutive year. While Process Safety Events (PSEs) increased from 2022, they remain significantly lower compared to 2020 and 2021. This uptick reminds us of the constant need for vigilance. To that point, it's important to recognize that the numbers, charts, and data points on the following pages represent real people who are hard at work providing the energy our world needs.

### RP 75 Influences Wind Operations

We're proud to highlight the publication of API Recommended Practice 75W, *Safety and Environmental Management System for Offshore Wind Operations and Assets*. This landmark practice leverages COS' extensive experience with offshore oil and natural gas development to provide a comprehensive framework for safety and environmental integrity in offshore wind operations. It's a groundbreaking document that shares knowledge from API RP 75 with offshore wind operators, laying a solid foundation for safety practices in this new U.S. industry.

### Mechanical Lifting Improvement

COS members achieved strong improvement in mechanical lifting operations across the two critical data points that we track: SPI 4, encompassing all lifting incidents; and SPI 2C, a subset of SPI 4, which includes incidents that result in injury, damage, or specific consequences. The frequency of SPI 4 incidents decreased 51% compared to the peak year of 2020, while SPI 2C reached a five-year low. These achievements reflect our industry's application of good practices in mechanical lifting operations.

We're grateful to our dedicated members for their participation in this annual report and their unwavering commitment to safety and environmental excellence. Through their collaborative efforts, including the sharing of knowledge and lessons learned via good practice documents, SEMS audit guidance, and active participation in committees and subcommittees, we continue to drive success and safety in the offshore oil and natural gas industry.

Sincerely,



Russell Holmes, COS Senior Director



**RUSSELL HOLMES**

**Senior Director**

Center for Offshore Safety

**10M**

more offshore  
work hours than  
in 2021

**77%**

of all U.S. Outer  
Continental Shelf  
(OCS) work hours  
represented by  
COS Members



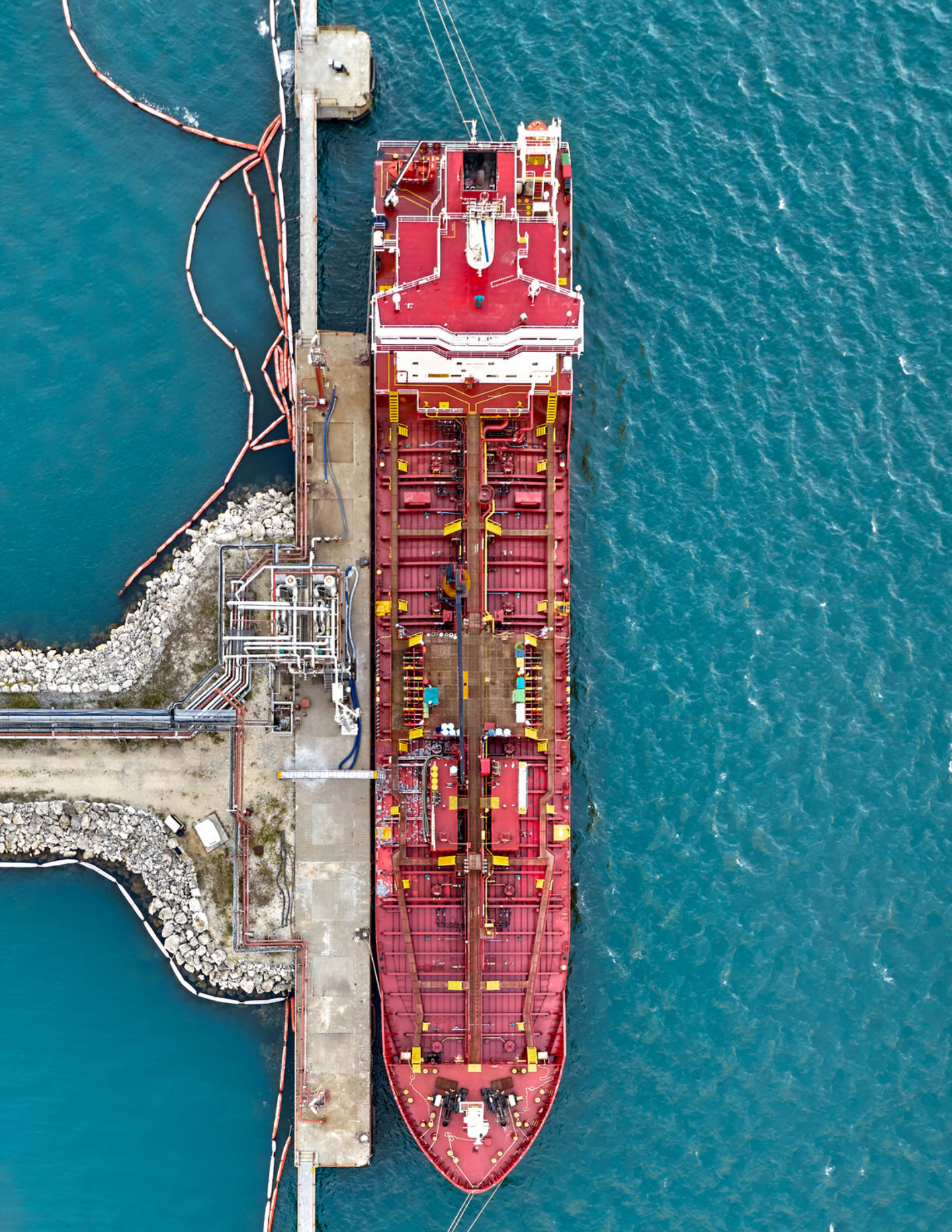
# TABLE OF CONTENTS

|                                                                                     |           |
|-------------------------------------------------------------------------------------|-----------|
| <b>1.0 COS MEMBERS AND PARTICIPANTS.....</b>                                        | <b>3</b>  |
| <b>2.0 INTRODUCTION.....</b>                                                        | <b>4</b>  |
| <b>3.0 EXECUTIVE SUMMARY .....</b>                                                  | <b>6</b>  |
| 3.1 SPI and LFI Data At-a-Glance .....                                              | 7         |
| 3.2 COS Accomplishments .....                                                       | 10        |
| 3.2.1 SEMS Audit Service Provider (ASP) Accreditation Program.....                  | 10        |
| 3.2.2 SEMS Audit and Certificate Program .....                                      | 10        |
| 3.2.3 COS Safety Leadership Award .....                                             | 11        |
| 3.2.4 COS Publications & Webinars .....                                             | 12        |
| 3.2.5 COS Safety Shares .....                                                       | 12        |
| 3.2.6 COS Outreach and Communication Activities - October 2023-September 2024 ..... | 13        |
| <b>4.0 SAFETY PERFORMANCE INDICATORS.....</b>                                       | <b>14</b> |
| 4.1 Introduction .....                                                              | 14        |
| 4.2 SPI 1 Results and Trends .....                                                  | 16        |
| 4.3 SPI 2 Results and Trends .....                                                  | 18        |
| 4.3.1 SPI 2C Crane Incident Data .....                                              | 21        |
| 4.4 SPI 3 Results and Trends .....                                                  | 26        |
| 4.5 SPI 4 Results and Trends .....                                                  | 30        |
| 4.6 SPI 5 Results and Trends .....                                                  | 31        |
| 4.7 SPI 6-9 Results and Trends .....                                                | 32        |
| 4.8 SPI 10 Results .....                                                            | 34        |
| 4.9 Normalization Factor (Work Hours) .....                                         | 36        |
| <b>5.0 LEARNING FROM INCIDENTS AND HIGH-VALUE LEARNING EVENTS .....</b>             | <b>38</b> |
| 5.1 Introduction .....                                                              | 38        |
| 5.2 Summary .....                                                                   | 39        |
| 5.3 SEMS Elements .....                                                             | 43        |
| 5.4 Learning from LFI Reports and Crane Incident Reports .....                      | 45        |
| 5.4.1 Dropped Objects.....                                                          | 46        |
| 5.4.2 Maintenance, Inspection, and Testing .....                                    | 49        |
| 5.4.3 Decommissioning .....                                                         | 51        |
| <b>APPENDIX SPI DEFINITIONS AND METRICS .....</b>                                   | <b>54</b> |











# 1.0 COS MEMBERS AND PARTICIPANTS



## OPERATORS



## DRILLING CONTRACTORS



## SERVICE COMPANIES



## BOARD AFFILIATES



For this APR, 100% of eligible COS Member Operators and Contractors shared Safety Performance Indicator (SPI) and/or Learning from Incidents and Events (LFI) data for the 2023 Reporting Year.

\*An additional Contractor, Expro, became a member of COS after the data collection cycle was closed for this APR. They will submit data beginning with the 2024 Reporting Year collection in 2025.

COS members listed above as Board Affiliates do not provide data.



# 2.0 INTRODUCTION

COS' objective is 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 enables operational excellence, in part, by enhancing and continuously improving the industry's safety and environmental performance and stimulating cooperation within the industry to share learnings. In the context of this report, the term "safety" is inclusive of personal safety, process safety, health, security, and environmental safety.

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

- Safety Performance Indicators (SPI), and
- Learning from Incidents and Events (LFI)

**The COS member data provided through the LFI and SPI programs enable continual improvement of performance-based management systems.**

The SPI originated from high-level bow-tie risk models of major hazards, developed within COS, that cover both process and personal safety. The information can be used for driving improvement and, when effectively acted upon, contribute to reducing the risk of major incidents by identifying weaknesses in barriers intended to prevent the occurrence or recurrence of incidents and mitigate consequences. The scope of the SPI data covers COS member wells, projects, and production facilities and operations in the U.S. Outer Continental Shelf (OCS).

The data collected via the SPI program ranges from SPI 1 (fatality, Tier 1 Process Safety Event (PSE), loss of well control, etc.) and SPI 2 (Tier 2 PSE, collision resulting in direct damage ≥ \$25,000, loss of station keeping, etc.) to SPI 10 (dropped objects potential and actual results). The full list of SPI collected by COS can be found in Section 4 of this report.

The LFI program covers the same scope but allows for the submittal of data for incidents and events that occur outside the U.S. OCS. The main objective of the LFI program is to provide COS members with a mechanism for sharing information from incidents that meet the criteria for an SPI 1 or SPI 2, as well as High-Value Learning Events (HVLE).

Publication of SPI and LFI data began in 2014, reflecting 2013 performance. Reporting is voluntary and data confidentiality is maintained through a process administered by the API Statistics Department.







## ABOUT THE REPORT

The COS Annual Performance Report (APR) for 2023 provides an accounting of safety-related incidents and events at facilities operating on the U.S. Outer Continental Shelf (OCS).

Members voluntarily submit data for the APR to support COS' mission to provide the highest level of safety for the U.S. offshore natural gas and oil industry. Through data analysis, COS strives to identify areas for improvement in risk management through safety management systems for the operation of offshore wells, projects, and production facilities on the U.S. OCS.

Member data in the report comes from two key COS programs: the Safety Performance Indicators program, or SPI, and the Learning from Incidents and Events program, or LFI. Both programs identify and monitor areas where the industry can improve safety on the U.S. OCS. While COS began collecting this data in 2013, the data presented in this APR reflects the most recent 5 years – 2019-2023.

This yearly performance report is an example of COS' commitment to open communication and transparency of safety information, building collaboration, communication, and sharing regarding safety between the industry, regulators, and the public.

## KEY FINDINGS FROM 2023 DATA

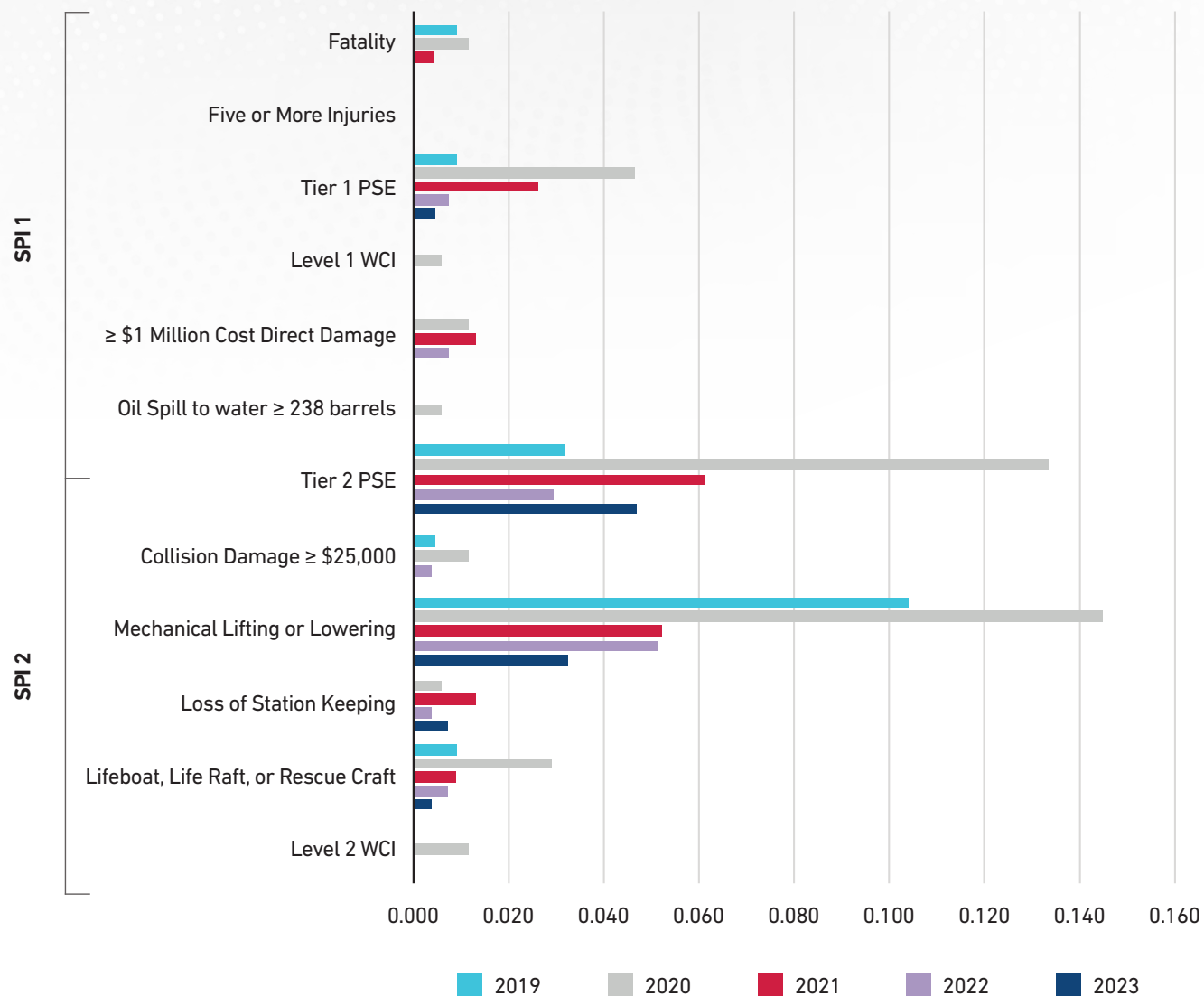
- COS members reported more than 55.5 million work hours for 2023, representing 77% of all U.S. OCS' natural gas and oil activity. This is an increase of almost 800,000 work hours compared to 2022 and 9.5 million more than 2021.
- COS members reported zero incidents involving a fatality and zero Level 1 or Level 2 Well Control Incidents for 2023.
- There were 25 combined **SPI 1** and **SPI 2** incidents reported by COS Member Operators for 2023, down slightly from the 30 reported in 2022. This continues a decreasing trend when compared to 40 in 2021, and 70 in 2020.
- For the two metrics COS collects related to Mechanical Lifting, **SPI 2C** and **SPI 4**, the numbers reported for 2023 (nine **SPI 2C** incidents and 129 **SPI 4** incidents) represent the lowest number of lifting incidents in a single year for the five years represented in this report.
- The 14 combined Tier 1 and Tier 2 Process Safety Events (PSE) represent an increase compared to the 10 Tier 1 and Tier 2 PSE for 2022. Despite this increase, looking back to 2021 and 2020, the frequency of PSE per 200k work hours is down 43% compared to 2021 (20 incidents) and down 72% compared to 2020 (31 incidents).
- Of the 28 **SPI 1** and **SPI 2** incidents reported by COS Member Operators, 13 (52%) included equipment failure as a contributing factor. Of those 13 incidents, nine of them (69%) included failures of Pressure Equipment, Pressure Vessels, or Piping.
- The numbers reported for RIIF (**SPI 8** - Recordable Injuries and Illnesses Frequency) and DART (**SPI 7** - Days Away, Restricted, or Transfer) were the highest reported in the five years represented in this report, up 38% for each category compared to 2022.
- For the 36 U.S. OCS incidents reported to the LFI program, the three areas most frequently identified for improvement were: Operating Procedures or Safe Work Practices (44%); Risk Assessment and Management Process (28%); and Facility or Equipment Design or Layout (28%).



### 3.1 SPI AND LFI DATA AT-A-GLANCE

For details of SPI and LFI data, see Sections 4 and 5 of this report.

**FIGURE 3.1-1: SPI 1 and SPI 2 Frequency**





**FIGURE 3.1-2: SPI 1 and SPI 2 Counts**

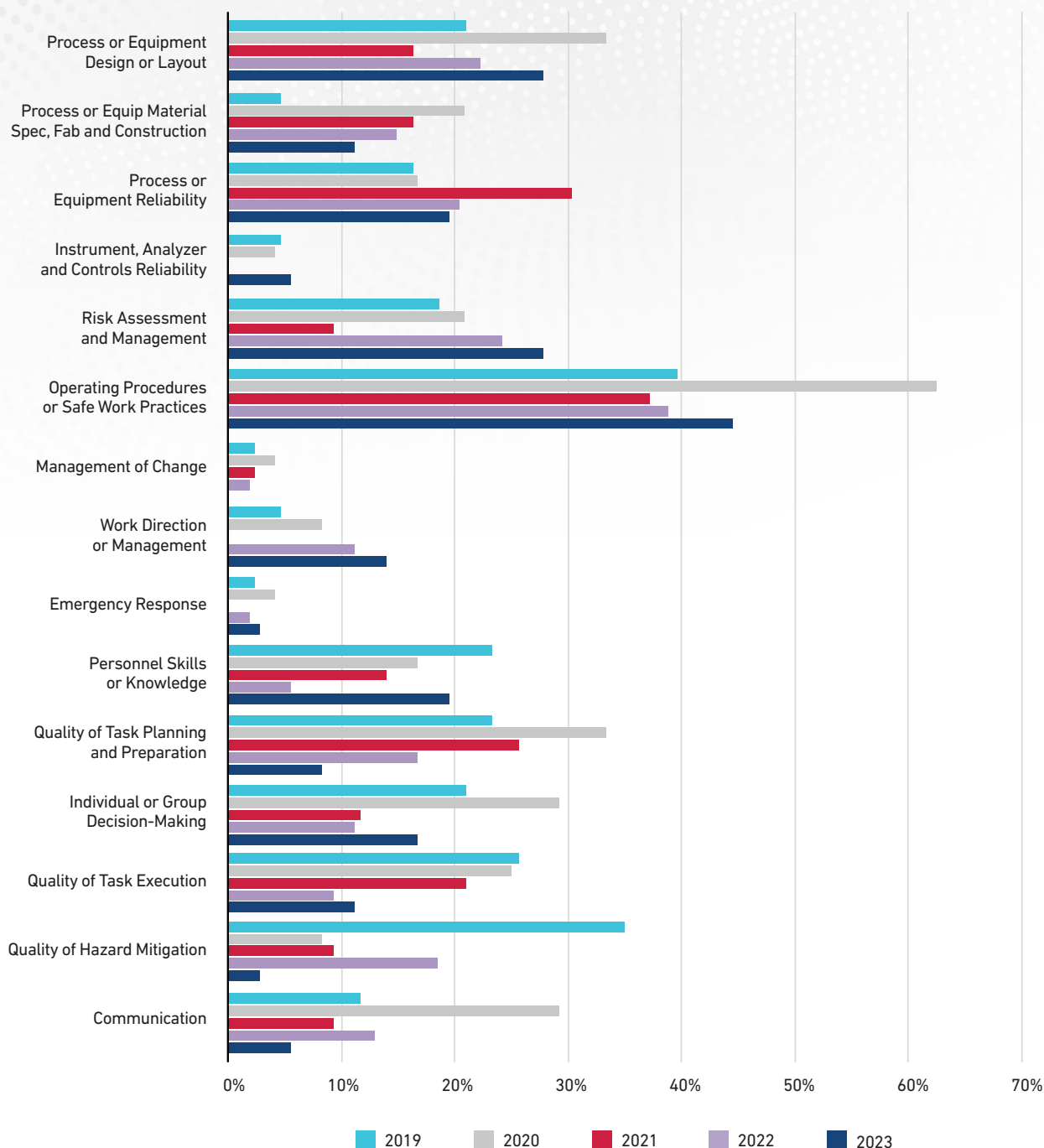
|       |                                      | 2019 | 2020 | 2021 | 2022 | 2023 |
|-------|--------------------------------------|------|------|------|------|------|
| SPI 1 | Fatality                             | 2    | 2    | 1    | 0    | 0    |
|       | Five or More Injuries                | 0    | 0    | 0    | 0    | 0    |
|       | Tier 1 PSE                           | 2    | 8    | 6    | 2    | 1    |
|       | Level 1 WCI                          | 0    | 1    | 0*   | 0    | 0    |
|       | ≥ \$1 Mil Direct Damage              | 0    | 2    | 3    | 2    | 0    |
|       | Oil Spill ≥ 238 bbl                  | 0    | 1    | 0    | 0    | 0    |
| SPI 2 | Tier 2 PSE                           | 7    | 23   | 14   | 8    | 13   |
|       | Collision Damage ≥ \$25k             | 1    | 2    | 0    | 1    | 0    |
|       | Mechanical Lifting or Lowering       | 23   | 25   | 12   | 14   | 9    |
|       | Loss of Station Keeping              | 3    | 0    | 1    | 3    | 2    |
|       | Lifeboat, Life Raft, or Rescue Craft | 2    | 2    | 5    | 2    | 1    |
|       | Level 2 WCI                          | 0    | 0    | 2    | 0    | 0    |

\*There was one Level 1 Well Control Incident (WCI) reported by a COS Contractor Member. As the charts and graphs in this APR represent data reported by COS Member Operators, this Level 1 WCI is not represented in the tables and graphs.





**FIGURE 3.1-3: LFI Areas for Improvement (U.S. OCS Only)**



NOTE: LFI submittals typically identify more than one AFI for any given incident. The graph above illustrates the percentage of times an AFI was identified relative to the number of LFI forms submitted. Because the number of AFI exceeds the number of LFI forms, the sum of the percentages will be  $\geq 100\%$ .



## 3.2 COS ACCOMPLISHMENTS

Below are highlights of COS activities and accomplishments for 2023.

### 3.2.1 SEMS AUDIT SERVICE PROVIDER ACCREDITATION PROGRAM

In accordance with the Memorandum of Understanding signed in 2015, COS became, and remains the only, accreditation body authorized by the Bureau of Safety and Environmental Enforcement (BSEE) to accredit SEMS Audit Service Providers (ASP) pursuant to 30 CFR 250, Subpart S. In 2023, COS published revised accreditation requirements and all ASP will need to conform with the updated requirements by September 1, 2024.

As of the publication of this APR, five ASP are accredited to perform SEMS audits and issue SEMS certificates:

- ABS Quality Evaluations
- CICS-Americas
- DNV GL Business Assurance
- ERM Certification and Verification Services
- Onward Auditing

A list of accredited ASP is maintained at: [centerforoffshoresafety.org](https://centerforoffshoresafety.org)

### 3.2.2 SEMS AUDIT AND CERTIFICATE PROGRAM

SEMS Certificates demonstrate that an organization has satisfactorily completed a Safety and Environmental Management System (SEMS) audit conducted by an accredited ASP and meets the requirements of API Recommended Practice 75, 3rd Edition.

The following companies have successfully attained or re-attained a COS SEMS Certificate since the publication of last year's report:

- Anadarko Petroleum Corporation, a wholly owned subsidiary of Occidental Petroleum Corporation (OXY)
- Arena Offshore, LP
- Equinor U.S.A E&P, Inc
- Hess Corporation
- High Point Gas Gathering
- Shell E&P Co.
- Quarter North Energy

Occidental Petroleum (OXY), through its ownership of Anadarko Petroleum Corporation, is the first company to receive its 5th COS SEMS Certificate.

A full list of companies that have been awarded COS SEMS Certificates since 2013 is maintained at: [centerforoffshoresafety.org](https://centerforoffshoresafety.org).



### 3.2.3 COS SAFETY LEADERSHIP AWARD

The winners of the 2023 COS Safety Leadership Awards were:



*OXY Heat Stress Program*



*Valaris Basic Training*

In addition to Occidental Petroleum and Valaris, the following were the finalists in the Operator and Contractor categories:

#### OPERATOR FINALISTS



*Building Process Safety Capability in  
BP's Offshore Operations*



*'Job by Design' Simplification*

#### CONTRACTOR FINALISTS



*Finding the Next Incident*



*WorkSight Assurance & Verification*

COS Safety Leadership Award finalists' presentations are available on the COS website:

[centerforoffshoresafety.org/announcements\\_page/SLA](https://centerforoffshoresafety.org/announcements_page/SLA).



### 3.2.4 COS PUBLICATIONS & WEBINARS

In 2023, COS published the following documents. These documents are all available for free download via the COS website [centerforoffshoresafety.org](https://centerforoffshoresafety.org). The new and updated documents are:

- COS-1-06/RP 75, 4th Ed, *Guidance for Developing a SEMS Audit Plan*
- COS-1-07/RP 75, 4th Ed, *Guidance for Developing a SEMS Corrective Action Plan*
- COS-1-08/RP 75, 4th Ed, *SEMS Audit Report Format and Guidance*
- COS-2-03, *SEMS Auditing Requirements, 3rd Ed*
- COS-3-09, *Work Planning & Work Management Flowchart*

COS held the following events in 2023 with the purpose of educating the industry on the published good practices along with other topics relevant to offshore safety. Recordings of the COS webinars can be viewed on the COS website.

- Feb 2023 – 2023 COS Outlook Webinar
- May 2023 – COS Half-Day at the Offshore Technology Conference (OTC)
- Sept 2023 – 11th Annual COS Forum
- Sept 2023 – Hart Energy Webinars: SEMS – Going Beyond the U.S. Offshore Oil and Gas Industry
- Sept 2023 – COS Annual Performance Report for the 2022 Reporting Year Webinar
- Nov 2023 – COS Lifting Incident Sharing Summit

### 3.2.5 COS SAFETY SHARES

As part of the COS commitment to the mission of promoting safe operations by sharing industry knowledge, COS created the COS Safety Shares Program. As of this writing, COS has added 16 new Safety Shares to its library:

- 2024-001 – *Worker in a Pickle (Confined Space)*
- 2024-002 – *Corroded Piping Section Falls During Decommissioning*
- 2024-003 – *Slip and Fall While Boarding Bouy*
- 2024-004 – *Non-Locking Valve Leads to Triethylene Glycol Release*
- 2024-005 – *Center of Gravity Miscalculation Results in Dropped Pipe*
- 2024-006 – *Solenoid “Ricochets” from Crow’s Nest*
- 2024-007 – *Improper Use of Cutting Tool Results in Injury*
- 2024-008 – *Workers “Borrow” Air Tugger Leading to Near Hit*
- 2024-009 – *Whipping Pressurized Hose Injures Two*
- 2024-010 – *Accepted Practice Results in Dropped Object (Hi-Po)*
- 2024-011 – *Fiberglass Cracking on Fast Rescue Craft*
- 2024-012 – *Failure to Recognize Rotor Wash Hazard Sends Cart Overboard*
- 2024-013 – *Paint Products Mixed for Disposal Result in Muster Event*
- 2024-014 – *Umbilical Lubricator Tool Dropped During Installation*
- 2024-015 – *Vessel Set Adrift During Storm with 168 Aboard*
- 2024-016 – *Hi-Po: Worker Falls Through Grating Over Caisson*

The complete library of COS Safety Shares is available at [centerforoffshoresafety.org](https://centerforoffshoresafety.org).



### 3.2.6 COS OUTREACH AND COMMUNICATION ACTIVITIES - OCTOBER 2023-SEPTEMBER 2024

A foundational pillar of the Center for Offshore Safety is Sharing Industry Knowledge. In support of this pillar, COS Senior Director Russell Holmes and other staff actively pursue opportunities to introduce the Center for Offshore Safety to a broader audience. Below are highlights of these outreach activities since publication of last year's COS Annual Performance Report:

|           |                                       |                                                                                                                                      |
|-----------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| OCT 2023  | Speaker                               | Offshore Technology Conference (OTC) Brazil                                                                                          |
| OCT 2023  | Speaker / Exhibitor                   | American Clean Power (ACP) Offshore WINDPOWER Conference, Boston, MA                                                                 |
| DEC 2023  | Facilitator                           | COS / OOC (Offshore Operators Committee) Leadership Workshop, Lafayette, LA                                                          |
| FEB 2024  | Exhibitor                             | American Clean Power (ACP) Operations, Maintenance and Safety Conference, San Diego, CA                                              |
| MAR 2024  | Speaker                               | U.S. Coast Guard National Offshore Safety Advisory Committee (NOSAC), New Orleans, LA                                                |
| MAR 2024  | Facilitator                           | COS / OOC (Offshore Operators Committee) Leadership Workshop, Lafayette, LA                                                          |
| APR 2024  | Exhibitor                             | International Partner Forum (IPF) Offshore Wind Conference, New Orleans, LA                                                          |
| APR 2024  | Speaker                               | Naval Safety and Environmental Training Center 32nd Joint Safety and Environmental Professional Development Symposium (PDS), Virtual |
| MAY 2024  | Morning Keynote / Sponsor / Exhibitor | Offshore Technology Conference (OTC), Houston, TX                                                                                    |
| AUG 2024  | Facilitator                           | COS / OOC (Offshore Operators Committee) Leadership Workshop, Lafayette, LA                                                          |
| SEPT 2024 | Speaker                               | U.S. Coast Guard National Offshore Safety Advisory Committee (NOSAC), Houston, TX                                                    |



## 4.1 INTRODUCTION

COS members share Safety Performance Indicator (SPI) data with COS through the SPI program. Reporting is voluntary and data confidentiality is maintained through a process administered by the API Statistics Department before submittal to COS. The data reported in this APR represents the five most recent years – 2019-2023. A normalization factor of work hours is utilized to enable year-to-year comparisons. A list of SPI collected is presented below.

**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 incident
- C. Tier 1 Process Safety Event
- D. Level 1 Well Control Incident - loss of well control
- E.  $\geq$  \$1 million direct cost from damage to or loss of facility / vessel / equipment
- F. Oil spill to water  $\geq$  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. Mechanical Lifting or Lowering Incident resulting in one of the following:
  - One - four recordable injuries
  - \$25,000 - \$1 million direct damage
  - Tier 2 Process Safety Event
  - Dropped load that strikes live process equipment
- D. Loss of station keeping resulting in a drive-off or drift-off
- E. Lifeboat, Life Raft, Rescue Craft event
- F. Level 2 Well Control Incident - multiple barrier systems failures and challenges

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

**SPI 4 is a crane or personnel / material handling operations incident.**

**SPI 5 is the percentage of planned critical maintenance, inspection, and testing (MIT) completed on time. Planned critical MIT deferred with a formal risk assessment and appropriate level of approval is not considered overdue.**

**SPI 6 is the number of work-related fatalities.**

**SPI 7 is the frequency of days away from work, restricted work, and job-transfer injury and illnesses (DART).**

**SPI 8 is the frequency of recordable injuries and illnesses (RIIF).**

**SPI 9 is the frequency of oil spills to water  $\geq$  1 barrel.**

**SPI 10 is the severity potential and actual results of incidents involving a dropped object.**



**SPI 1 – SPI 5** are based on structured assessments of major hazards facing the offshore industry. **SPI 6 – SPI 9** are indicators historically reported by industry and are not directly related to the structured assessment work. **SPI 10** was introduced for the 2019 reporting year and is based on the severity-potential calculator developed by DROPSOnline.<sup>1</sup>

Certain characteristics of the data reported for **SPI 1** and **SPI 2** incidents limit some aspects of the analysis and trending. An incident may have consequences that meet both **SPI 1** and **SPI 2** definitions but are not counted in both classifications. The higher consequence drives the classification. For example, a collision that results in ≥ \$1 Million Direct Damage Cost meets the **SPI 1E** definition, but also meets the **SPI 2B** consequence of Collision Resulting in ≥ \$25,000 in Damage. However, to prevent the duplication of data, per the SPI program structure, it is only counted as an **SPI 1E** incident and not an **SPI 2B** collision.

Although definitions used for some of the SPI are the same or similar to regulatory definitions, the numbers in this report will not necessarily match regulatory data due to this report being based on COS member company data from operations on the U.S. OCS only.

Per COS data submittal guidelines, to prevent duplication of data, COS Member Operators report all incidents that occur within 500m of their lease for both Operator and Contractor facilities and employees. A COS Member Contractor only reports an **SPI 1** or **SPI 2** incident if it occurs while they are working on the lease of a non-COS Member Operator or outside the 500m zone of a COS Member Operator.

Throughout this SPI portion of the report, work hours are used as the normalization factor to determine frequencies and rates. As a result, the charts and graphs in the following pages represent data reported by COS Member Operators. In the case where a COS Member Contractor has reported data from incidents that occurred when working for a non-COS Member Operator or which occurred outside of the 500m zone of a COS Member Operator lease, those data will be bulleted below the corresponding SPI information.

This report provides COS member data for 2019-2023. The data reported for 2023 represents more than 55.5 million Operator and Contractor work hours on the U.S. OCS. Work hours are reported only by COS Member Operators for work occurring within 500m of their facilities.

| REPORTING YEAR | COS U.S. OCS WORK HOURS (MILLIONS) |
|----------------|------------------------------------|
| 2019           | 44.2                               |
| 2020           | 34.5                               |
| 2021           | 45.9                               |
| 2022           | 54.7                               |
| 2023           | 55.5                               |

<sup>1</sup>Dropped Objects Prevention Scheme Online [dropsonline.org](https://dropsonline.org)

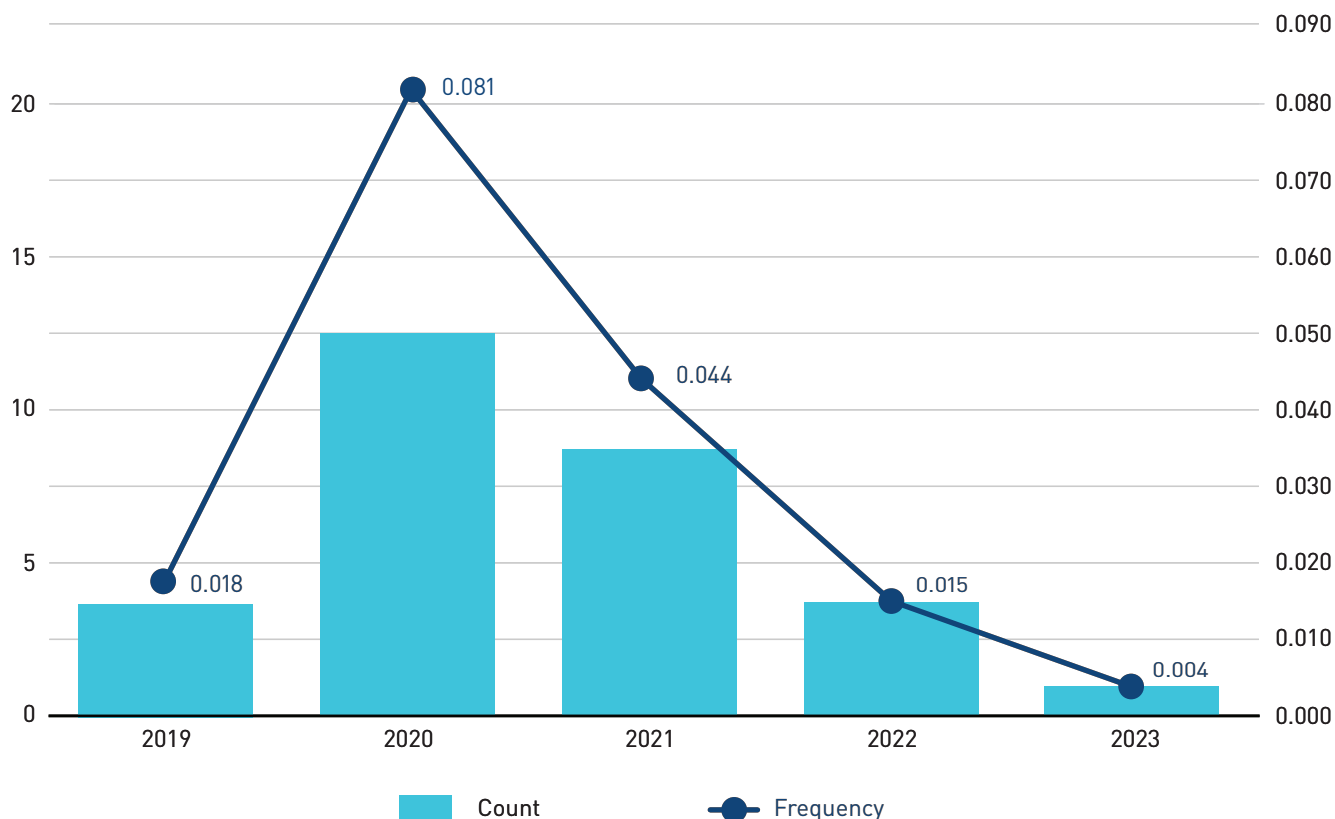
## 4.2 SPI 1 RESULTS AND TRENDS

### 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 incident
- C. Tier 1 Process Safety Event
- D. Level 1 Well Control Incident - loss of well control
- E.  $\geq$  \$1 million direct cost from damage to or loss of facility, vessel and / or equipment
- F. Oil spill to water  $\geq$  10,000 gallons (238 barrels)

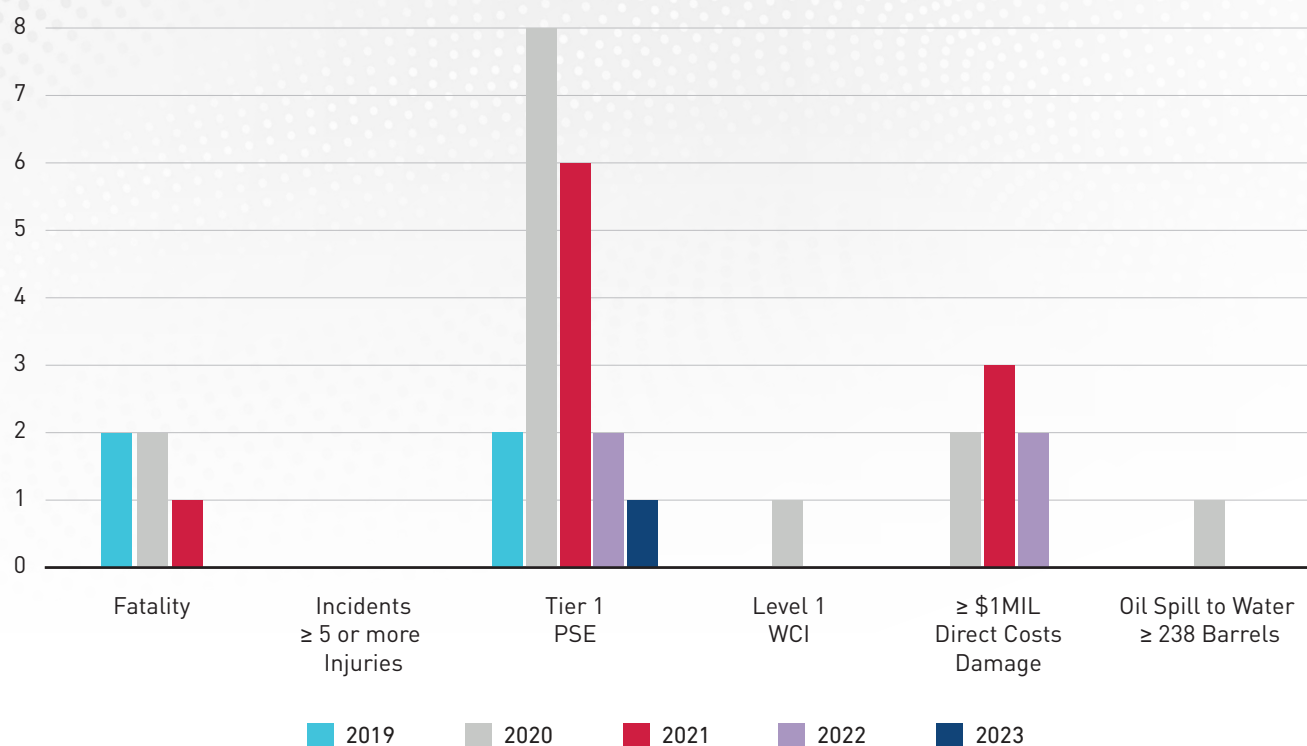
COS Member Operators reported one **SPI 1** incident for 2023, the lowest number reported for the five years represented in this report. The cited outcome for this incident was a Tier 1 Process Safety Event (PSE) (**SPI 1C**). Zero incidents involving a Fatality (**SPI 1A**),  $\geq$  Five Injuries in a Single Incident (**SPI 1B**), Level 1 Well Control Incident (WCI) (**SPI 1D**),  $\geq$  \$1MIL in Direct Damages (**SPI 1E**), or Oil Spill  $\geq$  10,000 gallons (**SPI 1F**) were reported.

**FIGURE 4.2-1: SPI 1 Count and Frequency**

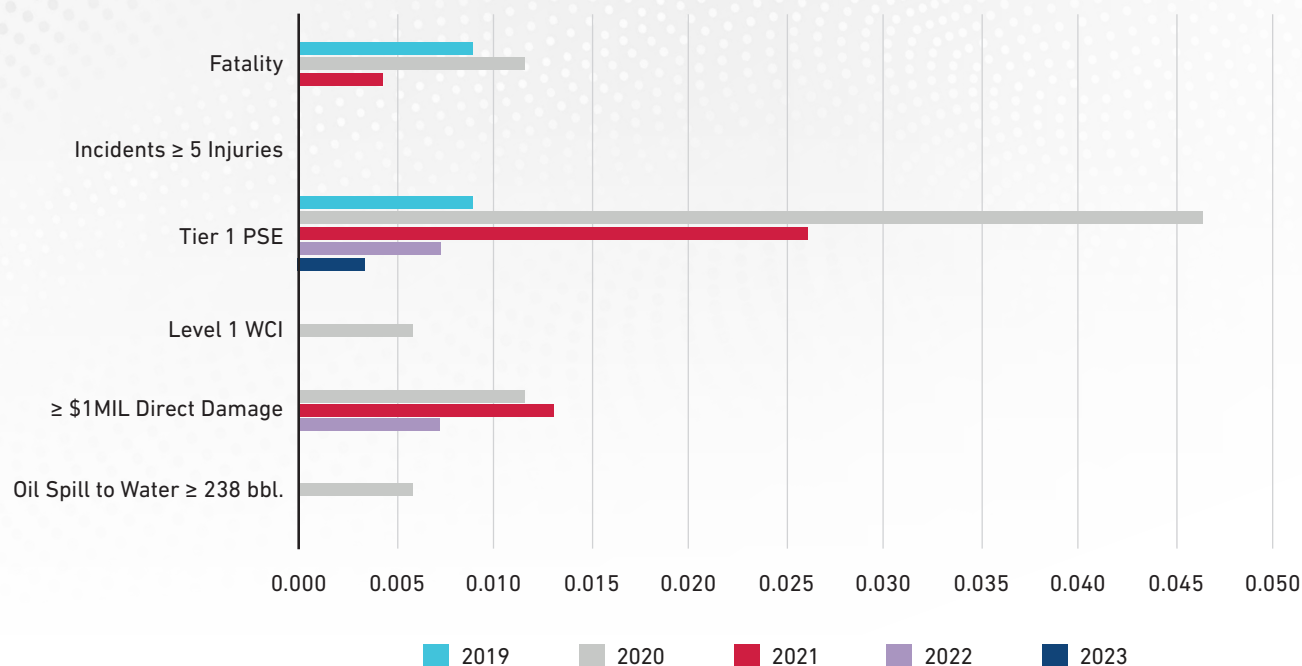




**FIGURE 4.2-2: SPI 1 Count per Sub-Group**



**FIGURE 4.2-3: SPI 1 Incident Frequency per Sub-Group**



## 4.3 SPI 2 RESULTS AND TRENDS

**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
  - Tier 2 Process Safety Event
- B. Collision resulting in property or equipment damage ≥ \$25,000
  - Dropped load that strikes live process equipment
- C. Mechanical Lifting or Lowering Incident resulting in one or more of the following:
  - One - four recordable injuries
  - \$25,000 - \$1 million direct damage
- D. Loss of station keeping resulting in a drive-off or drift-off
- E. Lifeboat, Life Raft, Rescue Craft event
- F. Level 2 Well Control Incident - multiple barrier systems failures and challenges

COS Member Operators reported 24 **SPI 2** incidents for 2023, as compared to 26 for 2022. For the 24 reported incidents, the cited outcomes were 13 resulting in Tier 2 PSE (**SPI 2A**), nine Mechanical Lifting or Lowering Incidents (**SPI 2C**), two incidents resulting in a Loss of Station Keeping (**SPI 2D**), and one Lifeboat, Life Raft, or Rescue Craft Event (**SPI 2E**). Zero incidents resulting in Collision Damage ≥ \$25,000 (**SPI 2B**) or Level 2 WCI (**SPI 2F**) were reported.

The 13 Tier 2 PSE (**SPI 2A**) reported in 2023 were up compared to the 8 reported in 2022, but in line with the 14 reported in 2021. Per 200k work hours, the 2023 number represents a 67% decrease when compared to 2020, the year with the highest number reported.

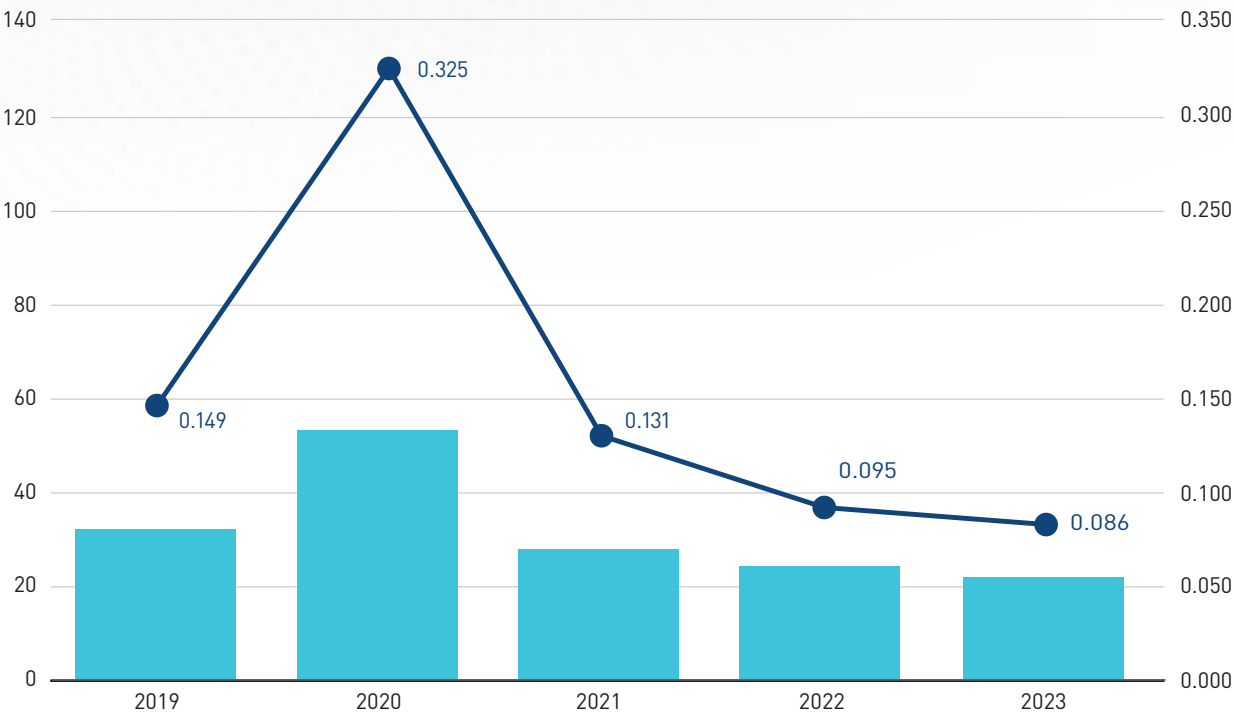


The nine incidents involving Mechanical Lifting or Lowering (**SPI 2C**) reported for 2023 is the lowest number reported out of the five years represented in this report. Per 200k work hours, this number represents a 78% decrease when compared to 2020, the year with the highest number reported.

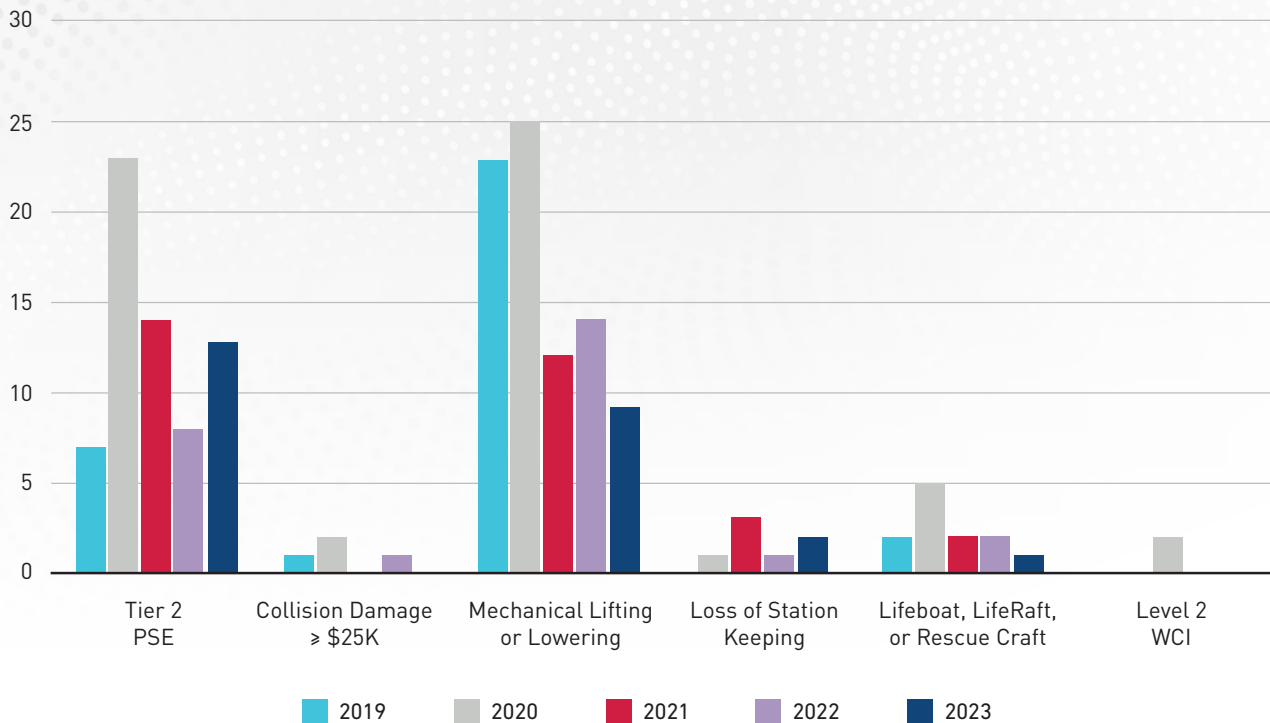
The two Loss of Station Keeping Resulting in Drive-Off or Drift-Off (**SPI 2D**) incidents for 2023 are up compared to the one reported in 2022.

The one Lifeboat, Life Raft, or Rescue Craft Event (**SPI 2E**) reported is the lowest reported for the five years represented in this report.

**FIGURE 4.3-1: SPI 2 Count and Frequency**



**FIGURE 4.3-2: SPI 2 Count per Sub-Group**

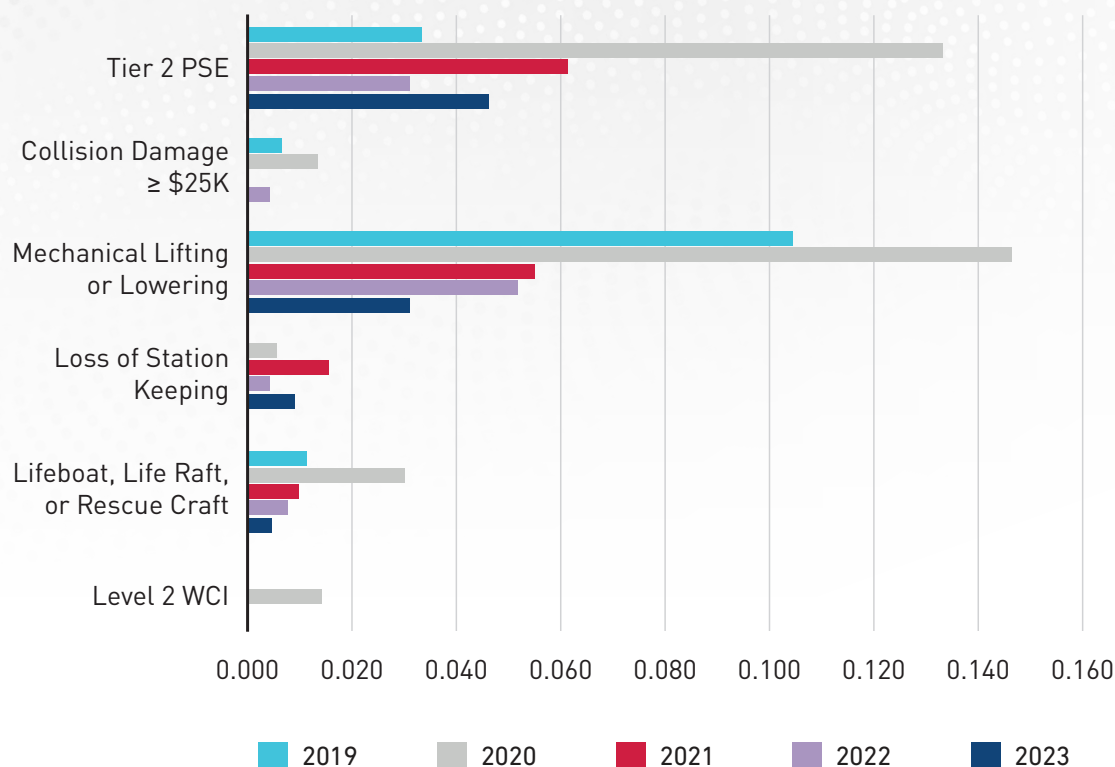


In addition to the data submitted by COS Member Operators, COS Member Contractors reported one Mechanical Lifting or Lowering Incident (**SPI 2C**). This incident is not reflected in the frequency calculations as work hours for non-COS Member Operators are not reported to COS.





**FIGURE 4.3-3: SPI 2 Frequency per Sub-Group**



### 4.3.1 SPI 2C CRANE INCIDENT DATA

Starting in 2021, COS began collecting additional data for offshore Mechanical Lifting Incidents involving cranes that met the severity criteria to be considered an **SPI 2C** incident. This was in response to a challenge to industry from the Bureau of Safety and Environmental Enforcement (BSEE) to “reduce offshore lifting incidents by 50%.”

An **SPI 2C** is an offshore mechanical lifting incident that resulted in one or more of the following consequences:

- One to four recordable injuries in a single incident that occurs during the lift
- Between \$25,000 and \$1 million direct damage to or loss of an asset (including the load itself)
- A loss of primary containment of a material meeting a Tier 2 Process Safety Event threshold quantity
- A dropped load that strikes live process equipment

COS members reported a total of 10 **SPI 2C** events for 2023 (nine reported by COS Member Operators and one reported by a COS Member Contractor), nine of which involved a crane. The members reporting these nine **SPI 2C** crane incidents submitted a supplemental form with details of each incident, the type of equipment used, the type of lift being performed at the time of the incident, and any resulting injuries.

The data from these supplemental forms are presented below. Since 2023 represents only the third year this data has been collected, it is too soon to seek trends or identify gaps.







**FIGURE 4.3-4: SPI 2C Cranes - Facility Types**

|                                    | 2021 | 2022 | 2023 |
|------------------------------------|------|------|------|
| Barge                              | 0    | 0    | 1    |
| Fixed (bottom supported structure) | 4    | 0    | 3    |
| Floating Platform Structure        | 3    | 4    | 2    |
| Self-Elevating Marine Vessel       | 0    | 1    | 0    |
| Semi-Submersible                   | 0    | 0    | 1    |
| Ship-hulled Vessel                 | 2    | 3    | 1    |
| Other                              | 0    | 0    | 1    |

**FIGURE 4.3-5: SPI 2C Cranes - Crane Types**

|                                           | 2021 | 2022 | 2023 |
|-------------------------------------------|------|------|------|
| Fixed Length Box Boom Crane               | 0    | 1    | 0    |
| Folding Boom                              | 1    | 4    | 0    |
| King Post Mounted Lattice Boom            | 2    | 3    | 3    |
| Pedestal Mounted Lattice Boom             | 1    | 0    | 2    |
| Swing Bearing Mounted Lattice Boom        | 5    | 0    | 2    |
| Telescopic Box Boom Cylinder Luffed Crane | 0    | 0    | 1    |
| Other                                     | 0    | 0    | 1    |



**FIGURE 4.3-6: SPI 2C Cranes - Lift Types**

|     |                           | 2021 | 2022 | 2023 |
|-----|---------------------------|------|------|------|
| I   | Onboard/Static            | 4    | 5    | 7    |
|     | Offboard/Dynamic          | 4    | 2    | 1    |
|     | Subsea                    | 0    | 0    | 1    |
|     | Non-Lifting (Maintenance) | 1    | 1    | 0    |
| II  | Routine                   | 5    | 6    | 4    |
|     | Non-Routine               | 3    | 1    | 5    |
|     | Non-Lifting (Maintenance) | 1    | 1    | 0    |
| III | Material Handling         | 8    | 4    | 9    |
|     | Pipe Handling             | 0    | 2    | 0    |
|     | Personnel Handling        | 0    | 1    | 0    |
|     | Non-Lifting               | 1    | 1    | 0    |



**FIGURE 4.3-7: SPI 2C Cranes - Failures of Equipment**

|                                                               | 2021 |    |     | 2022 |    |     | 2023 |    |     |
|---------------------------------------------------------------|------|----|-----|------|----|-----|------|----|-----|
|                                                               | YES  | NO | N/A | YES  | NO | N/A | YES  | NO | N/A |
| Mechanical (e.g., Hoist and Slewing Brake System)             | 1    | 7  | 1   | 0    | 8  | 0   | 1    | 8  | 0   |
| Structural (e.g., Boom Heel Pins or Boom Jib Section)         | 0    | 8  | 1   | 0    | 8  | 0   | 2    | 7  | 0   |
| Rigging (e.g., Hook Block Assembly or Bridle Assembly)        | 1    | 7  | 1   | 0    | 8  | 0   | 2    | 7  | 0   |
| Below the Hook (e.g., Shackles, Slings, or Personnel Baskets) | 1    | 7  | 1   | 0    | 8  | 0   | 0    | 9  | 0   |

**FIGURE 4.3-8: SPI 2C Cranes - Injuries**

|                                   |                              | 2021 | 2022 | 2023 |
|-----------------------------------|------------------------------|------|------|------|
| Number of Incidents with Injuries |                              | 4    | 3    | 5    |
| I                                 | Riggers                      | 3    | 2    | 2    |
|                                   | Flagger / Signalman          | 0    | 0    | 2    |
|                                   | Personnel on Transfer Basket | 0    | 1    | 0    |
|                                   | Rope Access Workers          | 1    | 0    | 0    |
|                                   | Other                        | 0    | 0    | 1    |
| II                                | Major Injury                 | 3    | 1    | 3    |
|                                   | Minor Injury                 | 1    | 2    | 2    |
|                                   | Slight Injury                | 1    | 0    | 0    |
| III                               | Head                         | 1    | 1    | 2    |
|                                   | Torso (front or back)        | 1    | 0    | 1    |
|                                   | Arms / Hands                 | 3    | 2    | 1    |
|                                   | Legs / Feet                  | 2    | 0    | 1    |

NOTE: The total count of injuries may be greater than the number of incidents reported, as one incident can have multiple injuries.

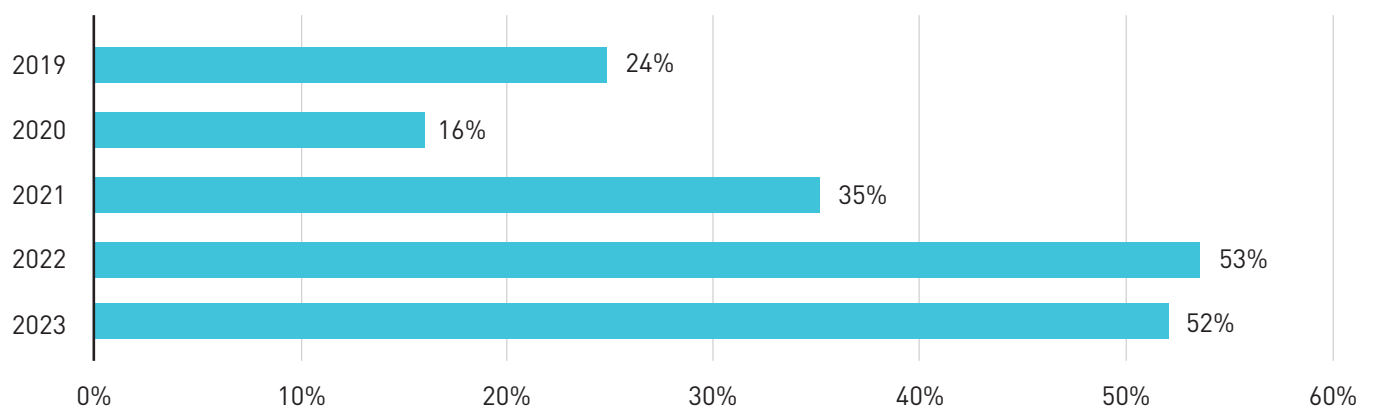


## 4.4 SPI 3 RESULTS AND TRENDS

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

Of the 25 total **SPI 1** and **SPI 2** incidents reported by COS Member Operators for 2023, 13 involved Failure of Equipment as a Contributing Factor (**SPI 3**), or 52%.

**FIGURE 4.4-1: SPI 3 Equipment Failure as a Contributing Factor**

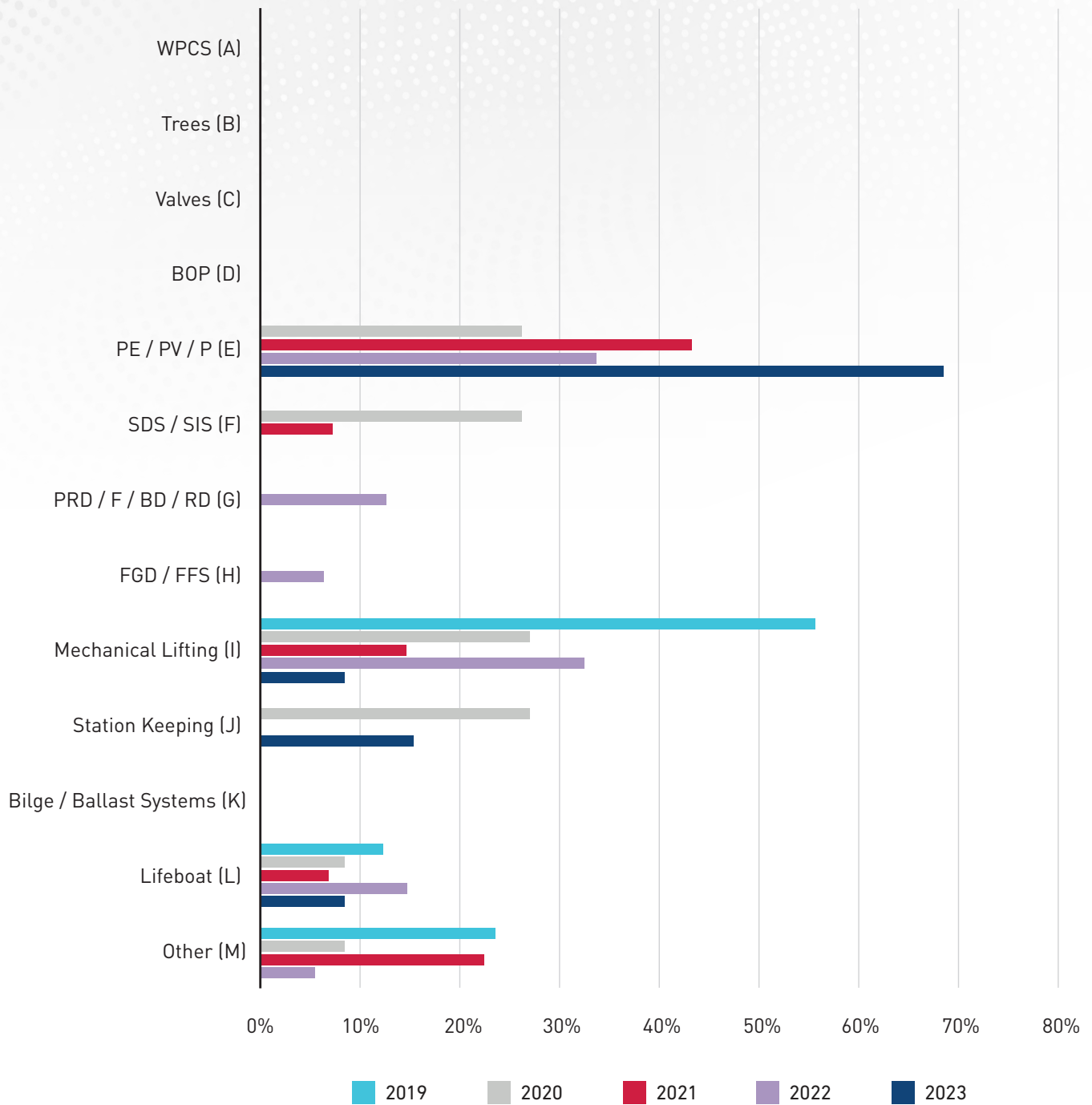








**FIGURE 4.4-2: SPI 3 Failure Rates by Equipment Category**





**FIGURE 4.4-3: SPI 3 Incident Counts by Equipment Category**

| EQUIPMENT                                                                          | 2019<br>FAILURES<br>(COUNT) | 2020<br>FAILURES<br>(COUNT) | 2021<br>FAILURES<br>(COUNT) | 2022<br>FAILURES<br>(COUNT) | 2023<br>FAILURES<br>(COUNT) |
|------------------------------------------------------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| A - Well Pressure Containment System (WPCS)                                        | 0                           | 0                           | 0                           | 0                           | 0                           |
| B - Christmas Trees                                                                | 0                           | 0                           | 0                           | 0                           | 0                           |
| C - Downhole Safety Valves (Valves)                                                | 0                           | 0                           | 0                           | 0                           | 0                           |
| D - Blowout Preventers and Intervention Systems (BOP)                              | 0                           | 0                           | 0                           | 0                           | 0                           |
| E - Process Equipment / Pressure Vessels / Piping (PE / PV / P)                    | 0                           | 3                           | 6                           | 5                           | 9                           |
| F - Shutdown Systems / Automated Safety Instrumented Systems (SDS / SIS)           | 0                           | 3                           | 1                           | 0                           | 0                           |
| G - Pressure Relief Devices / Flares / Blowdown / Rupture Disks (PRD / F / B / RD) | 0                           | 0                           | 0                           | 2                           | 0                           |
| H - Fire / Gas Detection and Fire Fighting Systems (FGD / FFS)                     | 0                           | 0                           | 0                           | 1                           | 0                           |
| I - Mechanical Lifting Equipment / Personnel Transport Systems                     | 5                           | 3                           | 2                           | 5                           | 1                           |
| J - Station Keeping Systems                                                        | 0                           | 0                           | 2                           | 0                           | 2                           |
| K - Bilge / Ballast Systems                                                        | 0                           | 0                           | 0                           | 0                           | 0                           |
| L - Lifeboat / Life Raft / Rescue Craft / Launch and Recovery Systems              | 1                           | 1                           | 1                           | 2                           | 1                           |
| M - Other                                                                          | 2                           | 1                           | 3                           | 1                           | 0                           |

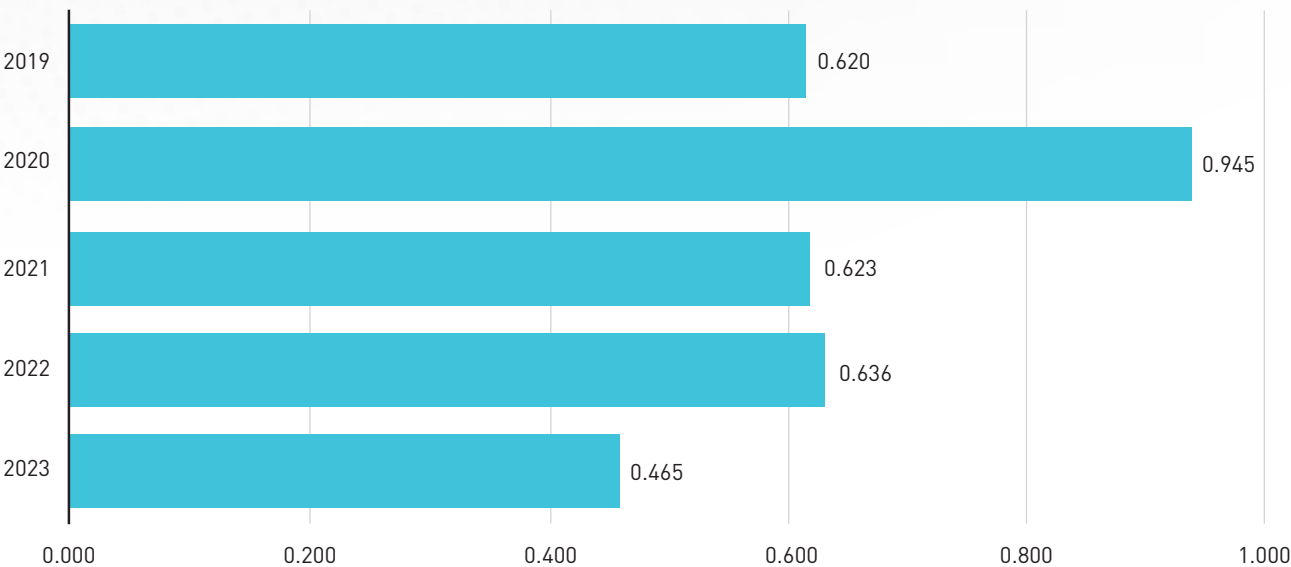
The most frequently cited system with equipment failure contributing to an **SPI 1** or **SPI 2** incident was Process Equipment / Pressure Vessels / Piping. These systems were cited in 9 of the 13 incidents with equipment failure, or 69%.

## 4.5 SPI 4 RESULTS AND TRENDS

**SPI 4 is a crane or personnel / material handling operations incident.**

The number of Incidents Involving Cranes or Personnel/Material Handling (**SPI 4** – of which **SPI 2C** is a subset) reported by COS Member Operators for 2023 was 129, compared to 174 for the prior year. This is the lowest number of lifting incidents reported by COS Member Operators for the five years represented in this report. When considered per 200k work hours this is a 51% decrease from the highest frequency reported in 2020.

**FIGURE 4.5-1: SPI 4 Crane or Personnel / Material Handling Frequency**



*NOTE: In 2019, BSEE issued NTL 2019-N05 which greatly expanded the definition of what was required to be reported for offshore lifting incidents.*

In addition to the data submitted by COS Member Operators, COS Member Contractors reported eight **SPI 4** Mechanical Lifting Incidents. These incidents are not reflected in the frequency calculations as work hours for non-COS Member Operators are not reported to COS.



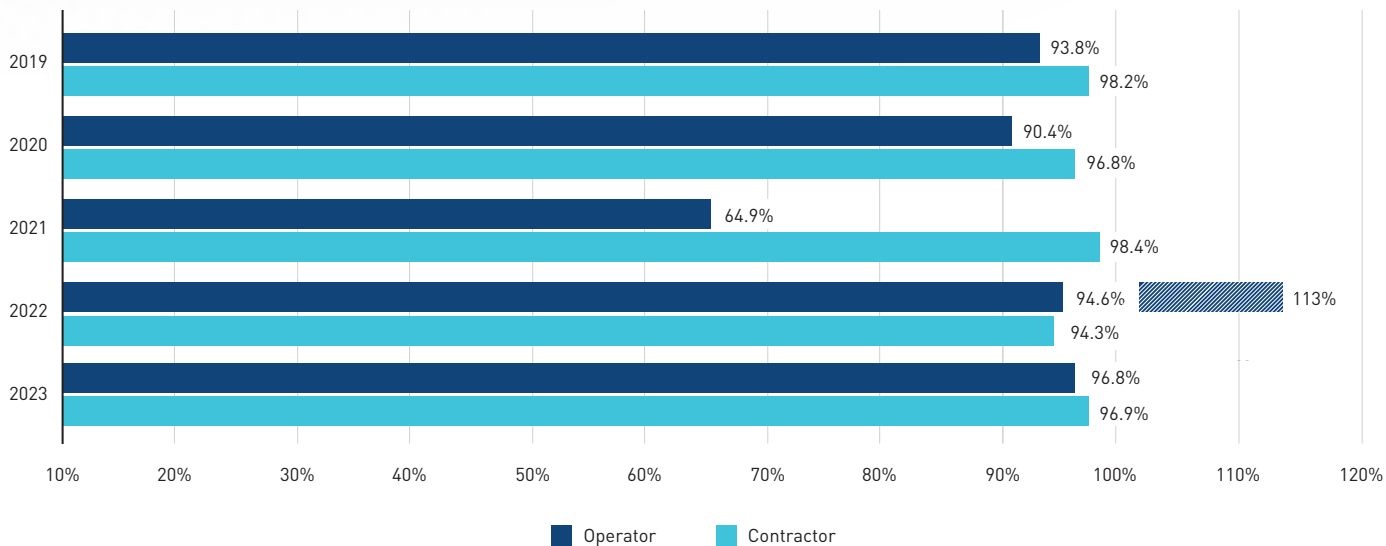
## 4.6 SPI 5 RESULTS AND TRENDS

**SPI 5 is the percentage of planned critical maintenance, inspection, and testing (MIT) completed on time. Planned critical MIT deferred with a formal risk assessment and appropriate level of approval is not considered overdue.**

For the seven COS Member Operators that submitted **SPI 5** data (Percentage of Planned Critical Maintenance Completed on Time), the combined average for 2023 was 103.1%. This is an increase from the average of 95% reported for 2022.

For COS Member Contractors that shared **SPI 5** data (2 of 7), the combined average for 2023 was 96.9%, an increase from the 94% reported for 2022.

**FIGURE 4.6-1: SPI 5 Planned Critical MIT Completed on Time**



*NOTE: Each company defines what maintenance, inspection, and testing tasks qualify as "critical". The 2022 percentages above include data from one COS Operator that, due to internal tracking methods, reported completing 243% of their planned critical maintenance. When added to the other seven COS Member Operators' data, this brings the average for all COS Member Operators for 2022 up to 113%.*

## 4.7 SPI 6-9 RESULTS AND TRENDS

**SPI 6 is the number of work-related fatalities**

**SPI 7 is the frequency of days away from work, restricted work, and job-transfer injuries and illness (DART)**

**SPI 8 is the frequency of recordable injuries and illnesses (RIIF)**

**SPI 9 is the frequency of oil spills to water  $\geq$  1 barrel**

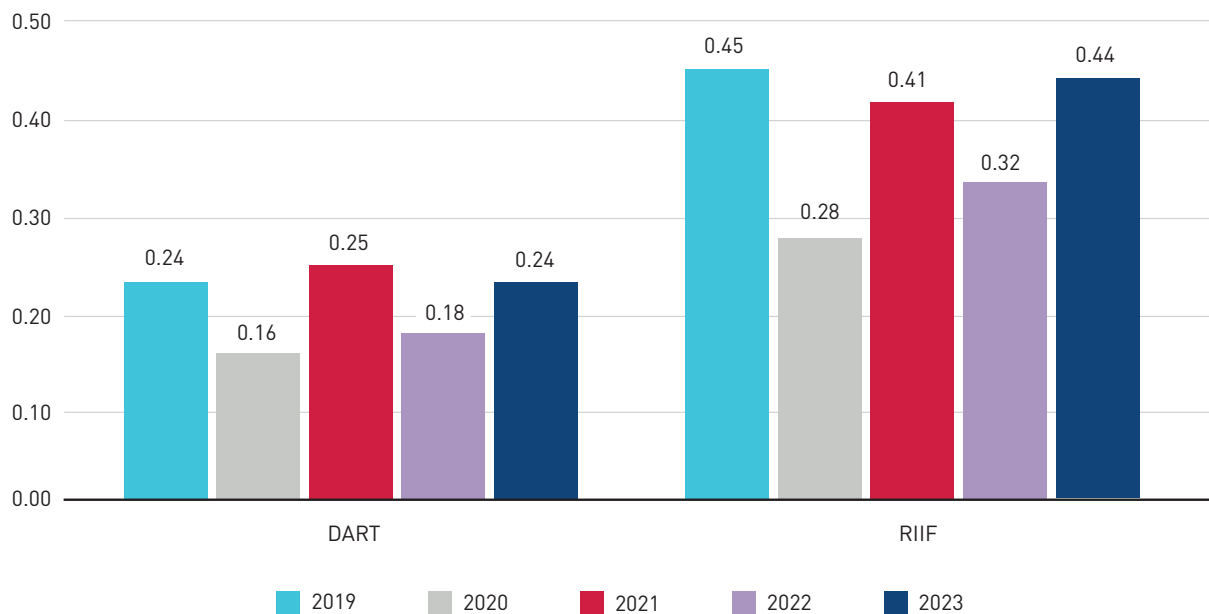
Zero COS Member Operators reported incidents with fatalities (**SPI 6**) for 2023.

The combined Days Away from Work, Restricted Work, and Transfer of Duty Rate (DART) (**SPI 7**) reported for 2023 was 0.24, which is up compared to 0.18 reported in 2022, but on par with the 0.25 reported for 2021.

The combined Recordable Injury and Illness Frequency (RIIF) (**SPI 8**) reported for 2023 was 0.44. This is the highest rate of Recordable Injuries and Illnesses reported since 2019.

COS Member Operators reported 26 Oil Spills to Water  $\geq$  One Barrel (**SPI 9**) for 2023, up from a high of seven reported in 2021. Given the increase in work hours since 2021, this represents a frequency increase of 129%.

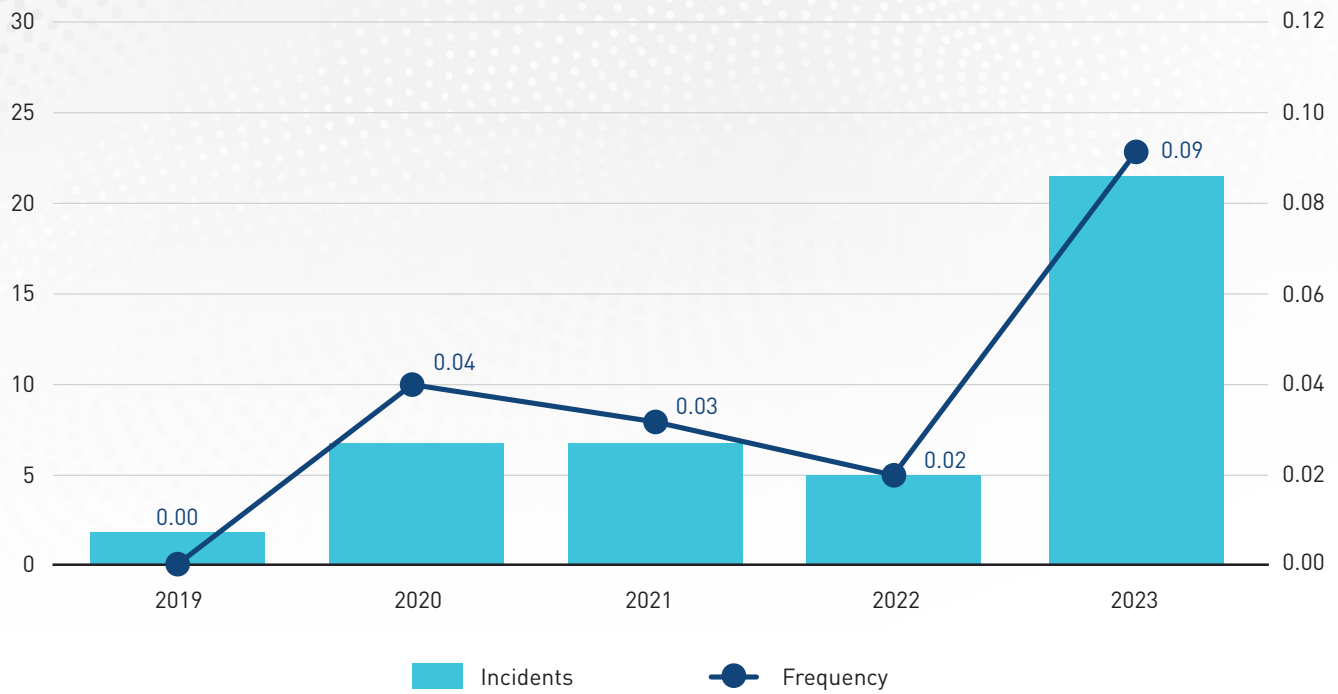
**FIGURE 4.7-1: SPI 7 DART and SPI 8 RIIF Rates**



*NOTE: To allow data comparisons with pre-2020 rates, the data for SPI 7 and SPI 8 does not include cases due to COVID-19.*



**FIGURE 4.7-2: SPI 9 Count of Oil Spills to Water ≥ One Barrel**



*NOTE: For 2020 vs 2021, although the number of SPI 9 incidents was the same for both years, the increase in the number of work hours for 2021 resulted in a frequency decrease of 27% from 0.041 to 0.030.*



## 4.8 SPI 10 RESULTS

**SPI 10 is the severity potential of actual results of incidents involving a dropped object.**

Similar to **SPI 5**, data for **SPI 10** is reported by both COS Member Operators and Contractors. The data from COS Member Operators reflect all drops on or within 500m of their lease and may include data from COS Member Contractors. Data reported by COS Member Contractors reflect dropped object incidents which occurred while working on the leases of non-COS Member Operators or outside the 500m zone.

|                                    | 2019 | 2020 | 2021 | 2022 | 2023 |
|------------------------------------|------|------|------|------|------|
| Number of Dropped Objects Reported | 266  | 251  | 213  | 305  | 249  |

Beginning with this 2023 reporting year data collection, **SPI 10** is reported both as **potential** and **actual** results of incidents involving a dropped object. For example, if an object weighing 25 lbs. dropped from a height of 100 ft and there were no injuries as a result of this drop, it would be reported as potentially fatal but resulting in zero actual harm.

A total of 249 dropped object incidents were reported for 2023. COS Member Operators reported 239 and COS Member Contractors reported 10. Of these 249 dropped object incidents, 239 (96%) resulted in zero injuries.

**FIGURE 4.8-1: SPI 10 Dropped Object Fatality Potential**

|                                                            |                      | 2023       |
|------------------------------------------------------------|----------------------|------------|
| Number of Dropped Objects with Fatality <b>potential</b> : |                      | 72         |
| Actual Results:                                            | # with Fatalities    | 0 (0%)     |
|                                                            | # of Major Injuries  | 1 (1.4%)   |
|                                                            | # of Minor Injuries  | 3 (4.2%)   |
|                                                            | # of Slight Injuries | 0 (0%)     |
|                                                            | # with Zero Injuries | 68 (94.4%) |



**FIGURE 4.8-2: SPI 10 Dropped Object Major Injury Potential**

|                                                               |                      | 2023       |
|---------------------------------------------------------------|----------------------|------------|
| Number of Dropped Objects with Major Injury <b>potential:</b> |                      | 17         |
| <b>Actual Results:</b>                                        | # of Major Injuries  | 1 (5.9%)   |
|                                                               | # of Minor Injuries  | 0          |
|                                                               | # of Slight Injuries | 0          |
|                                                               | # with Zero Injuries | 16 (94.1%) |

**FIGURE 4.8-3: SPI 10 Dropped Object Minor Injury Potential**

|                                                               |                      | 2023       |
|---------------------------------------------------------------|----------------------|------------|
| Number of Dropped Objects with Minor Injury <b>potential:</b> |                      | 71         |
| <b>Actual Results:</b>                                        | # of Minor Injuries  | 5 (7.0%)   |
|                                                               | # of Slight Injuries | 1 (1.4%)   |
|                                                               | # with Zero Injuries | 65 (91.6%) |

**FIGURE 4.8-4: SPI 10 Dropped Object Slight Injury Potential**

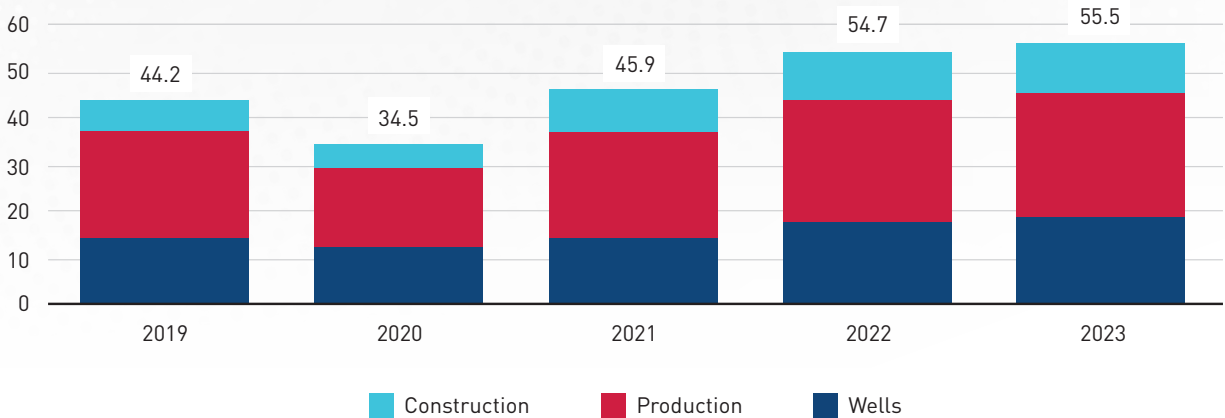
|                                                                |                      | 2023       |
|----------------------------------------------------------------|----------------------|------------|
| Number of Dropped Objects with Slight Injury <b>potential:</b> |                      | 89         |
| <b>Actual Results:</b>                                         | # of Slight Injuries | 2 (2.2%)   |
|                                                                | # with Zero Injuries | 87 (97.8%) |

## 4.9 NORMALIZATION FACTOR (WORK HOURS)

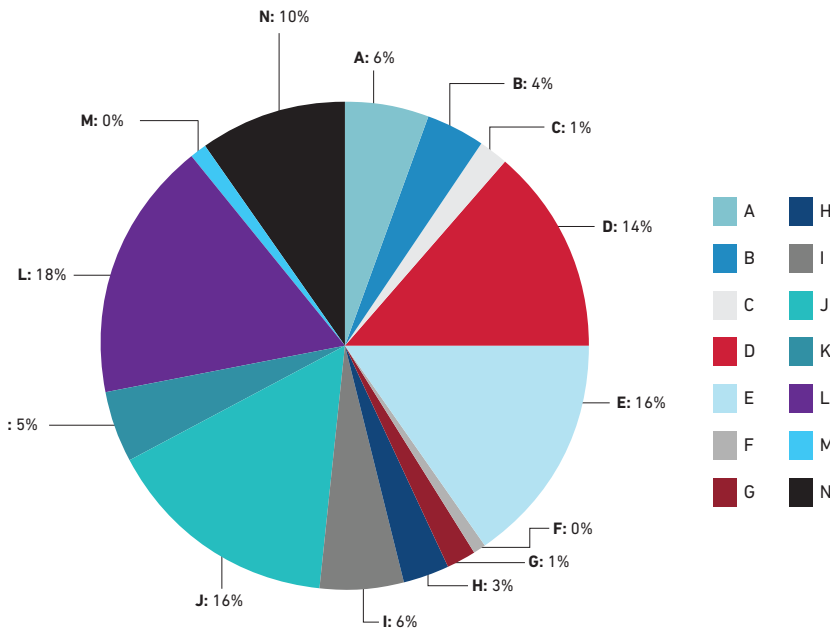
The data reported for 2023 represent more than 55.5 million Operator and Contractor work hours on the U.S. OCS. This is the highest number of work hours reported since 2015 and represents 77% of the total natural gas and oil activity on the U.S. OCS.

Work hours for both COS Member Operators and Contractors are reported only by COS Member Operators for work occurring within 500m of their facilities.

**FIGURE 4.9-1: Work Hours (Millions) by Operation Type**



**FIGURE 4.9-2: 2023 Work Hours per COS Member Operator**









# LEARNING FROM INCIDENTS AND HIGH VALUE LEARNING EVENTS

## 5.1 INTRODUCTION

The Learning from Incidents and Events (LFI) Program was established to provide a means for COS members to share and learn from incidents and High Value Learning Events (HVLE). Reporting is voluntary and data confidentiality is maintained through a process administered by the API Statistics Department before submittal to COS.

While COS maintains a full record of data collected beginning with 2013 data, the data reported in this APR represents the five most recent years. The LFI Section of this report provides an analysis and comparison of the **SPI 1**, **SPI 2**, and HVLE LFI data submitted for reporting years 2019-2023. The incident excerpts in this section include learnings that can be shared within companies to potentially prevent recurrence of similar or more severe incidents.

The data are comprised of the reported learnings from **SPI 1** and **SPI 2** incidents, as well as those from HVLE. A summary of the definitions for **SPI 1**, **SPI 2**, and HVLE are presented below.

### **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 incident
- C. Tier 1 Process Safety Event
- D. Level 1 Well Control Incident - loss of well control
- E. ≥ \$1 million direct cost from damage to or loss of facility / vessel / equipment
- F. Oil spill to water ≥ 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 ≥ \$25,000
- C. Mechanical Lifting or Lowering Incident resulting in one of the following:
  - One - four recordable injuries
  - \$25,000 - \$1 million direct damage
  - Tier 2 Process Safety Event
  - Dropped load that strikes live process equipment
- D. Loss of station keeping resulting in drive-off or drift-off
- E. Lifeboat, Life Raft, Rescue Craft event
- F. Level 2 Well Control Incident - multiple barrier systems failures and challenges

HVLE is 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 assessment, inspection, operating procedures review and / or training.



LFI data submittals include four key fields:

- **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 so that the situation and operations underway at the time of the incident can be understood.
- **Corrective Actions to Repair / Mitigate Reported Incident:** Actions taken at the time of the incident to mitigate the consequences and secure the equipment and facility.
- **Lessons Learned / Actions to Mitigate Recurrence:** Actions taken as a result of this incident to prevent it from happening again.
- **Areas for Improvement (AFI):** A selection of pre-determined general categories and subcategories. Submitters had the option to add comments to provide further clarity and content.

Within the AFI fields, submitters choose from three general categories and 15 sub-categories. Multiple AFI can be selected for a single incident or event. The three general categories are:

- **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.
- **Administrative Processes:** Enhancements in the quality, scope, or structure of administrative processes for managing various aspects of work execution were highlighted for improvement.
- **People:** Enhancements to the personnel actions linked to the execution of work tasks were highlighted for improvement.

5.2 SUMMARY

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

- Sharing of quality information from incidents and HVLE that meet the reporting criteria; and
- Reviewing submitted incidents and HVLE, along with other data in this report, to identify and implement applicable learnings appropriate to different levels and functions within their own organizations.

The LFI data presented in this report includes information from 47 LFI submittals received for the 2023 reporting year, with 36 of the reported incidents and HVLE occurring on the U.S. OCS and 11 occurring at international or onshore locations.

Due to the voluntary nature of the LFI program, this is not an all-inclusive list of incidents or HVLE that occurred in any given year. COS members use their discretion in selecting which incidents or HVLE to share via this program. Given this, while the data below is displayed as a comparison of data submitted for each of the last five years, the percent increase or decrease from year-to-year is not necessarily indicative of a trend.

FIGURE 5.2-1: Count of U.S. OCS LFI Reports by Incident or Event Category

| YEAR      | 2019 | 2020 | 2021 | 2022 | 2023 |
|-----------|------|------|------|------|------|
| COS SPI 1 | 1    | 7    | 6    | 5    | 1    |
| COS SPI 2 | 10   | 6    | 16   | 20   | 9    |
| HVLE      | 32   | 11   | 21   | 29   | 26   |
| TOTAL     | 43   | 24   | 43   | 54   | 36   |

**FIGURE 5.2-2: Count of LFI Reports by Location**

| LOCATION                    | 2019      | 2020      | 2021      | 2022      | 2023      |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|
| U.S. OCS                    | 43        | 24        | 43        | 54        | 36        |
| U.S. Onshore / State Waters | 4         | 3         | 0         | 4         | 6         |
| International               | 5         | 5         | 8         | 6         | 5         |
| <b>TOTAL</b>                | <b>52</b> | <b>32</b> | <b>51</b> | <b>64</b> | <b>47</b> |

A review of the 2023 reporting year LFI data (U.S. OCS only) identified the top reported activity types as:

- Maintenance, Inspection, and Testing (22%)
- Drilling Operations – Normal, Routine (19%)
- Production Operations – Normal, Routine (11%)
- Mechanical Lifting (11%)

Additional Activity Types reported include Confined Space Entry, Diving, Energy Isolation, Helicopter Landing or Take-off, Start-up or Shutdown, and Working at Height.

In addition to the topics mentioned above, the top AFI identified for U.S.OCS LFI Reports for 2023 were:

- Operating Procedures or Safe Work Practices (44%)
- Risk Assessment and Management Process (28%)
- Design or Layout of Facility or Individual Piece of Equipment (28%)
- Facility or Equipment Reliability (19%)
- Personnel Skills and Knowledge (19%)

Across all 11 reporting years, Operating Procedures or Safe Work Practices was the most frequently identified AFI.

Additional review of the 2023 data identified the following as common threads through many of the 36 U.S. OCS and 11 International or Onshore LFI submittals plus the additional nine SPI 2C Crane Incident Reports:

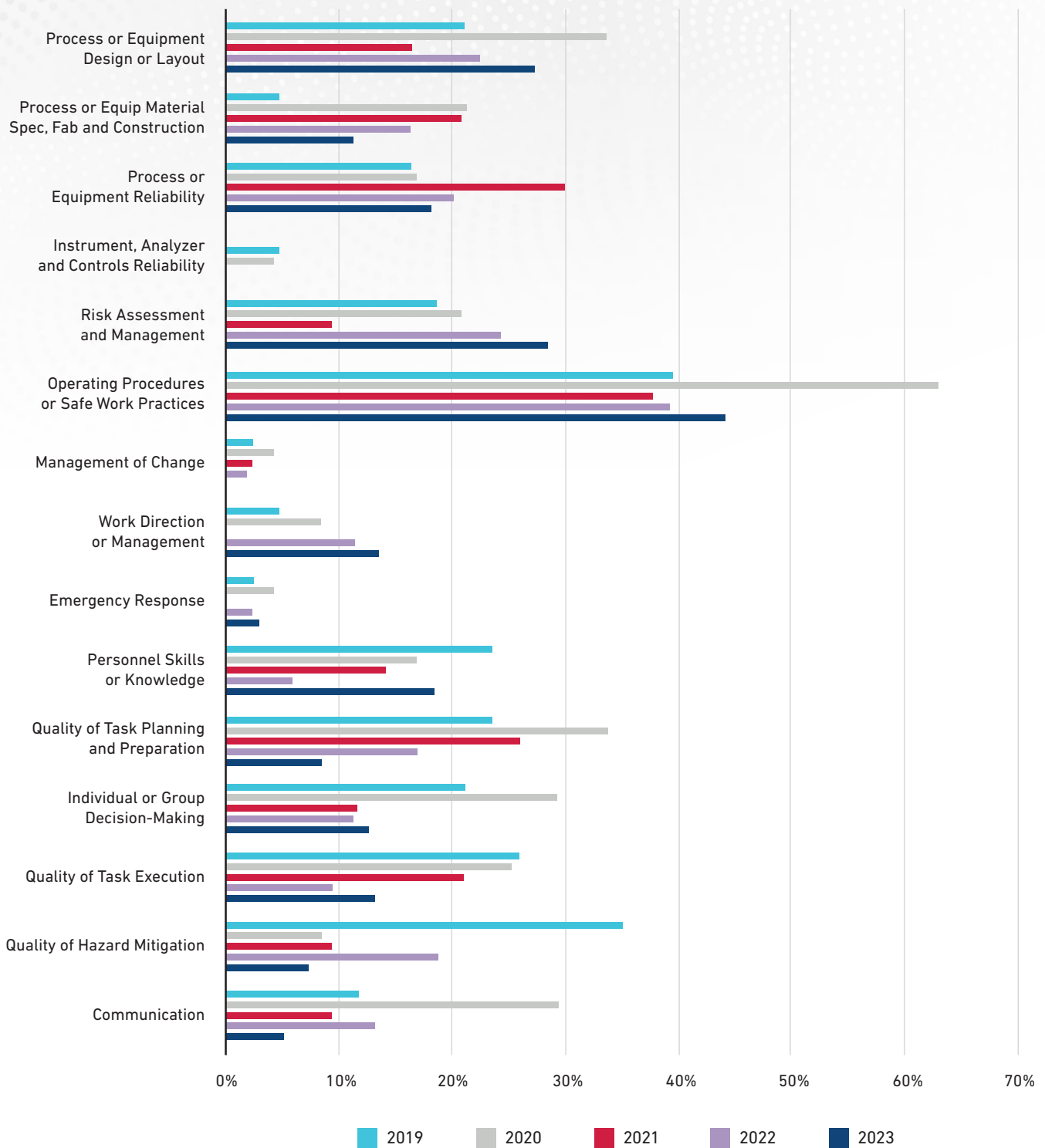
- Dropped Objects – 16 of 56 (29%)
- Maintenance, Inspection, and Testing – 10 of 56 (18%)
- Decommissioning – 9 of 56 (16%)



**FIGURE 5.2-3: LFI Areas for Improvement Distribution (U.S. OCS Only)**

| AREA FOR IMPROVEMENT                                                        | 2019  | 2020  | 2021  | 2022  | 2023         | 5-YR<br>AVG  |
|-----------------------------------------------------------------------------|-------|-------|-------|-------|--------------|--------------|
| Operating Procedures or Safe Work Practices                                 | 39.5% | 62.5% | 37.2% | 38.9% | <b>44.4%</b> | <b>44.5%</b> |
| Facility or Equipment Design or Layout                                      | 20.9% | 33.3% | 16.3% | 22.2% | <b>27.8%</b> | <b>24.1%</b> |
| Quality of Task Planning and Preparation                                    | 23.3% | 33.3% | 25.6% | 16.7% | <b>8.3%</b>  | <b>21.4%</b> |
| Facility or Equipment Reliability                                           | 16.3% | 16.7% | 30.2% | 20.4% | <b>19.4%</b> | <b>20.6%</b> |
| Risk Assessment and Management Process                                      | 18.6% | 20.8% | 9.3%  | 24.1% | <b>27.8%</b> | <b>20.1%</b> |
| Quality of Task Execution                                                   | 25.6% | 25.0% | 20.9% | 9.3%  | <b>11.1%</b> | <b>18.4%</b> |
| Individual or Group Decision-Making                                         | 20.9% | 29.2% | 11.6% | 11.1% | <b>16.7%</b> | <b>17.9%</b> |
| Personnel Skills or Knowledge                                               | 23.3% | 16.7% | 14.0% | 5.6%  | <b>19.4%</b> | <b>15.8%</b> |
| Quality of Hazard Mitigation                                                | 34.9% | 8.3%  | 9.3%  | 18.5% | <b>2.8%</b>  | <b>14.8%</b> |
| Communication                                                               | 11.6% | 29.2% | 9.3%  | 13.0% | <b>5.6%</b>  | <b>13.7%</b> |
| Facility or Equipment Material Specification, Fabrication, and Construction | 4.7%  | 20.8% | 16.3% | 14.8% | <b>11.1%</b> | <b>13.5%</b> |
| Work Direction or Management Process                                        | 4.7%  | 8.3%  | 0.0%  | 11.1% | <b>13.9%</b> | <b>7.6%</b>  |
| Instrument, Analyzer, and Controls Reliability                              | 4.7%  | 4.2%  | 0.0%  | 0.0%  | <b>5.6%</b>  | <b>2.9%</b>  |
| Emergency Response Process                                                  | 2.3%  | 4.2%  | 0.0%  | 1.9%  | <b>2.8%</b>  | <b>2.2%</b>  |
| Management of Change Process                                                | 2.3%  | 4.2%  | 2.3%  | 1.9%  | <b>0.0%</b>  | <b>2.1%</b>  |

**FIGURE 5.2-4: Areas for Improvement Distribution (U.S. OCS Only)**



NOTE: LFI submittals typically identify more than one AFI for any given incident. The graph above illustrates the percentage of times an AFI was identified relative to the number of LFI forms. Because the number of AFI exceeds the number of LFI forms, the sum of the percentages will be  $\geq 100\%$ .



## 5.3 SEMS ELEMENTS

A primary focus of COS is on Safety and Environmental Management Systems (SEMS), based on API RP 75, *Recommended Practice for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities*, 3rd Ed, which is incorporated into federal regulations administered under Bureau of Safety and Environmental Enforcement (BSEE) jurisdiction.

It was with this focus in mind that starting with 2021 Reporting Year data, COS added a new question to the LFI forms that members submit, "Choose all that apply - SEMS elements, per API RP 75 4th Ed - related to this incident." This same question was also included on the SPI 2C-Crane incident supplemental data form (Section 4.3.1).

As mentioned in Section 5.2, COS members use discretion in selecting incidents to report to the LFI program. Therefore, while this data is interesting and potentially useful, it should not be viewed as all-inclusive or necessarily indicative of a trend.

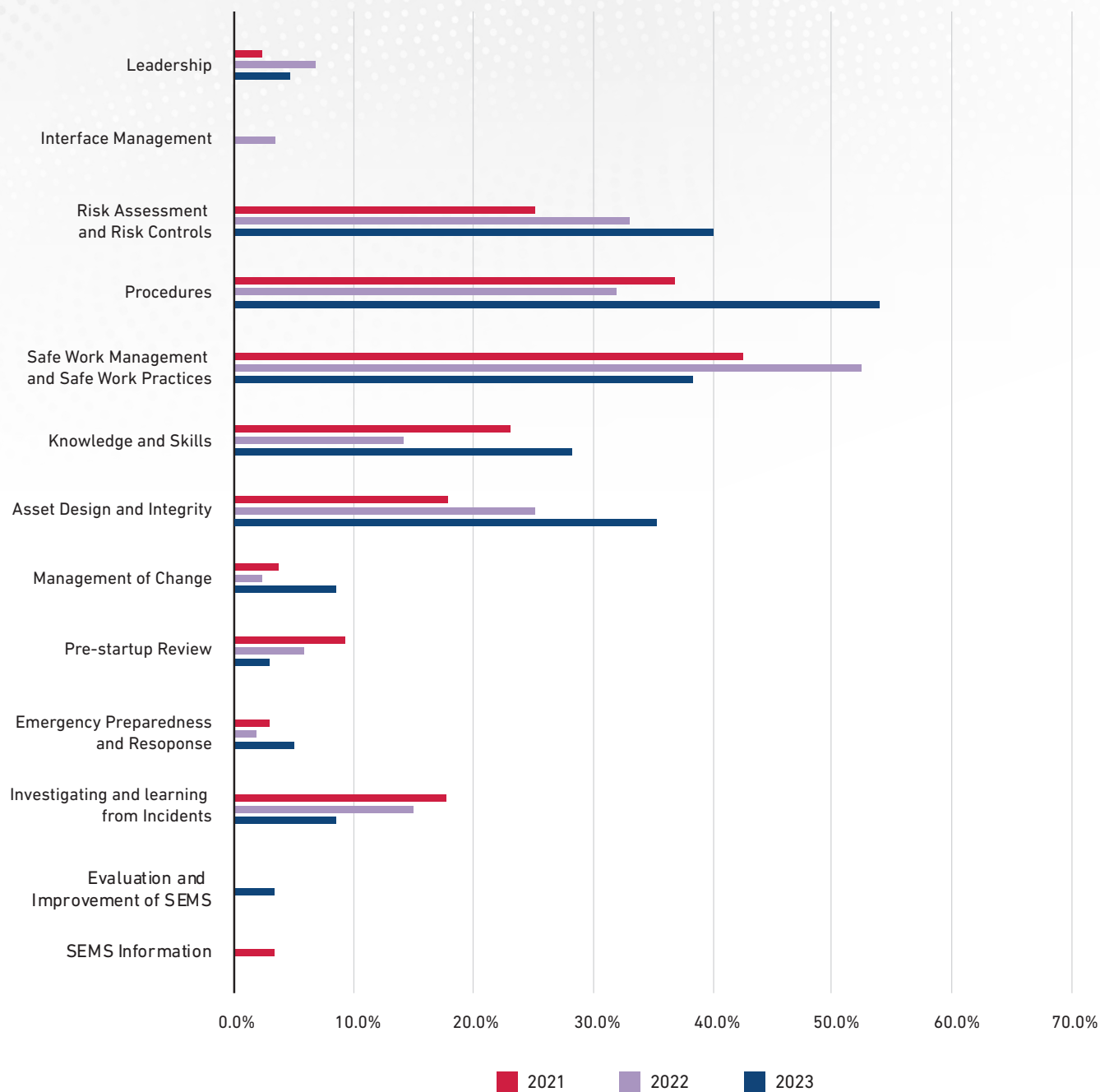
Below is the breakdown of SEMS elements selected for the 36 U.S. OCS LFI reports plus the nine SPI 2C-Crane incident reports:

**FIGURE 5.3-1: SEMS Elements - U.S. OCS LFI Reports and SPI 2C Supplemental Reports**

| SEMS ELEMENTS                                | 2021  | 2022  | 2023         | 3-YR AVG     |
|----------------------------------------------|-------|-------|--------------|--------------|
| Leadership                                   | 1.9%  | 6.5%  | <b>4.4%</b>  | <b>4.3%</b>  |
| Interface Management                         | 0.0%  | 3.2%  | <b>0.0%</b>  | <b>1.1%</b>  |
| Risk Assessment and Risk Controls            | 25.0% | 33.9% | <b>40.0%</b> | <b>33.0%</b> |
| Procedures                                   | 36.5% | 32.3% | <b>53.3%</b> | <b>40.7%</b> |
| Safe Work Management and Safe Work Practices | 42.3% | 51.6% | <b>37.8%</b> | <b>43.9%</b> |
| Knowledge and Skills                         | 23.1% | 14.5% | <b>28.9%</b> | <b>22.2%</b> |
| Asset Design and Integrity                   | 19.2% | 25.8% | <b>35.6%</b> | <b>26.9%</b> |
| Management of Change                         | 3.8%  | 3.2%  | <b>8.9%</b>  | <b>5.3%</b>  |
| Pre-Startup Review                           | 7.7%  | 6.5%  | <b>2.2%</b>  | <b>5.5%</b>  |
| Emergency Response and Preparedness          | 1.9%  | 1.6%  | <b>2.2%</b>  | <b>1.9%</b>  |
| Investigating and Learning from Incidents    | 17.3% | 16.1% | <b>6.7%</b>  | <b>13.4%</b> |
| Evaluation and Improvement of SEMS           | 0.0%  | 0.0%  | <b>2.2%</b>  | <b>0.01%</b> |
| SEMS Information                             | 1.9%  | 0.0%  | <b>0.0%</b>  | <b>0.6%</b>  |

NOTE: The graph above illustrates the percentage of times a SEMS element was identified relative to the number of LFI and SPI 2C-Crane incident reports submitted. Because the number of SEMS elements selected may exceed the number of LFI and SPI 2C incident reports, the sum of the percentages will likely be  $\geq 100\%$ .

**FIGURE 5.3-2: SEMS Elements**





## 5.4 LEARNINGS FROM LFI REPORTS AND CRANE INCIDENT REPORTS

The charts and graphs earlier in this section reflected LFI data for U.S. OCS incidents and HVLE only. In addition to these U.S. OCS LFI submittals, the following sections may include learnings from International or Onshore/U.S. State Waters incidents and HVLE, as well as the nine SPI 2C-Crane incident submittals (Section 4.3.1) – a total of 56 reported incidents and events. Selected learnings from these submittals are excerpted below.

As noted in Section 5.2, Dropped Objects; Maintenance, Inspection, and Testing (MIT); and Decommissioning were cited in many of the incidents and events reported for 2023.

Note that throughout this section the incident descriptions and lessons learned are presented as *written* in the LFI and SPI 2C-Crane incident reports submitted to COS.



### 5.4.1 DROPPED OBJECTS

Sixteen of the LFI and Crane incident submittals (29%) included a dropped object as either the cause or result of an incident. For these incidents, the reported Activities at the time of the drop were:

- Drilling Operations – Normal, Routine – 5 of 16 (31.3%)
- Maintenance, Inspection, and Testing – 3 of 16 (18.8%)
- Construction – 1 of 16 (6.3%)
- Material Transfer or Displacement – 1 of 16 (6.3%)
- Mechanical Lifting or Lowering – 1 of 16 (6.3%)
- Pipeline Lay – 1 of 16 (6.3%)
- Simultaneous Operations (SIMOPS) – 1 of 16 (6.3%)
- Start-up or Shutdown Operations – 1 of 16 (6.3%)
- Working at Height – 1 of 16 (6.3%)
- Other – 1 of 16 (6.3%)

The following incident descriptions and learnings are excerpted examples of learnings from Dropped Objects:

#### **BOOM CABLE FAILURE RESULTS IN 11,000 LB GRATING RACK DROP**

**Incident Description:** The platform began preparations to offload construction equipment. Ten lifts were performed (welding machines, bottle racks, toolboxes, etc.) utilizing the fast line. The eleventh lift, made with the load line, was a 3' X 20' grating rack weighing approximately 11,000 lbs. The load was approximately 6' off the top deck at a 76-degree boom angle when the boom cable failed. The grating rack fell 6' onto the top deck and was followed by the boom descending onto the top deck. Additionally, two connex boxes and the tip rotated over the platform east handrail. No personnel were injured. Minor damage to process piping and equipment was noted, and no environmental releases occurred.

- **Corrective Actions to Repair / Mitigate Reported Incidents:** Immediately after the boom failure, the Field Foreman exited the office area and engaged the emergency shutdown station (ESD) to secure platform production. Simultaneously, the muster alarm was sounded, and headcount conducted. After the headcount was made and all personnel accounted for, response personnel were dispatched to the top deck. Response personnel ensured that all production was secured, and no release of hydrocarbons had occurred. After the initial survey was completed and approval granted by BSEE, the boom and tip were secured with rigging to prevent the crane boom from further damaging production equipment.
- **Lessons Learned / Actions to Mitigate Recurrence:**
  - The same master reel lot number wire rope was used on another [company] location. Wire rope was quarantined and removed for failure analysis. The cable displayed breaking force consistent with certification documentation.
  - Revise [company] crane policies, procedures, and inspections to exceed API RP 2D, 6th Edition Appendix G.5.1.3. "Wire Rope Replacement Criteria," including those that have exceeded the minimum nominal diameter.
  - Include additional wire rope micrometer evaluations of the boom cable on all [company] operated cranes during quarterly and annual inspection schedules. Readings will be taken in areas of high rotation and wear.
  - Precautionary Failure Analysis Study - Conduct boom wire rope replacement at a maximum of 100 hours or within one year on the...crane to determine adequate wire rope replacement criteria and crane function.
  - Investigate alternative lubrication products that provide ample penetration to the cable core.



## DROPPED BELL HOUSING RESULTS IN INJURY

**Incident Description:** An ROV [Remote Operated Vehicle] team was performing maintenance on an ROV skid replacement. The supervisor was on top of the ROV to change out the bell mouth housing liners. The plan was to loosen the six bolts then remove those, attach a rope, and lower each half of the housings down to the deck one at a time. Once on deck, remove the worn liners, and install the new ones. As the supervisor was removing the fifth bolt, the last bolt came apart. This resulted in the bell mouth housings [dropping]...approximately four feet. One of them contacted the supervisor's leg and abraded it. The second housing slid down the ROV framing and came to a stop. There was also an ROV worker in the cone of exposure.

- **Corrective Actions to Repair / Mitigate Reported Incidents:** Inform all ROV systems about the incident and what lessons learned were identified. All maintenance and repair activities will have mandatory drop zone identified as a mitigation in the [Job Safety Analysis – JSA]. Engineering to review current design of bell mouths and re-design as needed. Application and removal procedure for bell mouth housings to be developed after re-design.
- **Lessons Learned / Actions to Mitigate Recurrence:** No secondary retention to prevent DROPS was utilized. Secondary retention requirements will be outlined in the new procedure and listed as a mitigation step on the risk assessment / [JSA]. Zone management for DROPS was not utilized. Zone management will be a standalone step in the [JSA] and work instruction. There are a few ways to change out the bell mouth housing liners but no written guidance. A written procedure for bell mouth housing liners will be developed.
- **Areas for Improvement:**
  - **Quality of Task Planning and Preparation:** The team did not adequately complete the pre-planning steps including identifying drop zones and identifying secondary retention system(s).

**Additional Comments:** Each half of the ROV bell housing weighs 110 lbs. They are 24"x24"x12" each. Top of courser to deck is 15 feet. Maintenance activity took place while vessel was dockside.

## FAILURE TO SECURE REPLACEMENT GRATING RESULTS IN SIGNIFICANT INJURY

**Incident Description:** A third-party construction crew [was] working to complete repairs and replacement of piping and grating. Three sheets of 1"x3'x20' grating had been previously staged and secured to the handrail with rope lashing. One sheet was removed and placed horizontally on the decking to be cut in preparation for relocation. Instead of re-lashing the grating to the handrail, the [injured person] (IP) used his right arm to keep the additional two sheets secured against the handrail. The IP released his grip on the two grating sheets to assist the team member who had cut the horizontal sheet on the deck. Upon releasing his grip, the two sheets fell on his right knee and leg which pushed him to the deck and resulted in a significant knee injury.

- **Corrective Actions to Repair / Mitigate Reported Incidents:** Proper job preparation includes identification and hazard assessments including:
  - Planning the staging of tools and materials including placement of or storage of materials along handrails or structures.
  - Material handling hazards including procuring, movement, cutting and storing of grating, plating, or piping.
  - The potential for "low elevation dropped objects" and "line of fire" incidents while moving or storing of materials.







- **Lessons Learned / Actions to Mitigate Recurrence:**

- Previously, the three sheets of grating were staged and lashed against the handrail due to a congested work environment.
- The [JSA] failed to identify the hazards or mitigating actions associated with relocation of the grating.
- Once tools and equipment were procured, the rope securing the grating was removed and [the grating was] held in place against the handrail by the IP.
- The IP released his right-hand grip on the two vertical sheets. Upon releasing his grip, the two sheets of grating fell onto the IP's right leg and knee, pushing him to the deck.

- **Areas for Improvement:**

- **Risk Assessment and Management Process:** Preparation, hazard assessment, and mitigating actions of work tasks associated with the grating preparation were not documented or communicated to individuals performing the task utilizing the [JSA] process.

### **UNSECURED 100 LB AIR CONDITIONING UNIT FALLS 25 FT DURING LIFT**

**Incident Description:** During crane operations a window air conditioning unit that had recently been replaced...was being relocated from a landing area to a scrap metal basket. The A/C unit was rigged with 2 nylon straps around the outer housing [and] a signal was given to the Crane Operator to begin lift. Once the lift was approximately 25 feet above the deck, the A/C unit, weighing 100 lbs., slid out of the outer housing/casing and fell back to the deck below. The outer housing rigged with nylon straps stayed suspended and was lowered by the crane to a safe location on the main deck. Once the lift began the riggers positioned themselves at the East & West stairway access to make sure no one entered the lift zone and were approximately 12-15 feet from the point of impact. No personnel were injured during this incident.

- **Corrective Actions to Repair / Mitigate Reported Incidents:** Stop Work Authority [SWA] was exercised and [Ultimate Work Authority] [UWA] notified. A safety stand-down was called to discuss the incident and determine the causes.
- **Lessons Learned / Actions to Mitigate Recurrence:** During the stand-down it was discovered that the individual performing the rigging didn't recognize that the A/C unit was comprised of 2 separate pieces (the A/C unit & outer housing) and that the potential existed for the two sections to separate during lifting operations. Moving forward, PICs [Persons in Charge] will ensure that small items to be lifted are placed in a dedicated container / basket to be safely contained during transit.
- **Areas for Improvement:**
  - **Risk Assessment and Management Process:** Small items...to be lifted are [to be] placed in a dedicated container / basket to minimize the risk for potential drops.
  - **Personal Skills or Knowledge:** The individual learned that window A/C units [are comprised] of an outer shell and a separable internal main unit.

### **5.4.2 MAINTENANCE, INSPECTION, AND TESTING**

Ten of the LFI and Crane incident submittals (18%) were related to Maintenance, Inspection, and Testing (MIT) activities.

The following incident descriptions and learnings are excerpted examples of learnings for MIT:

#### **CLOSED VALVES IN FIRE WATER SYSTEM FOUND DURING INSPECTION**

**Incident Description:** While using the firewater system during In-Service Inspection Program (ISIP) cleaning operations, there was a loss of water pressure in the fire hose being used. Upon further investigation, it was found that

two ring main valves were closed for 8 days that allowed for full function of the firewater system. During this time, a portion of the facility had limited availability of fire water.

- **Corrective Actions to Repair / Mitigate Reported Incidents:** Manually opened firewater valves to allow for full function of the firewater system.
- **Lessons Learned / Actions to Mitigate Recurrence:** Purchased valve position indicators that were a different color than the valves after it was discovered the positioner indicators were the same color as the valves, making it difficult to easily verify valve position.
- **Areas for Improvement:**
  - **Design or Layout of a Facility or Individual Piece of Equipment:** Valve position indicators were the same color as the valves, making it difficult to determine valves' positions.
  - **Facility or Equipment Reliability:** A ring main valve pin sheered due to aging during monthly functioning of the manual valve.
  - **Quality of Task Execution:** During a turnaround (TAR) 6 months prior to incident, a firewater system valve was isolated for a planned removal that was delayed. The valve was inadvertently left in the closed position

## WORKERS SPRAYED WITH TRAPPED HYDROCARBONS DURING TURNAROUND

**Incident Description:** While removing the header equalization line during a scheduled turnaround (TAR), hydrocarbon fluid was released from between the compact valve and connection flange. The line had been isolated and double-blocked and bled prior to work commencing. Zero pressure was measured on the gauge. Two Workers removing the bolts on the flange were sprayed with a small amount of hydrocarbon fluid, and the nearby gas detector was activated. Both Workers reported to the Medic and Medical Control Physician for evaluation. First aid was provided, and both Workers returned to work without restrictions.

- **Corrective Actions to Repair / Mitigate Reported Incidents:** The gas detector alarm sounded, so Non-Responder Crew Members mustered in the production galley. The Offshore Installation Manager (OIM) ordered a safety stand-down. All work was stopped, and initial investigation actions were conducted to take pictures of the accident site. The Production Supervisor and Production Lead went to the source of the alarm on the headers and confirmed there was no continuous gas leak. The OIM declared the all-clear. The OIM, Production Supervisor, and Production Lead surveyed the scene of the release to ascertain that all isolations were in place and were adequate. The bleed line was disassembled and found to be unobstructed.
- **Lessons Learned / Actions to Mitigate Recurrence:** Placed [vapor barrier] around the flanges of the equalization header before proceeding with the removal to prevent any hydrocarbon fluid release due to remaining static pressure to protect Workers from exposure. Reviewed all similar isolations for the TAR to look for any other possibilities of hydrocarbon release due to residual static pressure. As a result, updates were made to the compliance and leadership tool for replacing hydrocarbon piping to identify any trapped fluids and whether they can be removed through activation of lower valves to move trapped fluids to other areas not included in isolation.
- **Areas for Improvement:**
  - **Design or Layout of a Facility or Individual Piece of Equipment:** There was no bleed point located low enough on the header system to ensure that all residual fluid had been bled off prior to breaking containment.
  - **Risk Assessment and Management Process:** The Leads who were responsible for bleeding the system and verifying isolation did not consider the possibility that residual fluid could be contained above the flange due to the high location of the bleed point; therefore, the risk assessment overlooked this.

## CORROSION UNDER HELIDECK POSES DROPPED OBJECT THREAT

**Incident Description:** Due to aging, corrosion of the I-beams under the Platform's helideck has led to delamination of steel, creating the potential for dropped/falling objects.



- **Corrective Actions to Repair / Mitigate Reported Incidents:** Removed delaminated pieces that may have become falling objects. The pieces were of varying size and weight (most were small pieces, but the largest identified was 1.56 pounds, or 0.7 kilograms). The helideck is over the quarters building. Exterior areas below include the helicopter passenger staging area, smoking area, one of the lifeboats, and the fast rescue craft. Potential fall distance is between 10 and 35 feet, or 3 to 12 meters. The worst case of a 0.7-kilograms object falling 12 meters results in a kinetic energy of 82 Joules.

The area was not barred until reported

- Implemented a personal protective equipment (PPE) requirement for the area under the helideck and outside of the production living quarters to protect against potential falling debris until the hazard is mitigated.
  - Ordered that personnel can no longer be located under the helideck when awaiting a helicopter; they must wait until the helicopter lands and then proceed to the waiting area.
- **Lessons Learned / Actions to Mitigate Recurrence:** Performed a thickness inspection of beams under the helideck to identify critical structural components that may have been affected. Some areas of concern were further assessed using a structural analysis model, which showed that the structure has significant redundant strength, and only minor remedial work to ensure no water ingress into hollow beams will be done prior to repainting.

Shared learnings to other operations within the Company.

Planned for corrosion mitigation/painting to be performed for the structural support of the helideck.

- **Areas for Improvement:**

- **Facility or Equipment Reliability:** Due to aging, corrosion of the I-beams under the Platform's helideck has led to delamination of steel, creating the potential for dropped/falling objects. Delaminated pieces that could have become dropped/falling objects were removed, administrative controls to minimize personnel risk were implemented, and corrosion mitigation/painting is planned for the structural support of the helideck.

### 5.4.3 DECOMMISSIONING

Nine of the LFI and Crane incident submittals (16%) were for incidents that occurred during Decommissioning Activities.

The following incident descriptions and learnings are excerpted examples of learnings for Decommissioning:

#### **PARTED ANCHOR WIRE STRANDS DIVER**

**Incident Description:** The diving vessel was moored to the...structure with a soft mooring line (spring line) shackled to the #3 stern anchor wire of the diving vessel. A contract diver was in the water cold cutting scrap members to recover a section of decking when the stainless-steel anchor wire parted allowing the vessel to drift off location. The diver was able to follow the drifting vessel and crew members recovered the diver without incident.

- **Corrective Actions to Repair / Mitigate Reported Incidents:** An additional secondary mooring line will be attached to the shackle. In the event the anchor wire parts, the vessel will remain moored to the structure by the secondary line.
- **Lessons Learned / Actions to Mitigate Recurrence:** Guidance will be issued on adjusting "spread" in the mooring set-up to reduce mooring line shock load during impactful weather. The length of mooring line that receives the most wear, approximately 100', will be cut and replaced quarterly.

## WELDER CUTS SUPPORT FOR PLATFORM HE'S STANDING ON RESULTING IN INJURY

**Incident Description:** In the process of removing a decommissioned offshore platform, a contract welder was performing cuts on vertical connections from the main deck to the cellar deck, on which he was standing. After [injured person] (IP) made the cuts to the vertical supports, the outboard portion of the cellar collapsed. The IP fell with the cellar deck approx. 10', landing on the (+)5' boat landing directly below, resulting in injury.

- **Corrective Actions to Repair / Mitigate Reported Incidents:** A safety stand down was performed and attended by the Contractor's onshore leadership team and [Operator] representatives. Management of Change (MOC) procedures have been updated. The Contractor Superintendent, Deck and Welding foreman will verify all cut plans. Hold points will be established to re-evaluate the work during the process. The Contractor Deck and Welding foreman will inspect all supporting members for corrosion prior to cuts being made. Any changes to cut plans or procedures shall be documented and approved through an MOC.
- **Lessons Learned / Actions to Mitigate Recurrence:** The IP cut vertical supports of the cellar deck section on which he was standing. The structural integrity of the platform was underestimated. It was not recognized that the 6" horizontal members were corroded to the point where they would not hold the weight of the cellar deck once the vertical / diagonal supports were severed.

## CLIMBING DOWN RED-TAGGED SCAFFOLDING RESULTS IN INJURY

**Incident Description:** The [injured person] (IP) was assigned the task of accessing the scaffold platform to close a needle valve on riser to pressure test. IP was being monitored by the [Plug & Abandonment] P&A supervisor from the deck above. The scaffold being accessed was tagged red and not to be used due to not having ladder access and an incomplete scaffold floor. A self-retracting lifeline was installed overhead for use. The IP completed the task and was climbing down from the scaffold, to remove himself from a high-pressure area, when his left foot slipped on a lower horizontal scaffold bar. The employee fell back and down 22 inches to the deck and sustained a 2-inch laceration to his right elbow.

- **Corrective Actions to Repair / Mitigate Reported Incidents:** A safety stand down was conducted with the on-tour crew to discuss/review the procedures for fall protection requirements while working from elevated work platforms and inside open hole barricades. This stand down was also presented to the oncoming night crew at the scheduled...pre-tour meeting. The onsite scaffold builder corrected the ladder issue and floor opening on the scaffold platform and a yellow tag was affixed to put the scaffold in service.
- **Lessons Learned / Actions to Mitigate Recurrence:** The onsite scaffold builder corrected the ladder issue and floor opening on the scaffold platform and a yellow tag was affixed to put the scaffold in service.







# APPENDIX 1 SPI DEFINITIONS & METRICS

| SPI NO. | SPI DEFINITION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SPI METRIC                                               | REPORTING ENTITY                                                                                                                                                                                                 |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SPI 1   | <p>Number of work-related incidents resulting in one or more of the following consequences:</p> <ul style="list-style-type: none"> <li>A. Fatality: One or more fatalities.</li> <li>B. Injury to 5 or more persons in a single Incident</li> <li>C. Tier 1 Process Safety Event: (API RP 754 / IOGP Report 456 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: <ul style="list-style-type: none"> <li>▪ an employee, contractor or subcontractor “days away from work” injury and / or fatality;</li> <li>▪ a hospital admission and / or fatality of a third-party;</li> <li>▪ an officially declared community evacuation or community shelter-in-place;</li> <li>▪ a fire or explosion resulting in greater than or equal to \$25,000 of direct cost to the Company;</li> <li>▪ 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"> <li>▪ liquid carryover</li> <li>▪ discharge to a potentially unsafe location</li> <li>▪ an onsite shelter-in-place</li> <li>▪ public protective measures</li> </ul> </li> <li>▪ and a PRD discharge quantity greater than the threshold quantities for a Tier 1 PSE in IOGP Report 456 Part E in any one-hour period; or</li> <li>▪ A release of material greater than the threshold quantities for a Tier 1 PSE described in IOGP Report 456 Part E in any one-hour period.</li> </ul> </li> <li>D. Level 1 Well Control Incident: Loss of well control <ul style="list-style-type: none"> <li>▪ Uncontrolled flow of formation or other fluids resulting in:</li> <li>▪ Seabed / surface release.</li> <li>▪ Underground communication to another formation or well.</li> <li>▪ Includes shallow water flows that result in damage or loss of facilities / equipment</li> <li>▪ Excludes planned shallow gas mitigation operations.</li> </ul> </li> <li>E. \$1 million or greater direct cost from damage to or loss of facility / vessel / equipment (excludes costs associated with downtime or production loss).</li> <li>F. Oil spill to water ≥ or equal to 10,000 gallons (238 barrels)</li> </ul> | # of <b>SPI 1</b> incidents / total work hours * 200,000 | <p>COS Member Operator for all incidents within the 500-meter zone and for incidents to direct employees while offshore</p> <p>COS Member Contractor for incidents outside the 500-meter zone while offshore</p> |



| SPI NO. | SPI DEFINITION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SPI METRIC                                               | REPORTING ENTITY                                                                                                                                                                                                 |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SPI 2   | <p>Frequency of work-related incidents that do not meet the definition of a <b>SPI 1</b> incident but have resulted in one or more of the following:</p> <ul style="list-style-type: none"> <li>A. Tier 2 Process Safety Event: (API RP 754 / IOGP Report 456 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 CO<sub>2</sub>, 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: <ul style="list-style-type: none"> <li>▪ An employee, contractor or subcontractor recordable injury;</li> <li>▪ A fire or explosion resulting in greater than or equal to \$2,500 of direct cost to the Company;</li> <li>▪ 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:</li> </ul> </li> <li>B. Collision that results in property or equipment damage ≥ \$25,000</li> <li>C. Incident Involving Mechanical Lifting <ul style="list-style-type: none"> <li>▪ A mechanical lifting (or lowering) incident that results in one or more of the following consequences. Mechanical lifting includes lifts of an asset or personnel (personnel transfer and man-riding).</li> <li>▪ Consequences: <ul style="list-style-type: none"> <li>▪ One to four recordable injuries in a single incident that occurs during the lift</li> <li>▪ Between \$25,000 and \$1 million direct damage to or loss of an asset (including the load itself)</li> <li>▪ A loss of primary containment of a material meeting a Tier 2 Process Safety Event threshold quantity</li> <li>▪ A dropped load that strikes live process equipment</li> </ul> </li> <li>▪ Not Included: <ul style="list-style-type: none"> <li>▪ Lifting incident resulting only in a first aid injury</li> <li>▪ Lifting incident resulting only in direct damage to an asset (including the load itself) &lt; \$25,000</li> <li>▪ Lifting incident resulting only in a slipped load</li> <li>▪ Dropped load or object into the water valued at &lt; \$25,000</li> <li>▪ Manual lifting incidents</li> </ul> </li> </ul> </li> <li>D. Loss of station keeping resulting in drive off or drift off defined as a malfunction or improper operation of the dynamic positioning system</li> <li>E. Lifeboat, life raft, or rescue craft event that resulted in a recordable injury or equipment damage or malfunction during lifeboat, life raft, or rescue craft operations or that take it out of service.</li> <li>F. Level 2 Well Control Incident <p>One barrier system within the well design failed and other barrier system(s) either failed or were challenged beyond design capacity resulting in an influx without uncontrolled flow.</p> </li> </ul> | # of <b>SPI 2</b> incidents / total work hours * 200,000 | <p>COS Member Operator for all incidents within the 500-meter zone and for incidents to direct employees while offshore</p> <p>COS Member Contractor for incidents outside the 500-meter zone while offshore</p> |

| SPI NO.      | SPI DEFINITION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | SPI METRIC                                                                                                                                                       | REPORTING ENTITY                                                                                                                                                                                                 |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SPI 3</b> | <p>Number of <b>SPI 1</b> and <b>SPI 2</b> 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"> <li>A. Well pressure containment system</li> <li>B. Christmas trees</li> <li>C. Downhole safety valves</li> <li>D. Blow out preventer and intervention systems</li> <li>E. Process equipment / pressure vessels, piping</li> <li>F. Automated safety instrumented systems / shutdown systems</li> <li>G. Pressure relief devices, flare, blowdown, rupture disks</li> <li>H. Fire/gas detection and fire-fighting systems</li> <li>I. Mechanical lifting equipment / personnel transport systems</li> <li>J. Station keeping systems</li> <li>K. Bilge / ballast systems</li> <li>L. Lifeboat, life rafts, rescue craft, launch and recovery systems</li> <li>M. Other</li> </ul> <p>Definitions for the above systems can be found in the COS Safety Performance Indicator Program User Guide.</p> | <p>Number of <b>SPI 1</b> and <b>SPI 2</b> incidents involving failure of equipment / total number of <b>SPI 1</b> and <b>SPI 2</b> incidents * 100</p>          | <p>COS Member Operator for all incidents within the 500-meter zone and for incidents to direct employees while offshore</p> <p>COS Member Contractor for incidents outside the 500-meter zone while offshore</p> |
| <b>SPI 4</b> | <p>Crane or personnel / material handling operations defined as a failure of the crane itself (e.g., the boom, cables, winches, ball ring), other lifting 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). Reference MMS NTL 2019-N05.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                  |                                                                                                                                                                                                                  |
| <b>SPI 5</b> | <p>Number of planned critical maintenance, inspections and tests completed on time.</p> <p>A planned task can be deferred if a proper risk assessment was completed and approved, and a new due date set.</p> <p>COS Equipment:</p> <ul style="list-style-type: none"> <li>A. Well pressure containment system</li> <li>B. Christmas trees</li> <li>C. Downhole safety valves</li> <li>D. Blow out preventer and intervention systems</li> <li>E. Process equipment/pressure vessels, piping</li> <li>F. Automated safety instrumented systems / shutdown systems</li> <li>G. Pressure relief devices, flare, blowdown, rupture disks</li> <li>H. Fire/gas detection and fire-fighting systems</li> <li>I. Mechanical lifting equipment / personnel transport systems</li> <li>J. Station keeping systems</li> <li>K. Bilge / ballast systems</li> <li>L. Lifeboat, life rafts, rescue crafts, launch and recovery systems</li> <li>M. Other</li> </ul>                                                      | <p>Number of critical maintenance, inspections and tests tasks completed on time / number of critical maintenance, inspections and tests tasks planned * 100</p> | <p>COS Owner of Equipment</p>                                                                                                                                                                                    |



| SPI NO.           | SPI DEFINITION                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | SPI METRIC                                                                        | REPORTING ENTITY                                                                                                                                                       |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SPI 6</b>      | Number of work-related fatalities                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Number of work-related fatalities                                                 | COS Member Operator when within the 500-meter zone and for direct employees while offshore<br><br>COS Member Contractor when outside the 500-meter zone while offshore |
| <b>SPI 7</b>      | Number of DART injuries and illnesses. BSEE defines DART injuries or illnesses as those that resulted in "Days Away from work, Restricted duty, and Job Transfer" outcomes.                                                                                                                                                                                                                                                                                                          | # DART / total work hours * 200,000                                               | COS Member Operator when within the 500-meter zone and for direct employees while offshore (same as reported on BSEE-0131 Form)                                        |
| <b>SPI 8</b>      | Number of recordable injuries and illnesses                                                                                                                                                                                                                                                                                                                                                                                                                                          | Number of recordable injuries and illnesses / total work hours * 200,000          | COS Member Operator when within the 500-meter zone and for direct employees while offshore (same as reported on BSEE-0131 Form)                                        |
| <b>SPI 9</b>      | Number of spills greater or equal to 1 barrel that enter the water                                                                                                                                                                                                                                                                                                                                                                                                                   | Number of spills $\geq$ or equal to 1 barrel / total work hours * 200,000         | COS Member Operator for all spills within the 500-meter zone<br><br>COS Member Contractor for spills outside the 500-meter zone while offshore                         |
| <b>SPI 10</b>     | Number of dropped objects, their severity per the DROPSONLINE Calculator ( <a href="https://dropsonline.org/resources-and-guidance/drops-calculator">dropsonline.org/resources-and-guidance/drops-calculator</a> ) and their actual resulting injuries, if any. <ul style="list-style-type: none"> <li>▪ Potential Fatality</li> <li>▪ Potential Major</li> <li>▪ Potential Minor</li> <li>▪ Potential Slight</li> <li>▪ Number of dropped objects resulting in zero harm</li> </ul> | Number of dropped objects per severity / total number of dropped objects reported | COS Member Operator for all dropped objects within the 500-meter zone<br><br>COS Member Contractor for dropped objects outside the 500-meter zone while offshore       |
| <b>Work Hours</b> | For offshore workers, the hours worked are calculated on a 12-hour work day. Work hours are collected in the following categories: <ul style="list-style-type: none"> <li>▪ Total U.S. OCS construction workforce hours inside 500-meters</li> <li>▪ Total U.S. OCS well workforce hours inside 500-meters</li> <li>▪ Total U.S. OCS production workforce hours inside 500-meters</li> <li>▪ Total U.S. OCS workforce hours inside 500-meters</li> </ul>                             |                                                                                   | COS Member Operator when within the 500-meter zone (same as reported on BSEE-0131 Form)                                                                                |









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