



أحد شركات مؤسسة البترول الكويتية  
A Subsidiary of Kuwait Petroleum Corporation

# Lessons Learned from 5 Years

## PSM Audits

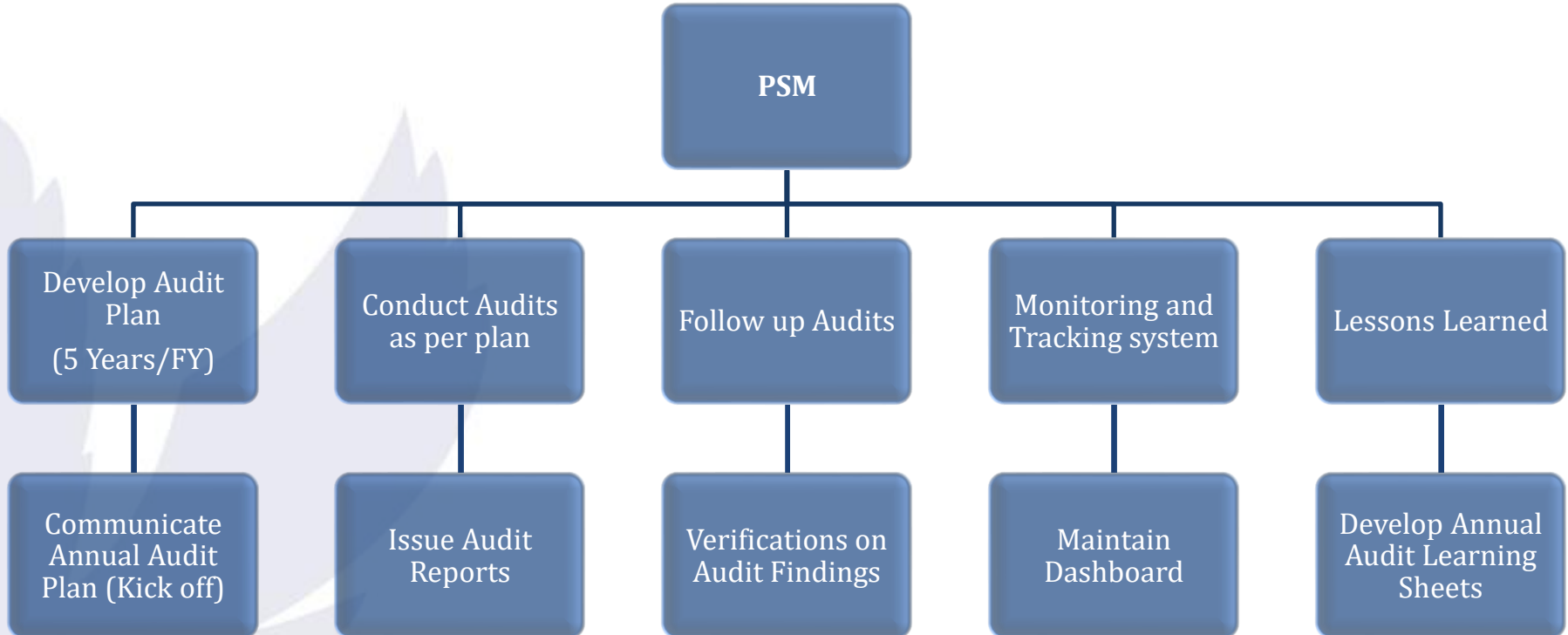
Senior process safety and integrity professional with **15+ years of experience** in petrochemical and oil & gas industries

**10 years as Senior Integrity Engineer at EQUATE,** focusing on asset integrity and reliability.

**3 years as RBI Engineer at Kuwait Oil Company (KOC),** specializing in risk-based inspection and equipment reliability.

**2 years as Senior PSM Engineer at KOC,** supporting the development and enhancement of Process Safety Management systems across major assets.

# Audit Journey



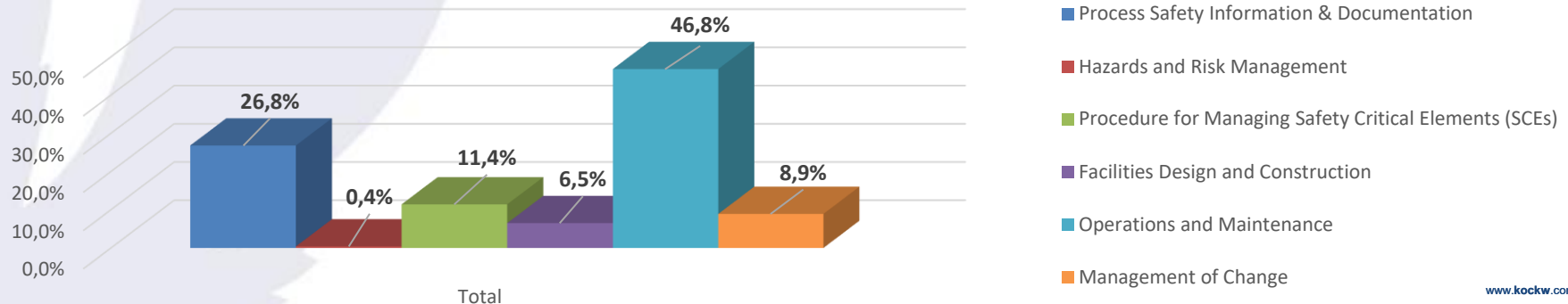
# PSM Audit Analysis (2021-2025)

## PSM Audit- 5 years Overview

No.	Title	Findings
1	Process Safety Information (PSI)	127
2	Mechanical Isolation	92
3	Safety Critical Elements (SCEs)	54
4	Plant Safety Override	49
5	Management of Change	42
6	Active Fire Protection Systems and Equipment	27
7	Emergency Shutdown System	24
8	Clamping of Piping and Pipelines	21
9	Bund Walls for Storage Tanks	14
10	Safe Deferral for Asset Integrity Management	10
11	Reliability Management	9
12	Pre-Startup Safety Review (PSSR)	4
13	Alarm Management System	2
14	Shift Handover	1
15	Project HSE Plan	1
Total		477

# PSM Audit Analysis by PSM Element

No.	PSM Element	Total
1	Process Safety Information & Documentation	26.8%
2	Hazards and Risk Management	0.4%
3	Procedure for Managing Safety Critical Elements (SCEs)	11.4%
4	Facilities Design and Construction	6.5%
5	Operations and Maintenance	46.8%
6	Management of Change	8.9%





# **Lesson 1**

## **O&M Execution Discipline**

**Strengthen Operations & Maintenance  
Discipline to Reduce High-Risk Findings**

# O&M Execution Discipline

## What the Data Showed:

- O&M contributed **46% of all findings** (the highest across all PSM elements).
- Recurring issues: ESDV test failures, improper testing methods, bund wall erosion, improper isolation practices, unauthorized overrides.

## Root Causes:

- Instrument malfunction
- Missing SRS
- Inadequate maintenance program
- Training gaps
- Culture of urgency allowing bypasses

## Improvement Actions Implemented:

- **Shutdown planning integrated with PSV calibration & ESD testing**, ensuring testing quality and compliance.
- **Competency-based O&M training embedded into PSM KPIs**, improving field execution quality.
- **Field verification audits introduced**, ensuring procedures are followed exactly in the field.



## **Lesson 2**

# **PSI Management and Documentation**

**Centralize and Govern PSI to Avoid  
Repeated Documentation Failures**



# PSI Management and Documentation

## What the Data Showed:

- PSI findings = 127 cases (27% of total).
- Missing MICs, outdated equipment lists, unavailable HAZOP/HAZID data, poor document control.

## Root Causes:

- No central database
- Lack of clear ownership for PSI
- Poor document control practices

## Improvement Actions Implemented:

- **KOC E-Technical Library** under development, creating a single, authoritative source of PSI.
- **SCE data migration to E-Beams**, reducing inconsistencies between documents and field requirements.
- **MOC Process digitalization**, ensuring PSI updates are triggered automatically during MOC closure.



## **Lesson 3**

# **SCE Reliability and Planning**

**Improve SCE Reliability Through  
Better Resourcing and Planning**

## What the Data Showed:

- Overdue PSV calibration
- Fire pumps not tested
- Defective gas detectors
- SCE performance standards not consistently applied

## Root Causes:

- Production demand  
(delayed shutdown)
- Contracts  
Management/Planning
- Inventory Management

## Improvement Actions Implemented:

- **PSV calibration and ESD testing** now coordinated with shutdown schedules, eliminating delays.
- **SCE database centralized in E-Beams**, improving visibility of deferment and work orders.
- **Supply-chain priorities** for SCE spare parts escalated.



# **Lesson 4**

## **Documentation–Execution Misalignment**

**Documentation Gaps Cause Execution  
Failures in the Field**

## What the Data Showed:

- Missing SRS → incorrect ESDV testing
- Isolation plan drawings not matching real field conditions
- HAZOP/HAZID documents unavailable
- Missing SCE lists → incomplete testing

## Root Causes:

- PSI not updated
- PSI ownership unclear
- As built drawing not updated

## Improvement Actions Implemented:

- **E-Technical Library** (in progress) ensures updated documentation is accessible to all facilities.
- **MOC Process. Digitalization** ensures PSI updates are embedded in workflow.
- **Field verification audits** ensure that drawings and procedures match real equipment configuration.



## **Lesson 5**

# **Behavioral and Cultural Drivers**

**Cultural and Behavioral Risks Must Be  
Addressed Alongside Technical Risks**

# Behavioral and Cultural Drivers

## What the Data Showed:

- Unauthorized overrides
- Isolation plans not followed
- Deviations under urgency  
( Production Pressure)

## Root Causes:

- Risk-taking culture under pressure
- Weak enforcement of procedural discipline
- Insufficient accountability

## Improvement Actions Implemented:

- **Competency-based training** linked to PSM KPIs, culture awareness .
- **Field verification audits** provide real-time coaching and noncompliance correction.
- **Strengthened contractor oversight** integrated into audits.



## **Lesson 6**

# **Contract/Supply-Chain Support Gaps**

**Contracting and Supply Chain Gaps Create  
Hidden Process Safety Risks**



# Contract/Supply-Chain Support Gaps

## What the Data Showed:

- Missed fire pump tests due to expired contract
- Gas detectors defective due to spare parts delays
- SCE maintenance waiting for planned shutdowns

## Root Causes:

- Contract management
- Supply chain management

## Improvement Actions Implemented:

- **Turnaround management**
- **SCE data migrated to E-Beams** to improve visibility and scheduling.
- **Contractor management** reviewed under PSM compliance audits.

# What the Data Taught Us

## Over 477 findings across 5 years and multiple assets revealed six systemic weaknesses:

- O&M execution discipline
- PSI management and documentation
- SCE reliability and planning
- Documentation–execution misalignment
- Behavioral and cultural drivers
- Contract/supply-chain support gaps

# Targeted Improvement

- E-Technical Library (single source of truth for PSI)
- SCE data migration to E-Beams
- Shutdown-linked PSV/ESD testing schedule
- Competency-based training tied to PSM KPI
- Field verification audits
- Digitalizing MOC Process with PSI triggers

# Results

- Better alignment between documentation and field execution
- Improved SCE oversight and planning
- Stronger competency and procedural discipline
- Enhanced long-term PSM governance
- Learning sheets for Audit Lessons Learned

# Questions ?

Shafee Al-Awadhi

Senior Process Safety Management Engineer

smawadhi@kockw.com

**Thank You**

A Subsidiary of Kuwait Petroleum Corporation  
**KOC Headquarters**  
P.O.Box 9758, Ahmadi 61008, Kuwait  
T. +965 23989111 C.R. 21835 F. +965 23983661