Observation technique

Working Together for Safety Recommended Practice 054E/2024

Prepared by Working Together for Safety Working Group: **August 2024**	Version: **Rev 00**	Working Together for Safety Project Manager: Hugo Halvorsen Hugo Halvorsen (signature on file)
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1. Introduction

Briefly put, good observation technique (OT) is about actively looking for anything that might constitute a hazard, or conditions that might develop into an undesired incident. Through practise, one can improve one's ability to notice these kinds of conditions, and positive conditions that others can learn from, in order to prevent hazardous conditions from arising. Various methods can be used to simplify observing such conditions at the work site. One example of such a method is to select a limited area in which to make observations; another is to choose a topic (such as this year's colour on lifting equipment) to look for. Checklists can also be used as a tool. By practising using such methods, each individual employee can strengthen their observation technique and skills.

Good OT training increases the likelihood that the reported observations will be of high quality. OT has traditionally been connected with preventing dropped objects but should cover all risk conditions and error traps linked to the risk of both major accidents and personal injury.

Management teams and others who handle reported observations should view the observations in context, in order to gain an overview of the total risk picture at the relevant work site and use this in planning and upcoming activities. If several observations of possible barrier weaknesses are received, all relating to the same defined situation of hazard and accident (DSHA) that may contribute to a major accident, this can provide management with an indication of where resources should be prioritised. A barrier series is a visualisation of several possible weaknesses, which together and individually may contribute to the same undesired incident occurring. The use of barrier series has proven to be motivating for observers. They are also useful in the training of management teams and others who handle reported observations to extract and collate information and gain an overview of the bigger picture.

The company must have routines for ensuring observations that may be linked to a major accident are identified as important and processed going forward. The system for identifying these observations should also be linked to the barrier monitoring system used at the workplace. Experience shows that the use of OT can identify weaknesses in barriers, even where the system status panel shows the barrier's status is green.

2. Purpose

The purpose of this recommendation is to help strengthen the organisation's safety culture through the increased use of good observation technique. This recommendation describes how active use of OT and the processing of reported observations can help reduce the risk of undesired incidents within the industry, with regard to both major accidents and personal injuries.

This recommendation also aims to highlight the importance of everyone contributing with observations – and thereby increase the motivation for all employees to participate actively in the work to avoid undesired incidents.

3. Target group

The target group for this recommendation is all organisations and all personnel within organisations that may reduce the risk of undesired incidents through the use of observation technique and the reporting of observations.

4. Background and problem

One of the prerequisites for a high level of safety and the prevention of serious incidents is that systematic, continual work is undertaken to improve safety. Observation has long been a natural part of the proactive safety work on the Norwegian shelf, and has been the focus of one of Always Safe's quarterly learning packs[1]. Most operating companies use their own Key Performance Indicators (KPIs) in their reporting, in order to encourage the use of OT at their facilities.

Under the right conditions, OT can be a source of active monitoring and improvement for all critical safety aspects. Major accidents often develop over time due to several barrier elements becoming weakened[1] without anyone noticing. Basic knowledge of barriers and training in observation technique enables personnel to act as a final important barrier.

5. Recommended practice

The use of OT is a natural part of a good safety and reporting culture that encourages continual learning and improvement. The aim is to identify hazardous conditions to make the workplace safer and improve safety routines. Since employees all have different skills and competence, it is crucial that everyone contributes in order to identify and learn from potential hazards. Havtil's booklet, "HSE and culture"[2], provides extensive information about how a good HSE culture can be achieved.

5.1 Training and exercises

Even if an employee is familiar with risk assessments of their own work tasks, OT at the workplace is a skill that requires additional training. Experience shows that the preferred solution is a combination of theoretical courses and practical training, e.g.

[1] Always Safe – Learning Pack Q3 2021, Observation of hazards

[2] Havtil's HSE and Culture booklet

by going through various theoretical methods in the classroom first, before going out and using these methods together in groups at the workplace.

It can also be useful to take along someone with “fresh eyes”, or an external observation team with no prior knowledge of the workplace. They will view the workplace for the first time, and therefore not be influenced by so-called “factory blindness”. This can provide new learning and suggestions for improvement.

Hazard recognition is linked to OT, but does not necessarily cover weakened barriers in the way that OT does. Appendix 4 describes various hazard recognition methods that can be used.

In order to get the most out of OT and ensure personnel know what to look for, systematic reviews can be arranged in the field. These can take the form of checklists of things observers should look out for at the workplace. The checklists can be based on performed risk assessments and analyses, risk matrices, a system’s functional requirements, barrier monitoring elements, and so on. Increasing the observer’s understanding of what is critical for safety and useful to look out for will simultaneously increase the observer’s internal motivation to contribute.

5.2 Use of observation technique

In addition to competence building within OT, it is important to set aside time to make observations. This also applies to the operative management at the workplace. We are all mutually dependent upon one another, and everyone will notice different conditions depending on their professional competence and experience. It is therefore importante that everyone contributes. It is to be expected that a mechanic will notice different conditions to an electrician, which means it is also important to use OT outside one’s own work area, for example by making observations when travelling to and from the workplace, or in someone else’s work area.

Our ability to notice hazardous conditions will also be improved through conversations with colleagues about what we have observed. Such discussions can provide us with increased knowledge and understanding of barriers within our own and others’ fields, and help us start to notice other similar conditions as we move around the workplace. For example, we will notice more covered fire alarms if we have been made aware that this is something we should look out for.

The aim of observations is to identify undesired conditions or error traps (see Appendix 6) before they become hazardous, or to gain experience that might prevent hazardous conditions reoccurring in the future. For example, this might be conditions which in themselves, or in connection with other conditions, may develop into an undesired incident if they are not addressed through corrective measures. For major accidents, there will often be several conditions that have developed over time which contribute to the major accident occurring.

OT should be used at all management inspections, safety inspection rounds and other HSE inspections. By structuring observations, it is possible to prepare a barrier series for a given department or area, or for the entire facility. This will give

department managers an overview of weakened barriers within their area of responsibility. Likewise, it will enable senior managers to establish a barrier series for the facility/installation, and based on this say whether or not the risk level is acceptable at any given time.

Below is an example of a barrier series for an onshore facility (see Appendix 1 for rigs and platforms):

1) Flammable material placed next to an electric heater. What if a fire starts here?

2) The fire extinguisher is not easily accessible, which may allow the incident to escalate further.

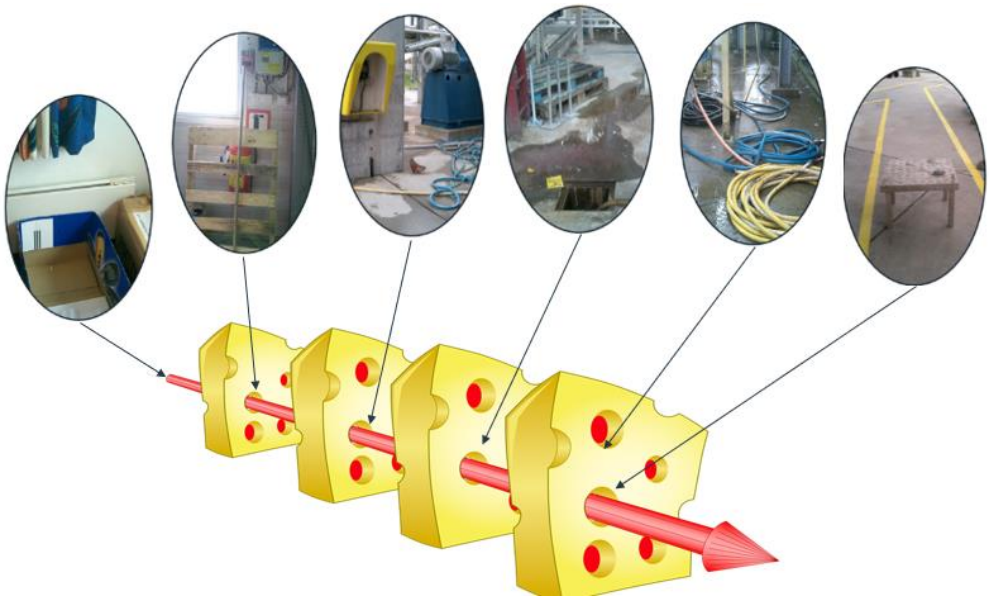
3) Hoses and equipment in front of the emergency telephone, which may allow the incident to escalate further.

4) An opening which has not been cordoned off may cause problems for search and rescue teams, enabling the incident to escalate further.

5) Hoses will prevent access in an emergency situation. May allow the incident to escalate further.

6) Equipment located in an escape route may allow the incident to escalate further.

Viewed from a barrier perspective:



The example above shows that an understanding of barriers and the ability to recognise hazards are important skills in making good observations. Havtil's barrier memorandum[3] provides a good introduction to what constitutes a barrier, and this Working Together for Safety recommendation links OT to barrier management. It is important that managers take an interest in and ownership of the observations made

[3] Havtil barrier memorandum 2017

within their department. This has a motivating effect for the work team, and ensures the manager acts as a role model for the organisation.

A common weakness within barrier management and monitoring is that too little focus is placed on the organisational and operational elements that may have an impact on safety (error traps). Operational managers are recipients of information from those who plan the operations, and can simultaneously observe the actual conditions in the field. This gives managers a good opportunity to look for organisational and operational error traps and ensure that these observations are emphasised in future planning.

Examples of organisational and operational observations may include:

- Does the work team have enough time to do the job safely – and to tidy up afterwards?
- Has the job been planned in a way that can be executed in practice?
- Is the workplace effectively adapted to the work?
- Are the relevant logistics in place, and executed effectively?
- Are drawings and other documentation updated and accessible?
- Is there space to take all the equipment for the next operation on board?
- Does the work team have the necessary capacity, competence and experience with the planned work?

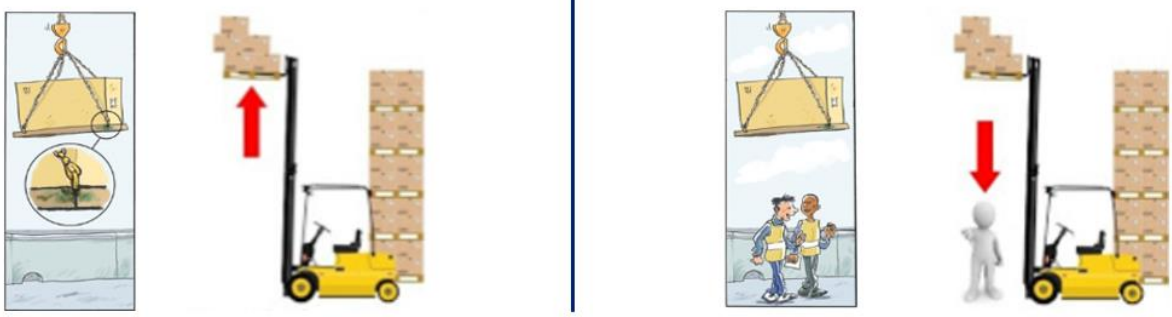
See App. 6 for more information about organisational and operational error traps.

5.3 Reporting

The main purpose of reporting is to obtain an overview of the risks that may cause harm to people, the environment or valuable assets. All employees shall have the opportunity and necessary access to report an observation. In addition, employees must also receive training in how the observations shall be reported.

Reports may be made about a hazardous action, error trap or a dangerous condition (such as weakened barriers), and should include details of any measures that have already been implemented. A report may also relate to a positive observation others can learn from in order to prevent hazardous conditions from arising. It is important that silent nonconformities are not permitted to remain nonconformities.

Hazardous condition **Hazardous action**



So that as many people as possible are able to make reports, the reporting system must be easy to use, but it must simultaneously provide enough detail for the report recipient to understand the risk and learn from the observation. The use of standardised reporting forms and completion guides can help to ensure improved reporting.

In order to ensure effective and accurate follow-up, it is important to train personnel in providing sufficient information about the observed conditions. This is to ensure recipients of the reports can understand their content, and in turn prioritise the right measures and involve the relevant departments in the handling and implementation of any actions. For example, personnel who have observed a potential dropped object should be trained to provide information about the possible fall height, the weight of the object and the possible area for the point of impact. This will provide the recipient with an indication of the severity of the potential conditions and an idea of how the observation should be processed within the company's internal systems.

Digital tools may make the reporting of observations easier, and ensure more efficient handling and administrative processing of reported conditions. The use of digital solutions also makes it possible to attach images of observed conditions. This will reduce the need for written information and make it easier for the person processing the report to assess what follow-up is required.

If the organisation does not have a digital solution, it must be ensured that submitted observations will reach the person responsible for processing the observation cards, or the manager responsible for safety within the relevant area (risk owner). It must not be possible for individuals to filter out unwanted observations.

All observations must have a time and location reference (description of the area or module, compass bearing specified if necessary) or a process reference. The use of e.g. the system number (TAG) or area will help the person processing the observation to place the observation within a wider context, and ascertain whether several weaknesses in the same barrier have been reported.

5.4 Handling observations

The most important elements in the effective handling observations are as follows:

Strive for rapid administrative processing: A daily review is recommended, regardless of whether digital solutions or hand-written cards are used.

Always provide feedback: A quick reply, preferably thanking the observer for their efforts, will motivate more employees to make observations. Remember that the purpose of reporting is learning; avoid focusing on allocating blame (it is both human and normal to make mistakes).

Learning, use of learning groups: Learning groups are a group-based method of strengthening operational learning. The group may look at one or more observations and prepare recommendations/measures that will help improve safety. See Appendix 6 for more details about Human and Organisational Performance (HOP).

Provide recognition/awards: Select the best cards and publish them – preferably with some sort of award or prize, e.g. observation of the day, week, month or year. This will be both motivating and offer insight into what constitutes a good observation. Good observations may also be highlighted in safety meetings, pre-job discussions and so on.

Prioritised handling: Ensure a system is in place through which observations that require immediate action and other important observations (such as weaknesses in barriers relating to a DSHA) can be identified and quickly processed via the reporting system. Flag such observations to management and the safety representatives.

Categorised handling: Divide the observations into groups: observations the reporter has already closed, those that can be closed through local measures, and observations that will require external resources to close.

Allocate a responsible person/department: All observation cards that involve the implementation of measures must feature the name of a responsible person or department, and a reasonable timeframe. An overview of the status of the measures must also be maintained via internal follow-up systems (Synergi or an equivalent system).

5.5 Collating with other data

Observations are valuable in themselves, but to get the most out of them reported observations should be analysed against other systems:

- Nonconformity or incident reporting system (Synergi or similar): Can be used to follow up individual observations, but also to analyse data and learning outcomes. It is crucial that observations which have revealed weaknesses in barriers are correctly classified and processed.
- Barrier monitoring: Experience shows that observations may reveal a risk of weakened barriers, even if the status panel in the monitoring system shows a so-called ‘green’ status. Several observations relating to possible weaknesses in the same barrier will change the severity level of the observations.
- Risk management: Relevant observations should be used as input when updating risk analyses, as-built documentation and re-HAZOP/HAZID analyses of all or parts of the facility.
- Maintenance systems: Observations relating to a lack of maintenance may indicate a need for amendments to the maintenance routines.
- Training matrices: Observations that indicate insufficient competence may lead to changes in training needs.

6. References and links

1. Always safe – Learning pack Q3 2021, Observation of hazards
2. Havtil's booklet on HSE and culture
3. Havtil's barrier memorandum 2017
4. Norsk Industri: Safety, leadership and learning – HOP in practice

7. Definitions and abbreviations

Barrier	A measure whose function is to offer protection in failure, hazard and accident situations, see Havtil's barrier memorandum
CCR	Central control room
DROPS	Dropped object prevention scheme
DSHA	Defined situations of hazard and accident – see Appendix 3
Hazard	The possibility that an accident, injury or similar may occur, e.g. in the event of an uncontrolled release of / undesired contact with an energy source
HAZID	Hazard identification study
HAZOP	Hazard and operability study
HC	Hydrocarbons
HOP	Human and organisational performance
HSE	Health, safety and environment
KPI	Key performance indicator
OT	Observation technique
P&ID	Process and instrument diagram
PPE	Personal protective equipment
RUI	Reporting of undesired incidents
SJA	Safe job analysis
WP	Work permit

Appendix 1: Barrier series

A barrier series is a visualisation of several possible weaknesses, which together or alone may contribute to the same undesired incident occurring. The following pages provide examples from a semi-submersible and a fixed platform, respectively. NB: these are actual photographs, all of which were taken on the same observation round, i.e. all the weaknesses were present at the same time.

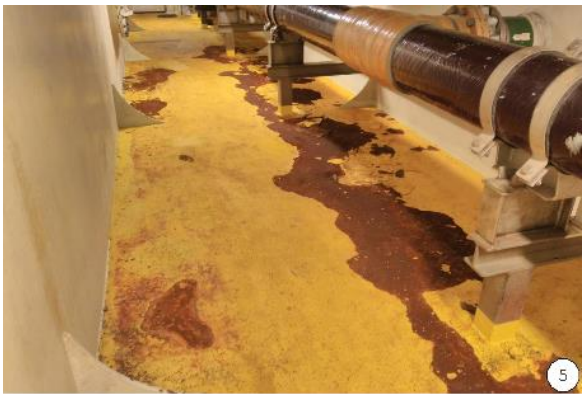
Example from semi-submersible rig: DHSA no. 8: Loss of stability. As stated in DSHA no. 8 for mobile installations, a semi-submersible platform may start to tilt if a pipe in the seawater system in a pump room bursts. It is therefore important that there are no loose objects that might block emergency draining of the pump room. At the same time, it is important that the watertight doors are kept closed. In such situations, availability of the alarm system is also an important factor. Telephones and the alarm system must not be out of operation.

1-Loose flange may fall onto the float. This may prevent the water alarm from being triggered.

2-Loose metal objects in room with watertight doors. In a worst case scenario these may become trapped between the door and the frame.

3-Unsecured equipment in a room with watertight doors. In a worst case scenario this may become trapped between the door and the frame.

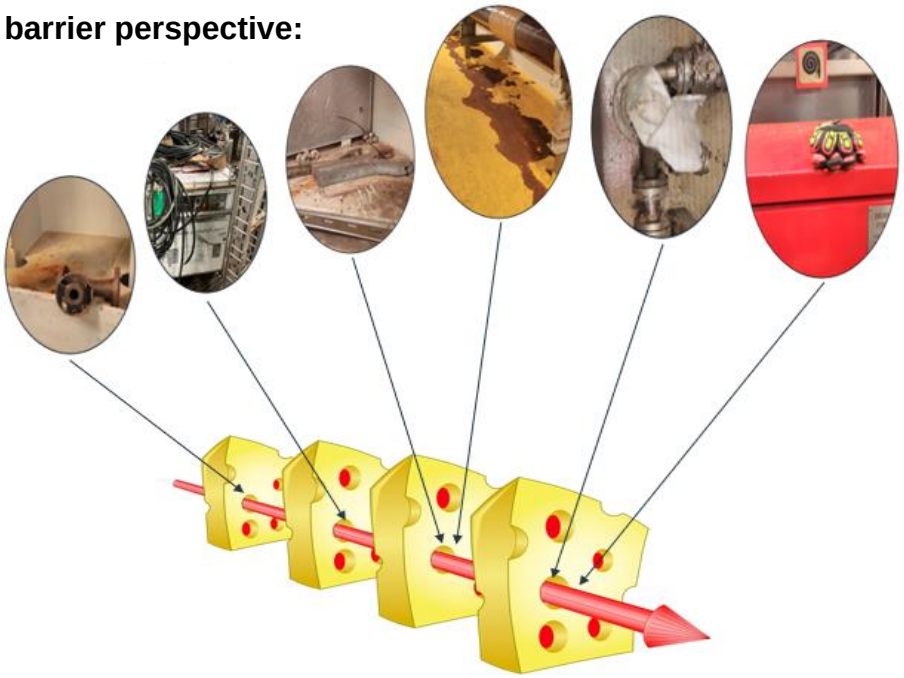
4-Cloth below the flooring in a room with pump systems



5-Flaking paint and rust in a room with pump systems, which may block the pump system in the event of a massive influx of water

6-Gloves left behind in a room with pump systems; these may block the pump system in the event of a massive influx of water

Viewed from a barrier perspective:

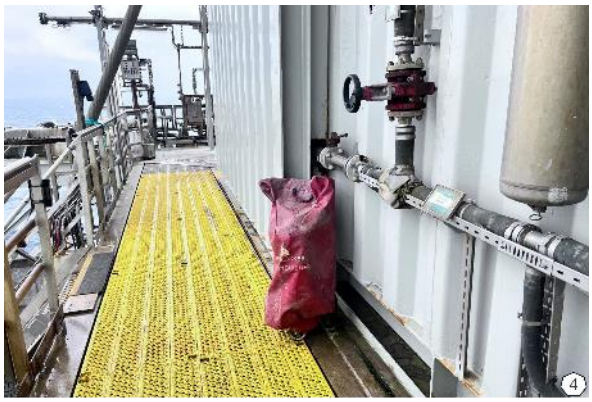


Example from platform: DSHA no. 4 - Fire

1-Fire and gas panel disconnected.

2-Closest emergency telephone not operational.

3-Cordon with no signage in relevant area.

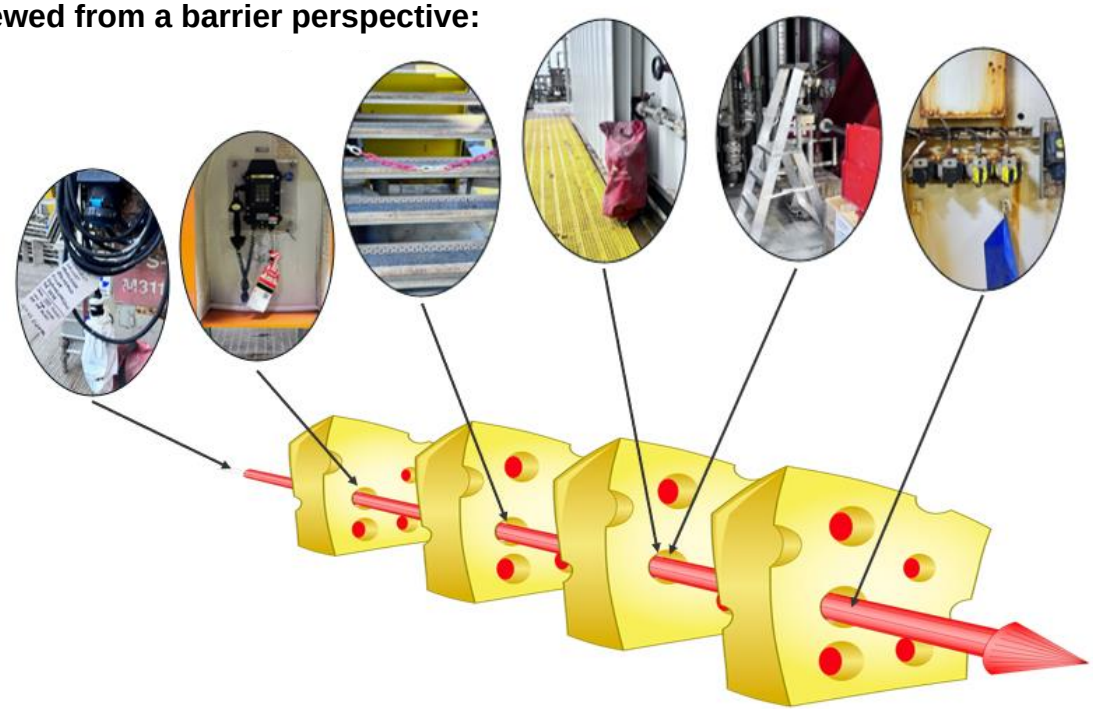


4-Fire extinguishing equipment not marked.

5-Equipment blocking the water valve for firefighting.

6-Emergency shut-off not labelled – which button is the right one?

Viewed from a barrier perspective:



Appendix 2: Barrier perspective checklist

The list below may be useful in observing breaches of barrier functions. For example, one can select a DSHA (Appendix 3), and then actively use this checklist. As one becomes better at observing individual errors, one will also develop an understanding of how these error traps are linked to barrier series, which may in turn contribute to a major accident.

What types of detection?	Key things to look for when making observations:
-Temperature, Vibrometer -Smoke alarm -Flame detector -Gas meter -Surveillance camera -Level gauges on tanks -Barometer for pressure -Floats and fluid sensors -IR camera, oil radar, wave radar	Survey the area and see which detection systems are present. Is there damage to the detection equipment, or is anything broken? Obstructions that might delay/prevent detection? Is there an early warning system on the detection system (e.g. red light)? Annual colour code? Annual calibration? Is there anything that might unintentionally activate detection, e.g. plastic?
What type of alarm?	**Key things to look for when making observations:**
-Telephones -Emergency PA system -Manual fire alarms -Other types of emergency alarms -PA speakers	Is there damage to the alarm equipment, or is anything broken? Obstructions that might prevent immediate use? Is the telephone labelled with the emergency number and call list? Is the telephone labelled with the number you are calling from? Is equipment such as fire alarms, emergency shutdown buttons and telephones clearly marked?
What type of equipment?	**Key things to look for when making observations:**
-Fire doors and watertight doors -Fire extinguishers and hoses -Foam and fire hydrants -Sprinkler system and Deluge -Fire stations and section valves -Emergency shut-down buttons, stretchers and life buoys -Flammable materials and fluids -Drain -Fire dampers -NAS, PAS, Deluge	Is there damage to the safety equipment, or is anything broken? Obstructions that might prevent immediate use? Does equipment correspond to signage/labelling? Do the fire doors close by themselves? Are seals intact on fire doors and watertight doors? Are grates in place over drain/emergency drain inlets? Anything loose in the immediate vicinity that may change the situation in the event of tilting/strong winds? Are drains open, and are flammable liquids and materials responsibly stored? Do fire dampers work, and is there adequate access to operate them? Are signs faded/dull, meaning they likely won't be seen in the dark?
Which alternatives exist?	**Key things to look for when making observations:**
-Escape routes -Escape doors -Escape hatches -Escape signage -Escape plans	Is there damage to the escape doors and hatches, or is anything broken? Obstructions that might prevent immediate use? Anything loose in the immediate vicinity that may change the situation in the event of tilting/strong winds? Are doors and hatches easy to open; is signage legible and in place? Are escape routes slippery; do plans accurately reflect the area?

Detection

Sound the alarm

Control/ firefighting

Evacuation

Appendix 3: Overview of DSHAs

The table below applies for facilities on the Norwegian shelf. For onshore facilities, DSHAs 1,2,4,18,19, 20 and 21 apply. The following additional DSHAs also apply for onshore facilities: DSHA 22 “Emissions from support systems” and DSHA 23 “Car accident / transport system accident”

DSHA no.	DSHA description	Production*	Mobile unit
1	Unignited hydrocarbon leak	X	X
2	Ignited hydrocarbon leak	X	X
3	Well incidents / loss of well control	X**	X
4	Fire/explosion in other areas, not HC	X	X
5	Vessel on collision course (towards facility)	X	X
6	Drifting object (on course for facility)	X	X
7	Collision with field-related vessel/facility/shuttle tanker	X	X
8	Structural damage to facility or stability/anchoring/positioning failure	X	X
9	Leak from riser, pipeline and subsea production facility***	X	
10	Damage to riser, pipeline and subsea production facility***	X	
11	Evacuation	X	X
12	Helicopter incidents	X	X
13	Man overboard	X	X
14	Serious injury to personnel + fatalities	X	X
15	Occupational illness	X	X
16	Full loss of power	X	X
17	Control room out of operation	X	X
18	Diving accident	X	X
19	H_2S emissions	X	
20	Crane and lifting operations	X	X
21	Dropped objects	X	X

* ‘Production’ refers to all types of facilities used for production purposes, including storage vessels
** Will not be relevant for floating facilities without wells
*** Includes well stream pipeline, loading buoy and loading hose, where relevant

DSHA 20 Crane and lifting operations was included in 2015. DSHA 17 (Control room out of operation) has been excluded from the analysis since 2005. DSHAs were also originally included for acute pollution, production stoppages and transportation system stoppages, but these DSHAs have not been continued following the end of the pilot project.

Appendix 4: Observation rounds

Checklist:

The list below is intended to be used as an aid in observation rounds not specifically focused on barrier series. The individual organisation may select parts of the list and adapt them to the organisation's needs based on the facility/installation type. It may also be relevant to select a specific area on the facility/installation, so that one has time to go into depth. The lists below are not exhaustive. Five examples of elements that may be focused on in accordance with Always Safe's annual safety wheel have been included.

Avoid major accidents / hydrocarbon leaks

- Leak of flammable medium, flammable material stored in the wrong place
- Insufficient documentation, P&ID not updated, etc.
- Weaknesses in technical barriers, including insufficient maintenance
- Weaknesses in organisational and/or operational barriers
- Damage to Ex enclosures / ignition sources

Avoid personal injuries:

- Crush hazards / insufficient shielding
- Insufficient competence/training
- Weaknesses in safety equipment
- Inadequate work permits
- Hot or cold surfaces

Safe work at height / prevent dropped objects

- Risk of falls. Inadequate railings/fall protection, damaged grating/deck
- Risk of dropped objects – remember risks posed by frost/snow/ice in winter
- Weaknesses in cranes and lifting equipment
- Faults/omissions/weaknesses relating to communications equipment
- Corrosion, wear

Working environment / health

- Leak of medium hazardous to health/environment
- Risk of exposure to hazardous chemicals, dust, exhaust, etc.
- Risk of exposure to noise or radiation
- Poor order/tidiness and ergonomic conditions
- Faulty or insufficient use of PPE

Examples of observation rounds:

Operations and maintenance operators normally perform regular logging rounds, in which the senses are actively used. Participants should have both basic OT competence and facility competence. It is important that these logging rounds are undertaken in an effective manner, and that the completed forms are processed and used for learning and improvement. The use of photos and videos as part of the training helps to prevent “factory blindness”. All observed nonconformities and deviations shall be processed and closed.

Other regular activities to identify hazards:

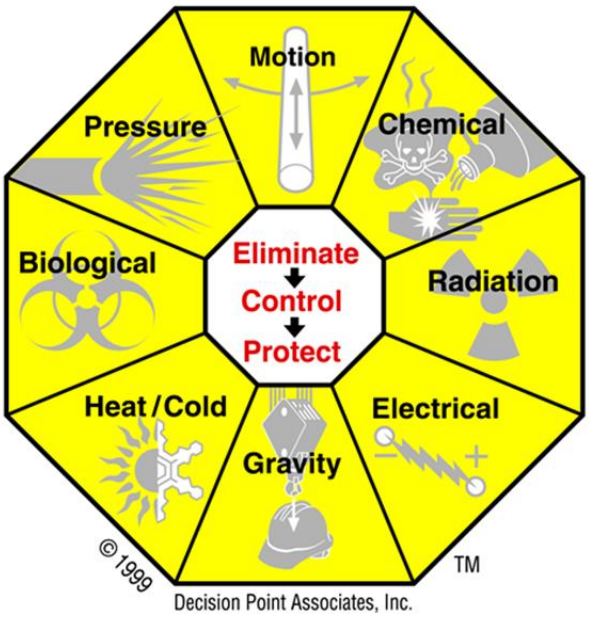
- HSE management inspections
- Safety rounds
- “Sunday clean up” (standard setting) or similar.
- Departmental tidying rounds.
- Campaigns/special topics (preferably adapted to the season/annual wheel)

It is always important to talk with those who are out working on the front lines. This can help to reveal any operational/organisational factors and barriers with weaknesses.

Appendix 5: Hazard recognition

There are several tools and methods that can be used to identify hazards and avoid undesired incidents. Among the most well-known are the use of “life-saving rules” and the use of “the energy wheel”. The life-saving rules have been prepared based on a review of deaths within the petroleum industry, and measures that could have been implemented to prevent them.

The energy wheel – or the so-called energy octagon – sets up a review of all energy sources present at the workplace. The idea is that if one maintains control of the energy sources, hazardous situations cannot arise. The methodology can be used in pre-job discussions, at the workplace itself, or in an SJA review.



A controlled release of energy is **work**. This is a desired physical process where energy is used to our advantage in a safe manner.

A *possible* uncontrolled release of, or undesired contact with an energy source is a **hazard.**

The consequence and probability of this hazard, and the uncertainty relating to it, is a **risk.**

An uncontrolled release of, or undesired contact with an energy source is an **undesired incident.**

When moving about the facility, it is important to use all one’s senses (hearing, sight, smell and touch) in order to identify abnormal conditions, e.g. a gas leak of a greater or smaller nature. One can also use various types of portable sensors/cameras, such as a forward-looking infrared (FLIR) camera, to detect hydrocarbon leaks.

A weakness of all these tools and methods is that they do not necessarily identify that a barrier is at risk of becoming, or already is, weakened. A focused search for error traps and the use of observation technique will often be necessary to ensure that barriers function as intended.

Appendix 6: Human and Organisational Performance (HOP)

The energy sector, together with other high-risk industries, have adopted the HOP principles to improve practices relating to safety management. HOP is the way in which people, technology, work processes and organisations interact as a system. Norsk Industri have good information about HOP on their website[4].

The HOP principles build upon some foundational assumptions and principles. HOP is a proactive approach to increasing the level of safety, and represents a change in direction in our approach to learning and improvement:

The 5 HOP principles:

1. It is normal to make mistakes so we must reduce the consequences.
2. Blame fixes nothing. We must choose between blame and learning.
3. Learning is the key to improvement. Theory must be transformed into practice.
4. Context drives behaviour. Work is guided by what seems reasonable.
5. How leaders respond matters – not just their words, but also their actions.

The HOP principles can also be used when following up observations – a key part of HOP is identifying error traps (see the examples below). An example might be observations relating to quality and adherence to the work permit process. One can then establish a learning group of 5 to 10 persons in one or more workshops, which examine how the job would normally be performed versus how it should be performed. Representatives from both operators and contractors/suppliers should be included here.

Learning groups is a group-based method intended to strengthen learning, and a core element of the HOP philosophy. Learning groups shall focus on operational learning from those who perform the work, and strive to manage conditions (error traps) that make it difficult to work safely and proactively.

Examples of error traps:

Technical error traps	**Task-related error traps**
- Faults on equipment or systems - Insufficient documentation - Unclear instructions, labelling or signals - Inappropriate tools or poor accessibility - Noise, lighting conditions, temperature and air quality	- Unfamiliar tasks - Unpredictable tasks - Complex tasks - Limited time - Mundane repetitive tasks
Organisational error traps	**Individual error traps**
- Unclear roles and responsibilities - Task conflicts - Communication/collaboration issues - Staffing and resource management - Work organisation	- Insufficient training/competence - Lack of experience - Lack of rest - Health issues - Stress