**Tier 2 Methanol Release**

**31st July, 2022**

**SA-G Well @ BJSA**

[***#546575***](https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Feu2.spheracloud.net%2Finsight%3Fc%3DA10346D53BA14937A6C0%26fa%3D1%26rc%3DQH4d%24UkgWHkOd%24Y33Hs1gWc%26id%3Dggk57fus3_EU2%26urlAfterLogon%3D%255EAD137Y331cc%24kc0w!AIkccJkt1%3DUkgWHkOd%24Y33Hs1gWc*Hs%3DOO72MePca_hfK&data=05%7C01%7Cadriana.gonzaga%40shell.com%7Ce83f8d297dab4723784208da7982cc63%7Cdb1e96a8a3da442a930b235cac24cd5c%7C0%7C0%7C637955899931235799%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=t27vVmKVdBi%2Bu%2BIwTw6aDfU5MX%2FtvZanHnHCMF7voRM%3D&reserved=0)

**RESTRICTED**

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| --- | --- | --- | --- |
| **REV.** | **DESCRIPTION** | **ENDORSED BY** | **DATE** |
| 00 | Issue for use | Valdir Pessoa |  |

# Executive Summary

Summary of the Incident

Key Investigation Findings – what happened, how it happened, why it happened.

Causal themes or insights determined / agreed through learning sessions can be included

Corrective actions (select the most important/impactful) can be summarised

The Executive Summary is important and will be the first (and often only) part of the report that is read. It needs to present the most important elements of the incident investigation to enable the reader to grasp what, how and why it happened, and what was done about it.

Summarising the detail of the investigation can be difficult and require more time than anticipated.

Written well the Executive Summary can be used as a basis for other communications about the incident – helping establish that the Investigation Report is the one source of truth.

The Incident Investigation Summary (where developed) and any other presentations must be consistent and aligned with the Executive Summary.

Include photographs and diagrams only if they are essential for people to understand. Ensure that you respect the ownership and acknowledge any copyright of photos.

# Table of Contents

[Executive Summary 2](#_Toc121317056)

[Table of Contents 3](#_Toc121317057)

[1 Incident Description 4](#_Toc121317058)

[2 Investigation Terms of Reference and Investigation Team 5](#_Toc121317059)

[3 Problem Statement 6](#_Toc121317060)

[4 Background Information 7](#_Toc121317061)

[5 Timeline 8](#_Toc121317062)

[6 Causal Analysis 9](#_Toc121317063)

[7 Investigation Learning 10](#_Toc121317064)

[7.1 Key Learnings 10](#_Toc121317065)

[8 Actions 11](#_Toc121317066)

[8.1 Corrective Actions 11](#_Toc121317067)

[8.2 Continuous Improvement Opportunities 12](#_Toc121317068)

[Appendix 1. Terms of Reference 13](#_Toc121317069)

[Appendix 2. Background 13](#_Toc121317070)

[Appendix 3. Investigation Mural 13](#_Toc121317071)

# Incident Description

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| --- | --- | --- | --- |
| **Incident Title** | | Tier 2 Methanol release to the sea | |
| **Incident Date** | | 31st July, 2022 | |
| **Incident Location** | | SA-G Well @ BJSA | |
| **Incident Classification** | | LOPC > 100kg/1h, PSE Tier 2 | |
|  | | **Actual** | **Potential** |
| **Incident Consequences in words** | | 220L Methanol release to the environment through the SA-G Well. | Slight impact of Methanol to the environment /  Damage to Shell reputation with stakeholders |
| **RAM Rating** | **People** | - | - |
| **Assets** | - | - |
| **Environment** | 1 | 1D |
| **Community** | - | - |

On July 31st, 2022 at 00:13h, the Island Enforcer was retrieving a tree cap from SA-G well in order to install a new cap with adapter for the rig arrival pre-P&A (Plug and Abandonment) intervention. During this operation, a pressure drop was observed on the SA-G well head. In order to maintain positive pressure on the tree cavity, two (02) subsequent methanol injection activities were performed aiming to prevent hydrate formation. However, further pressure drop was observed after the execution of both methanol injections steps indicating that the well single barrier (prior to the installation of the XO (Cross Over Valve) and adapter on the SA-G Well), the Production Swab Valve, was passing. The operation was stopped and the cap replaced.

After initial investigation, it has been confirmed that the methanol was being released to the environment as there was no indication that methanol was going to the jumpers/manifold or inside the well through the PMV/AMV (Production Master Valve / Annulus Master Valve).

Total volume of Methanol assumed to be released to sea between 00:48am and 01:33am is above 100kg (220L of methanol estimated).

# Investigation Terms of Reference and Investigation Team

The Investigation Terms of Reference endorsed by Valdir Pessoa on 18th August, 2022.

A copy of the Terms of Reference is attached in Appendix 1.

The key members of the Investigation Team were:

|  |  |  |
| --- | --- | --- |
| **Role** | **Name** | **Job Title** |
| Investigation Sponsor | Valdir Pessoa | S&E General Manager |
| Incident Investigator | Ligia Inafuku | Safety Sr. Advisor |
| Investigation Team Member  (SHELL) | Diego Osório | Project & Subsea IMR |
| Danilo Esteves | BJSA Operations and Integrity Lead |
| Carolina Monnerat | BJSA Subsea Engineer |
| Jonathan Harrelson | Staff Wells Engineer |
| Paula Silveira | Process Safety Lead |
| Alfeu Alcantara | Marine Technical Advisor |
| Michael Lees | Sr. Geomatics Coordinator |
| Quality Assurance | Andrea Cardoso | Operational Safety Manager |

# Problem Statement

The problem statement agreed with the Investigation Sponsor for the investigation was:

***Expected situation:***

Safe removal of SA-G well tree cap for temporary abandonment of SA-G well, keeping a positive and stabilized pressure in the X-Tree cavity with methanol prior to well entry.

***Actual situation:***

220L Methanol release to the environment through the SA-G Well (00:48 am to 01:33 am) on 31st July, 2022.

***Impact:***

Damage to Shell reputation with stakeholders

Tier 2 Process Safety Event

Slight impact to the environment

RAM Actual: 1 Environment

RAM Potential: 1D Environment

# Background Information

ADD Background to P&A and the need to access and intervene in SA-G well.

On July 31st, 2022 at 00:13h, the Island Enforcer was retrieving a tree cap from

Intervention on SA-G well in order to install a new cap with adapter for the rig arrival pre-P&A (Plug and Abandonment) intervention.

A HAZID was carried out to cover the risks involved in Cap Tree Recovery, installation and testing of the TRT + XO adapter and in the interface test with the Tree manifold of the BJ-R and SA-G well in preparation for the Abandonment as well as the corrosion cap recovery and installation of the DQ connector + OWBS + XO.

The operation was planned to be performed by the vessel Chouest Island Enforcer, therefore general intervention risks were covered in the general intervention HAZID for the vessel.

# Timeline

The timeline is presented in the Investigation Mural attached in Appendix 3 also available in the [link](https://app.mural.co/t/projectstechnology3065/m/projectstechnology3065/1660322311224/c6369d2a4d2111f928429072b87cfdf50f57af0a?sender=u4ed7c096e787b300d33d0455).

# Causal Analysis

The Cause and Effect Diagram is presented in the Investigation Mural attached in the Appendix 3 also available in the [link](https://app.mural.co/t/projectstechnology3065/m/projectstechnology3065/1660322311224/c6369d2a4d2111f928429072b87cfdf50f57af0a?sender=u4ed7c096e787b300d33d0455).

# Investigation Learning

The investigation team was asked to formulate Observations, Insights and Conclusions (OIC) about the incident to enable reflection and discussion on the causes discovered.

## Key Learnings

|  |  |
| --- | --- |
| 1. **Need for inputs from operations team in Hazid and elaboration of procedure** | |
| **Observation** | Flowrate limitation recommendation in HAZID |
| **Insight** | Flowrate recommendation in HAZID not aligned with operational practice |
| **Conclusion** | Need for participation of operations representative in risk studies or IOP to identify and avoid misalignment between procedure and operational reality/practice. |

|  |  |
| --- | --- |
| 1. **Need for familiarization of CROs with risks and operational instructions** | |
| **Observation** |  |
| **Insight** |  |
| **Conclusion** | Ensure learnings from this incident will be incorporated into next risk assessments for future operations |

|  |  |
| --- | --- |
| 1. **Need to capture learnings and incorporated into future Hazids** | |
| **Observation** | Tanker mooring area layout incompatible with AHTS mooring system that led to a last-minute change in operational procedure |
| **Insight** | Tankers might have different layouts and compatibility must be confirmed in advance |
| **Conclusion** | Need for systematics confirmation of tankers´ mooring area layout and AHTS mooring system. |

|  |  |
| --- | --- |
| 1. **FPSO CRO focused on delivering pressure** | |
| **Observation** | CRO Operator focused on delivering the required pressure |
| **Insight** | Flowrate parameter is not monitored and is even incompatible with the pressure control |
| **Conclusion** | Need for familiarization of CROs with risks and operational instructions |

|  |  |
| --- | --- |
| 1. **Interfaces IE e FPSO CRO – estabelecer melhor alinhamento e processo de tomada de decisão.** | |
| **Observation** |  |
| **Insight** |  |
| **Conclusion** | Perform integrated Toolbox talk between FPSO and intervention vessel – go over the operational instructions, risks and clarify interfaces. |

|  |  |
| --- | --- |
| 1. **Hazid considerou vazamento** | |
| **Observation** | Tanker mooring area layout incompatible with AHTS mooring system that led to a last-minute change in operational procedure |
| **Insight** | Tankers might have different layouts and compatibility must be confirmed in advance |
| **Conclusion** | Need for systematics confirmation of tankers´ mooring area layout and AHTS mooring system. |

# Actions

## Corrective Actions

|  |  |  |  |
| --- | --- | --- | --- |
| 1. **Subsea system training to MODEC production team** | | | |
| **What To address** | FPSO CRO believed pressure drop was acceptable/not alarming | | |
| **Solution Overview** | Provide training on the subsea system operations, intervention procedures, roles & responsibilities, and behaviours with MODEC production team.  *Prover treinamento da operação do sistema submarino, procedimentos de intervenção, responsabilidades, e comportamentos com time da produção da MODEC.* | | |
| **Solution Effectiveness** | Training will ensure operational behaviours and expected actions are known by the production team. | | |
| **Detailed Actions** | 1.1 | Deliver training to MODEC production team | 31/12/2022 |
| **Accountable Manager** | Carolina Monnerat | | |
| **Verification Requirements** | Detail any action effectiveness verification requirements | | |

|  |  |  |  |
| --- | --- | --- | --- |
| 1. **Involve MODEC production team in IOP (Intervention On Paper) and cascade information to CROs** | | | |
| **What To address** | Injection flowrate ~10L/min / FPSO CRO instructed operator to open valve at enough rate to deliver the needed pressure in the XT cavity | | |
| **Solution Overview** | Ensure that the MODEC production team is involved in the IOP (Intervention On Paper) and share information with the CROs afterwards.  *Garantir que haja envolvimento do time de produção da MODEC durante IOP (Intervention on paper) e posterior passagem de conhecimento aos CROs.* | | |
| **Solution Effectiveness** | Action will ensure MODEC production team can contribute with their inputs form the operational perspective and CROs are aware of procedures details/limitations. | | |
| **Detailed Actions** | 2.1 | Ensure involvement of MODEC production team in next IOP (Intervention On Paper) and share information with CROs | 30/04/2023 |
| **Accountable Manager** | Carolina Monnerat | | |
| **Verification Requirements** | Detail any action effectiveness verification requirements | | |

## Continuous Improvement Opportunities

|  |  |  |  |
| --- | --- | --- | --- |
| 1. **Incorporate lessons learned in HAZIDs of future operations** | | | |
| **Improvement Opportunity** | Ensure learnings from this incident will be incorporated into next risk assessments for future operations | | |
| **Action Detail** | 4.1 | Review risk assessment of intervention operation with MPSV to ensure update/elaboration of operational procedure encompasses lessons learned and risks mapped in the integrity system. | 01/12/2023 |
| **Accountable Manager** | Diego Osório | | |
| **Verification Requirements** | Detail any action effectiveness verification requirements | | |

# Terms of Reference

<<See Attachment>>

# Background Information - HAZID

<<See Attachment>>

# Investigation Mural

<<See Attachment>>