

RNNP

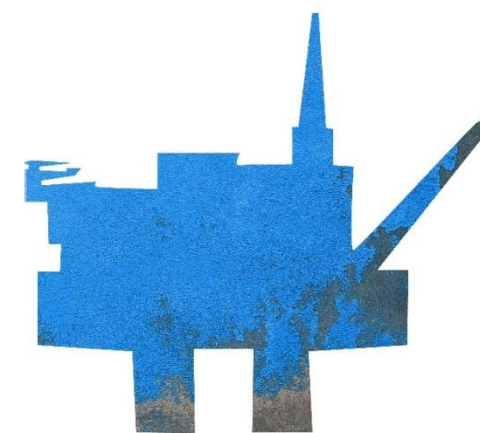
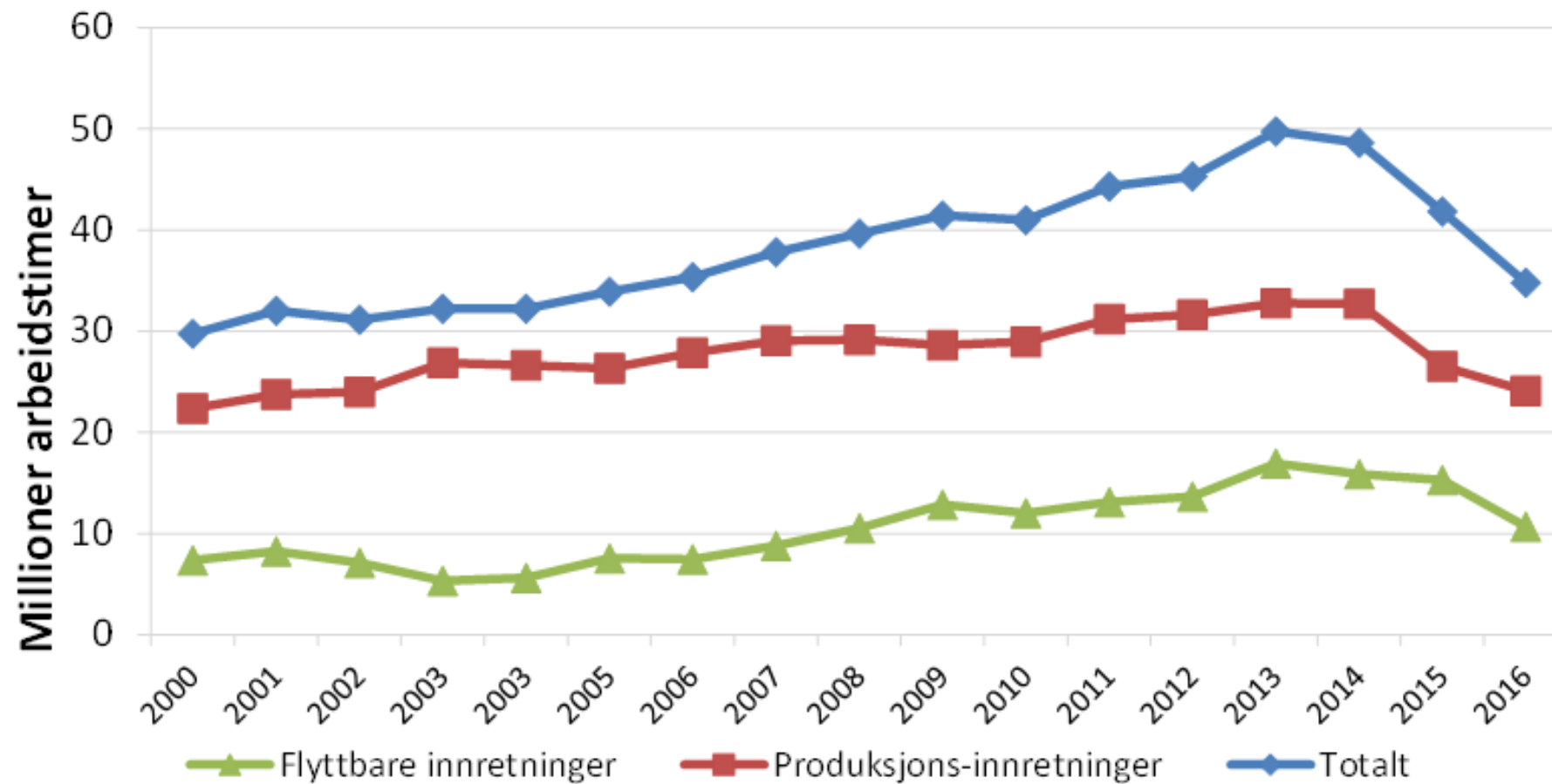
TRENDS IN RISK LEVEL IN THE PETROLEUM ACTIVITY Risikonivå i norsk petroleumsvirksomhet 2016

Mette E. Vintermyr



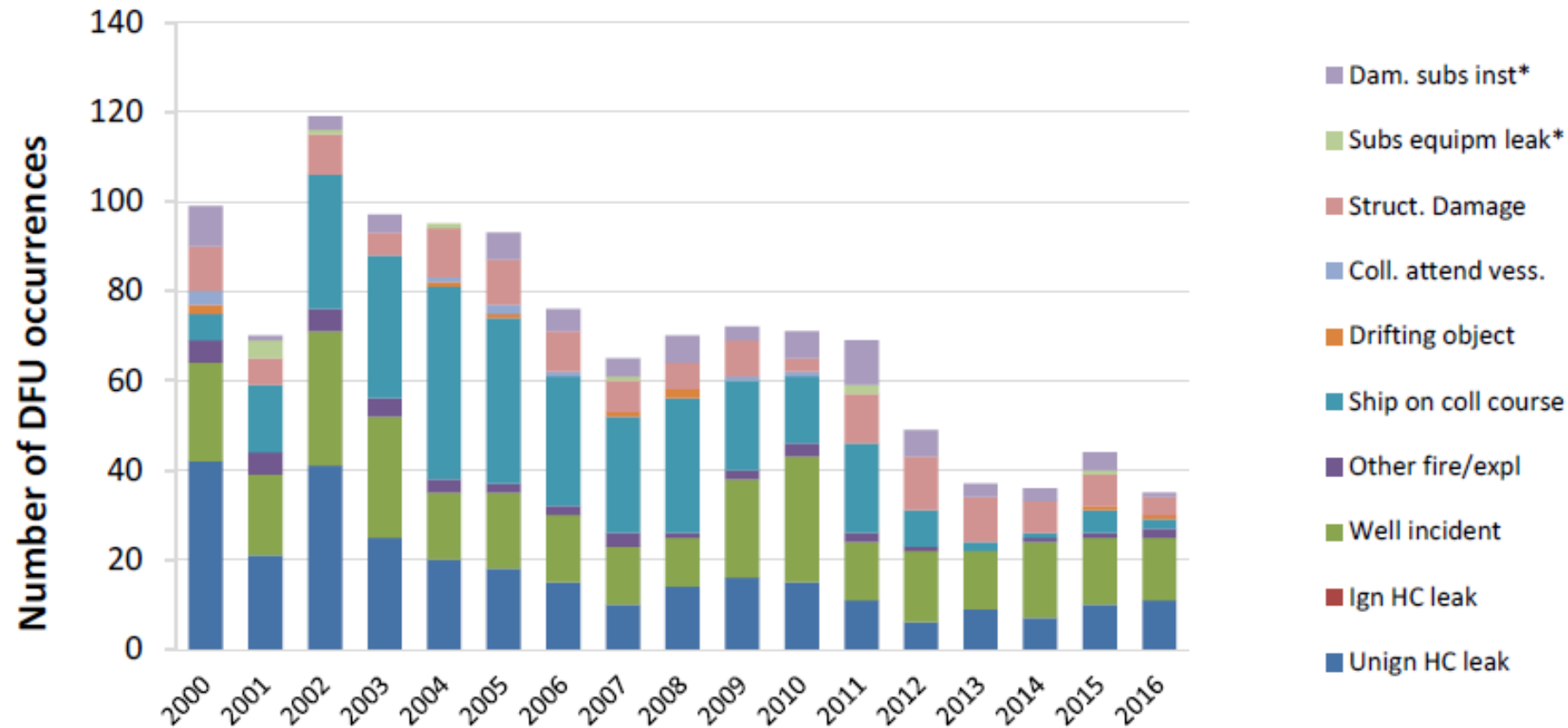
PETROLEUMSTILSYNET

Utvikling i arbeidstimer per år for produksjons- og flyttbare innretninger 2000-2016



DFU — Definerte Fare og ulykkessituasjoner

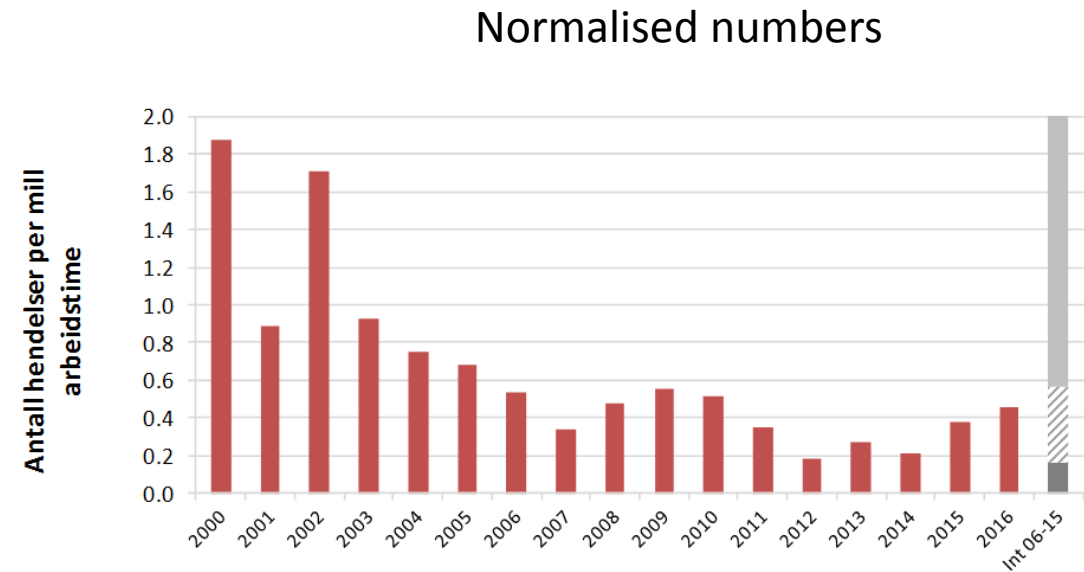
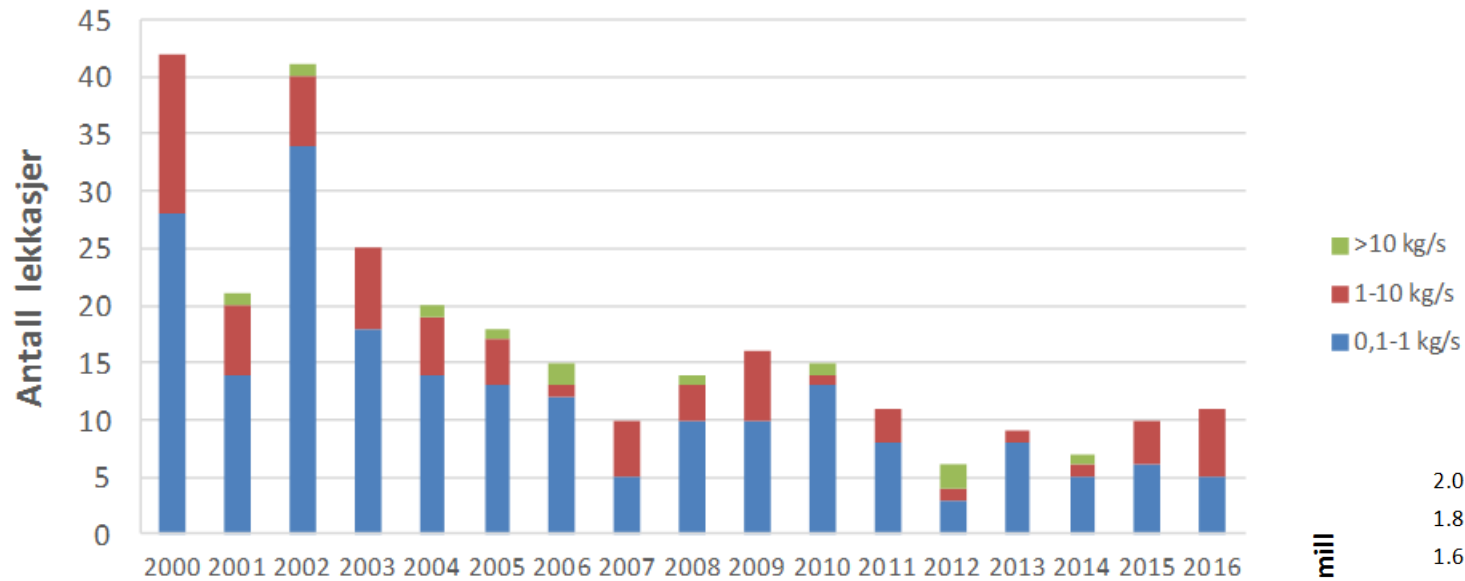
Helicopter incidents not included



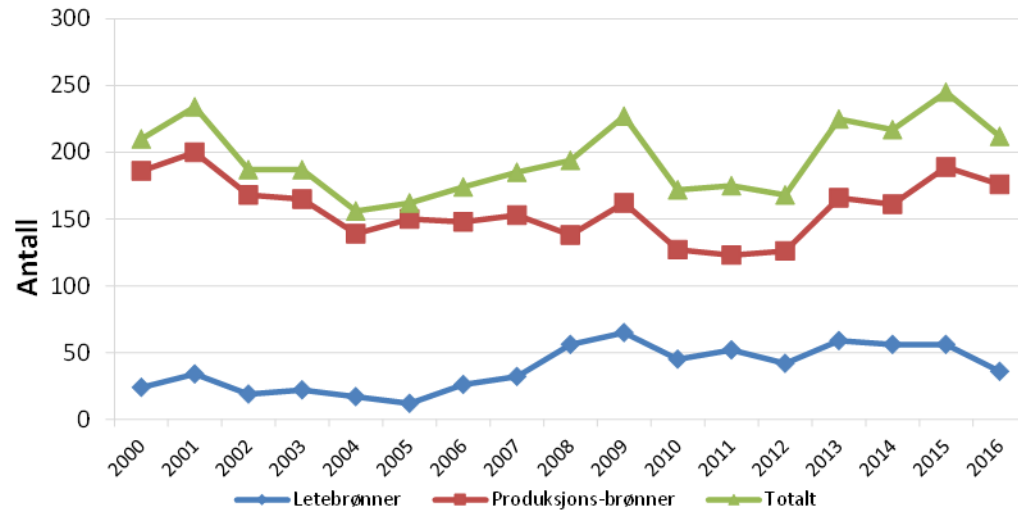
*Within the safety zone

Oversikt over alle DFU-er med storulykkes potensial på innretninger

Hydrokarbon lekkasjer $\geq 0,1$ kg/s



Brønner boret i 2016



Antall brønner lete-/ produksjonsbrønner

2016:

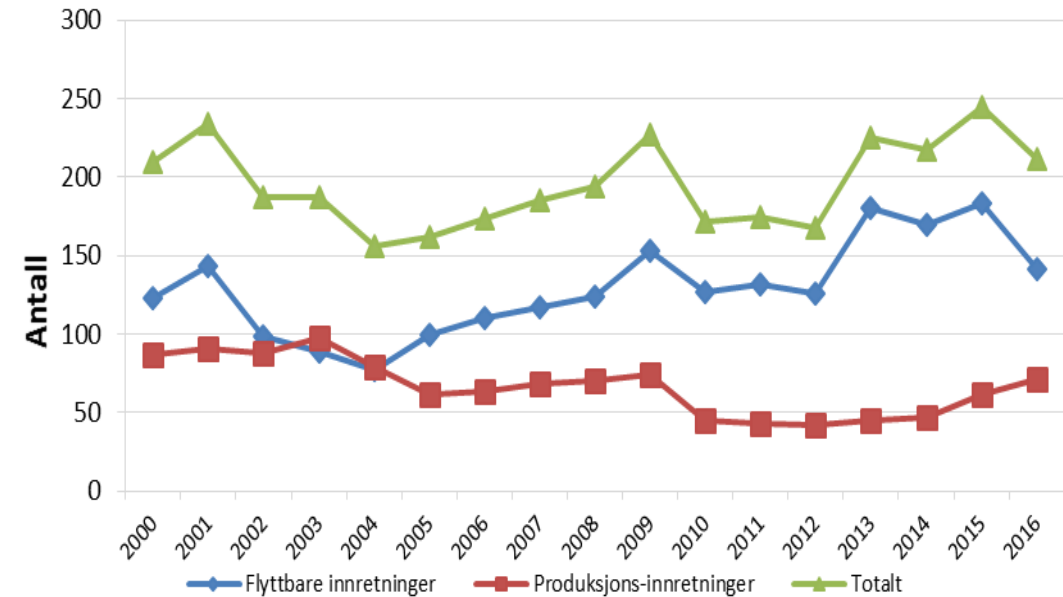
212 brønner boret:

- 176 produksjonboring
- 36 letebrønner

2015:

245 brønner boret:

- 189 produksjonsboring
- 56 letebrønner



Antall brønner produksjons-/ flyttbare innretninger

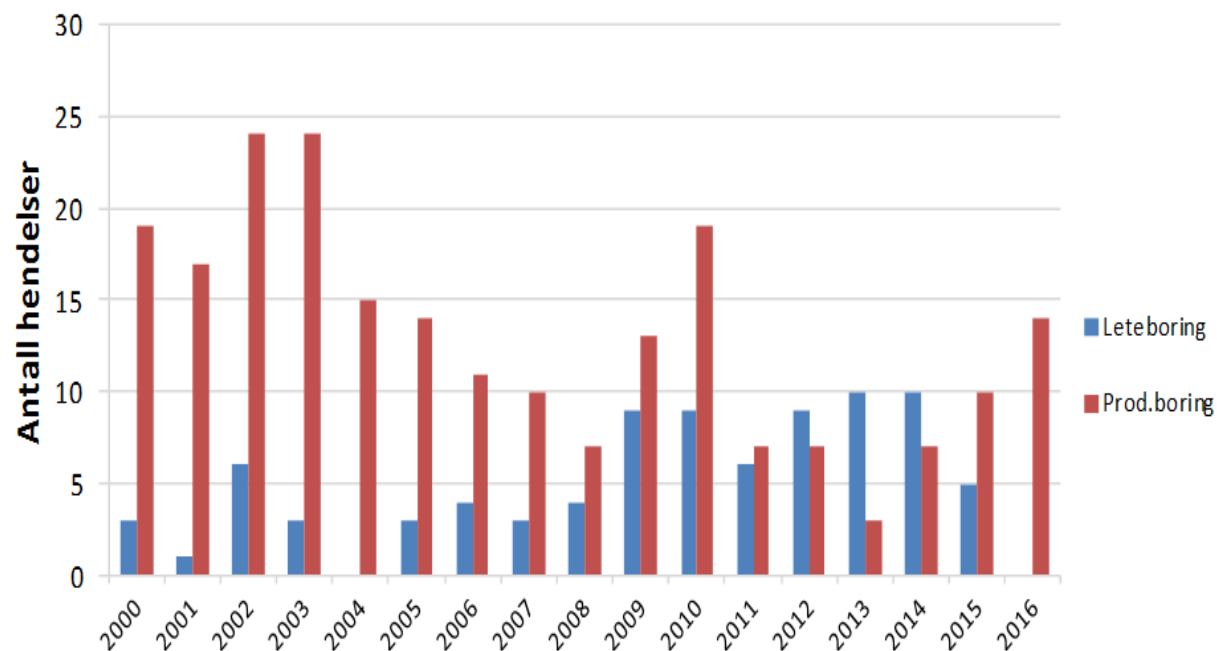
2016:

- 141 brønner flyttbare innretninger
- 71 produksjonsinnretninger

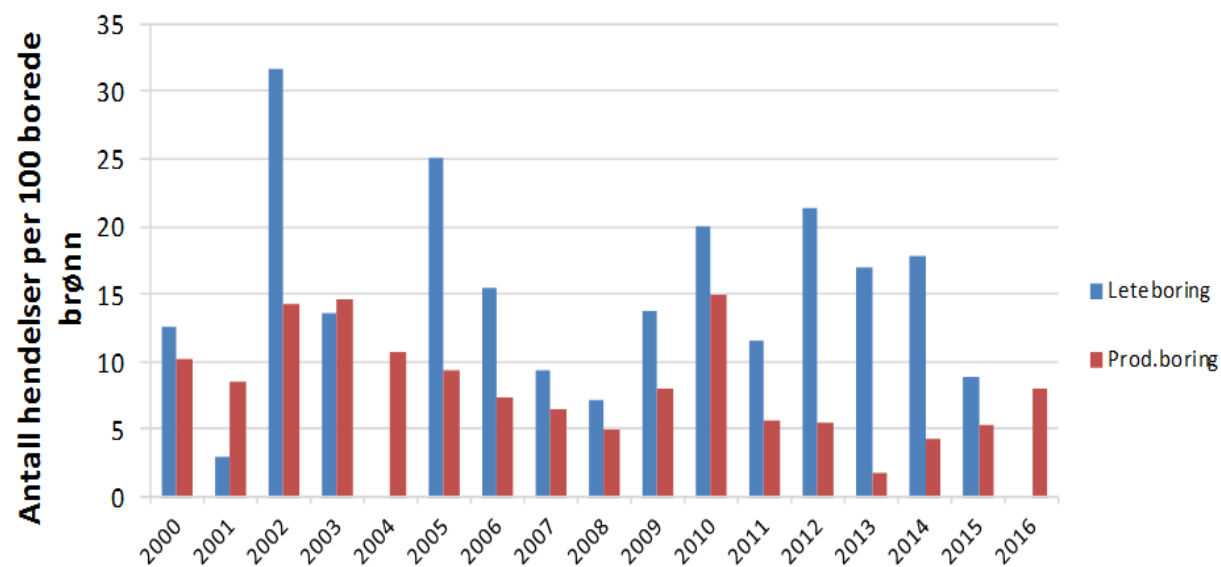
2015:

- 183 brønner flyttbare innretninger
- 62 produksjonsinnretninger

Brønnkontrollhendelser



Brønnkontrollhendelser i lete- /produksjonsboring 2000 -2016



Brønnkontrollhendelser per 100 brønner, lete- og prod. boring

Well control incident

Songa Endurance, Troll

Location: Block 31/2
Rig type: Semi Submersible
Well type: P&A – Multi lateral well
Date: 15.10.2016

Plan:

- Use FCV's and GLV as primary barriers. Shallow plug and tubing hanger as secondary.
- Pull X-mas tree and install BOP. Pressure test BOP connector.
- Release TH with closed annular, pump open shallow plug and pull tubing to surface.

Operation with course of events:

- Incident occurred 15.10 at 09.34, when connecting Pulling Tool to TH with annular BOP open: TH was unlocked and string jumped 5 - 6 m due to HC gas trapped below. Seawater in marine riser evacuated to the rig floor, followed by gas.
- Closed Annular Preventer and Blind Shear Ram. BSR closed on TH and did not shear string.
- Well killed by bullheading, first annulus side and then tubing side after cut and pull TH

Reason for events:

- The investigation concluded that FCV's and GLV unintentionally opened during BOP connector pressure test. Poppet valves on top of the TH were exposed during connector test, and pressure was transmitted down the control lines, cycling FCV's and GLV to 100% open position. As a consequence, gas from the reservoir migrated into the well and was trapped below TH and shallow set plug in the tubing until the incident occurred (approximately 6 hours after connector test, see yellow arrows).

Lessons Learned:

- Use deep set plug and not FCV's/GLV as deep set barrier.
- Always check for pressure below shallow plug/TH prior to releasing TH.
- Improve quality in planning and risk management: Identify and emphasize the well specific risks, highlight changes.
- Improve management of change, during planning and execution.

Recommended actions:

- Need for better understanding of risks associated with the large gas reservoir in Troll
- Improve understanding of Vetco wellhead system by establishing a specific training program for relevant personnel

Well control incident category:

Level 1.2

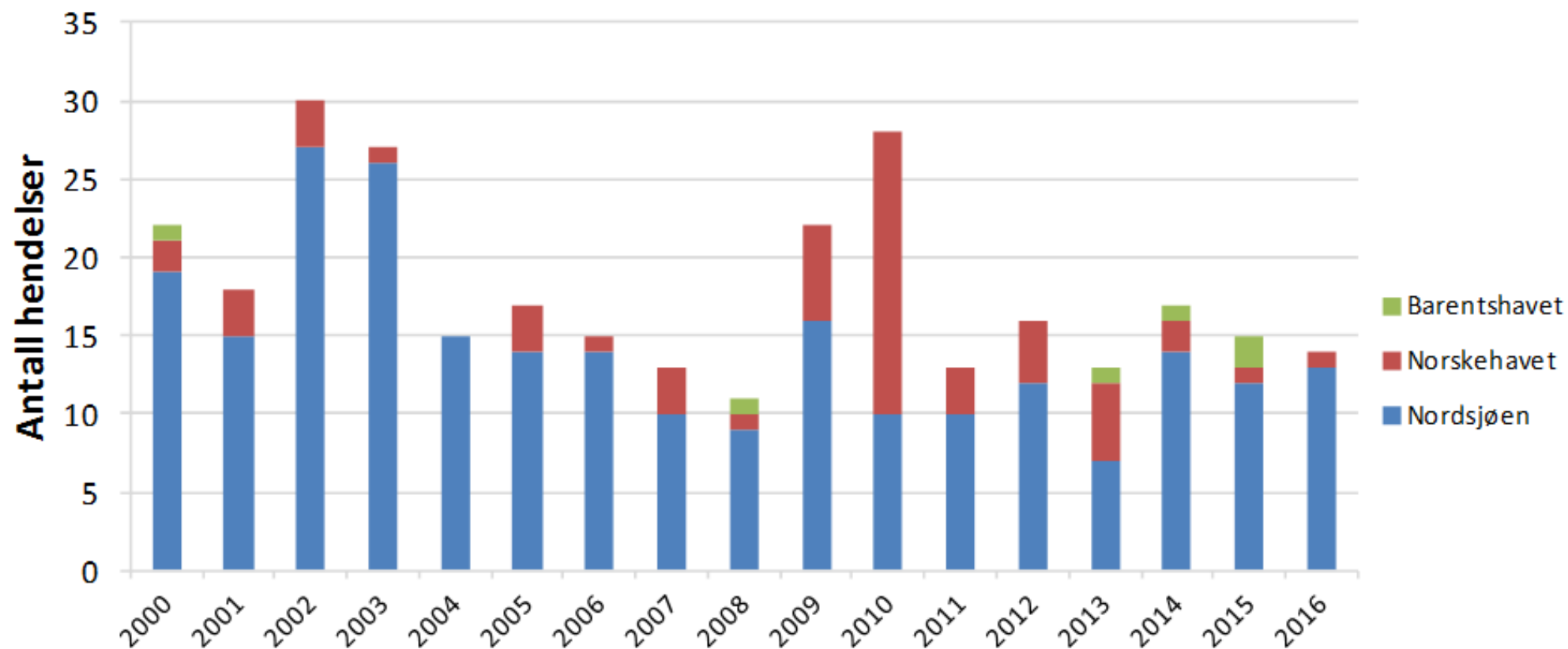
Impact:

- HC gas release on rig floor before BOP was closed. Loss of primary barrier (FCV's and GLV).
- Only one barrier element in BOP (Annular Preventer) available and in function until well was killed (16/10 at 15.00) The BSR and CSR were unavailable due to non-shearable items across these. A procedure to make BSR and CSR available was in place.
- NPT time due to incident is 22,4 days.

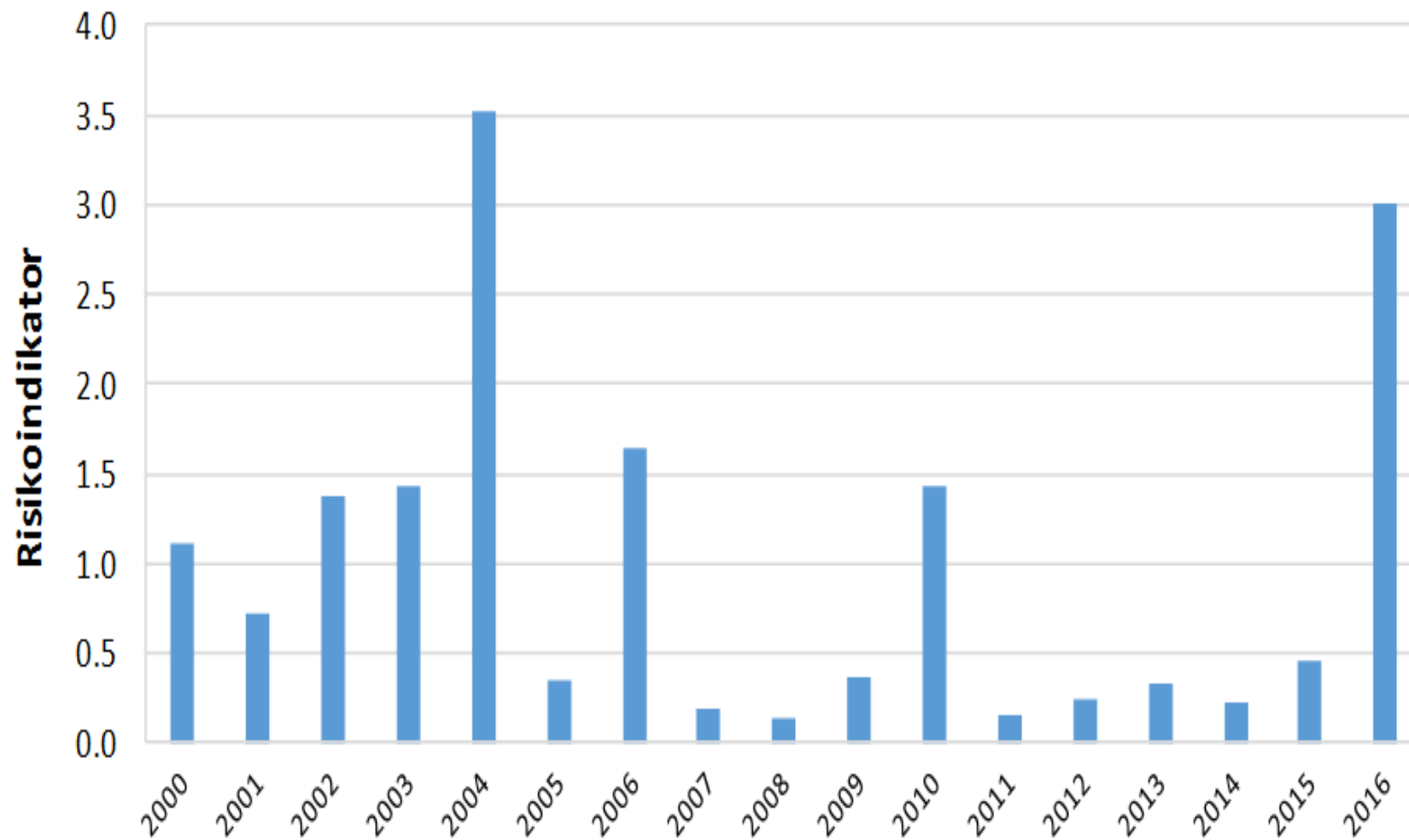


Figur 15 Utstrømning av gass og væske fra fingerbord nivå (kilde: Songa Offshore)

Fordeling av brønnkontrollhendelser pr område 2000 - 2016



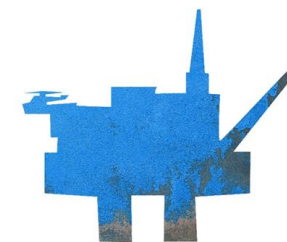
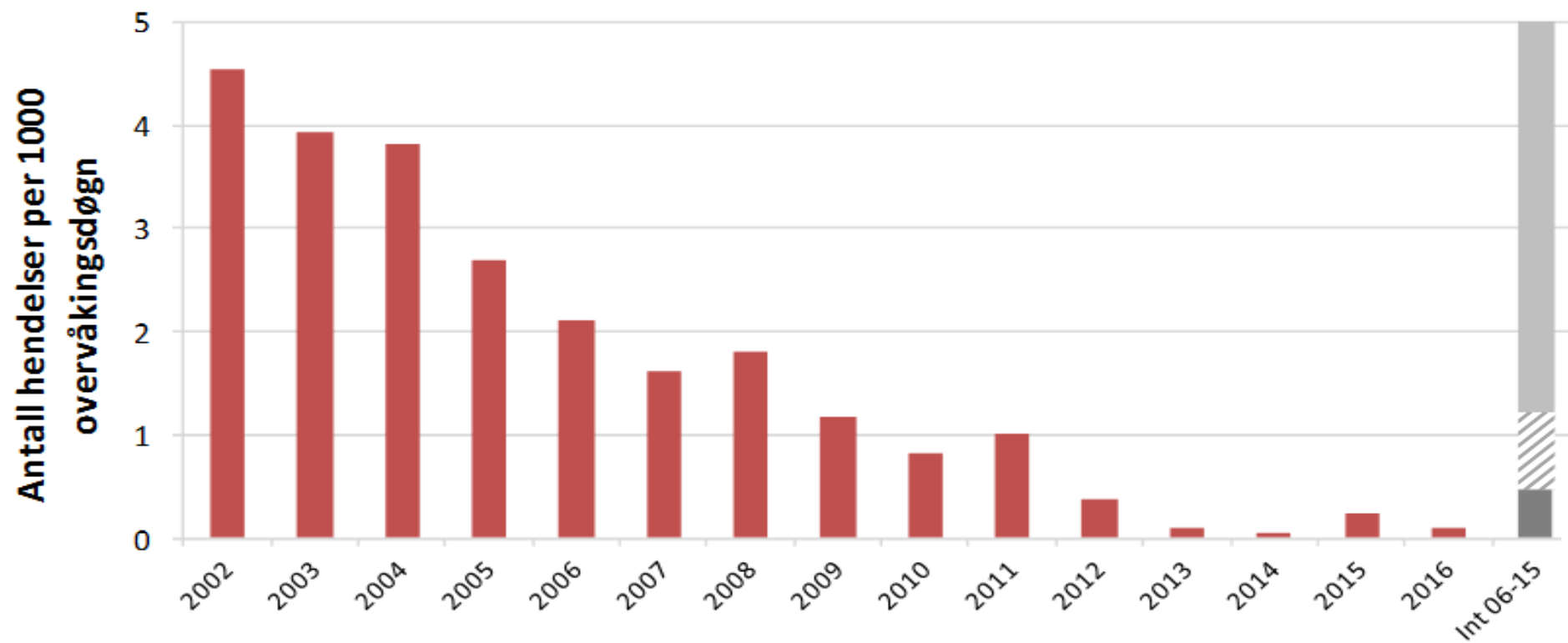
Risikoindikator for brønnkontrollhendelser



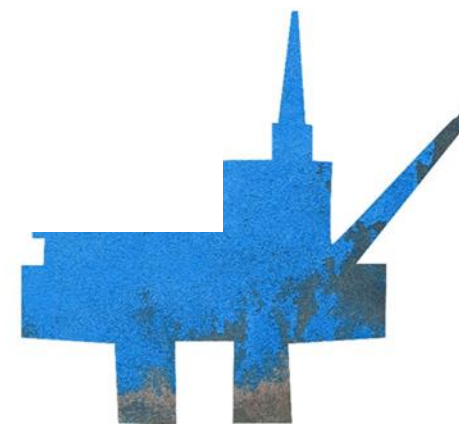
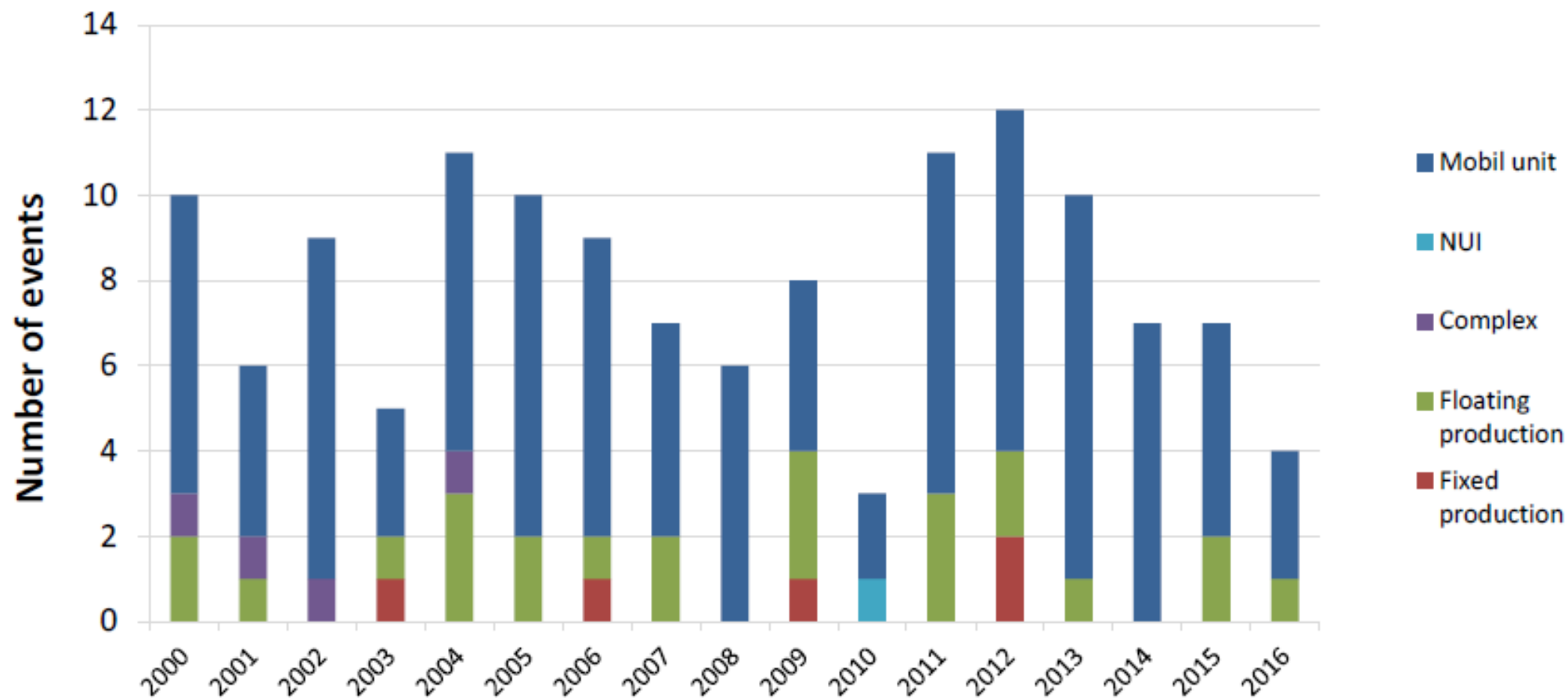
Figur 15 Utstrømning av gass og væske fra fingerbord nivå (kilde: Songa Offshore)



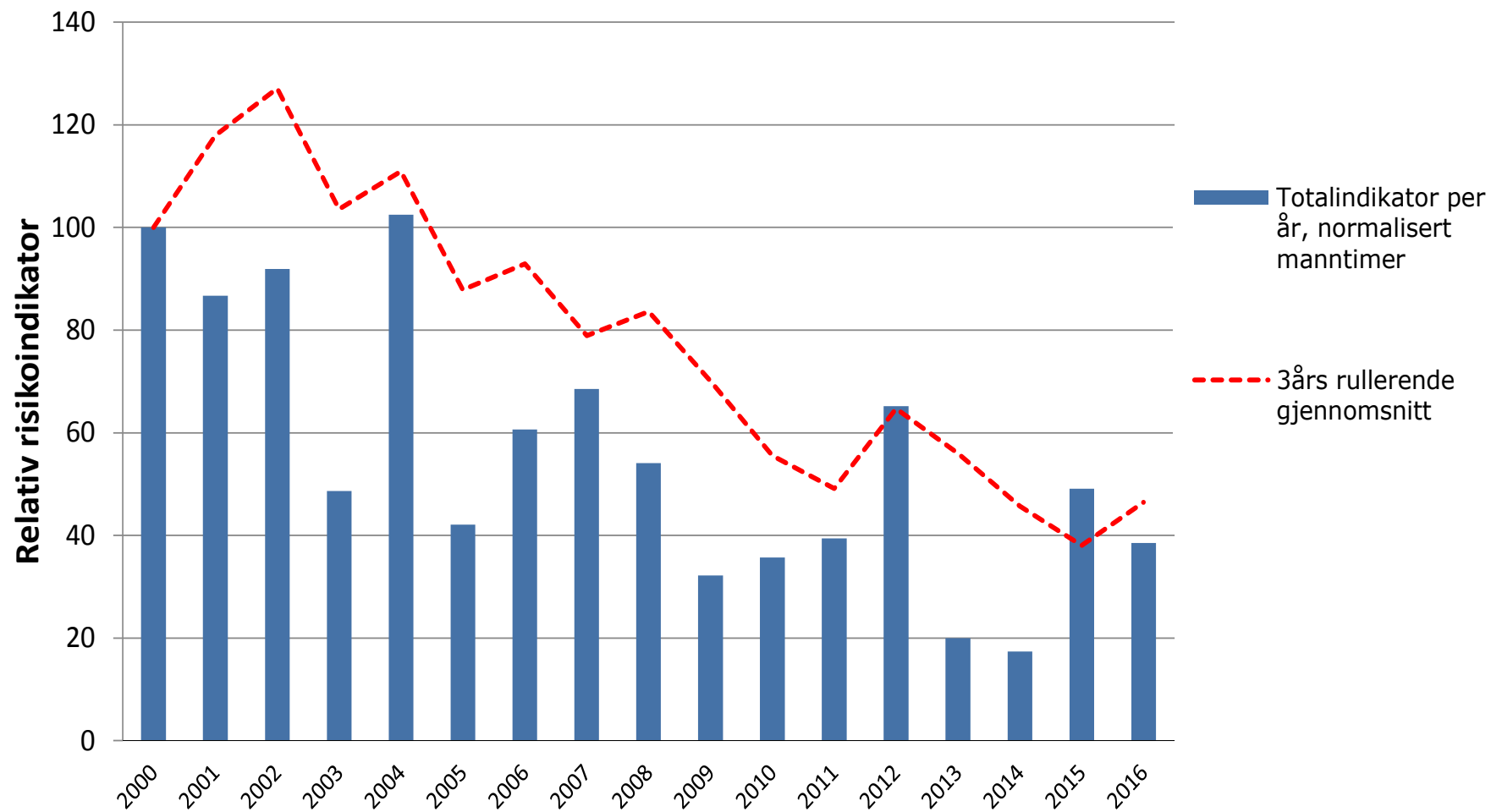
Skip på kollisjonskurs



Konstruksjonsrelaterte hendelser



Totalindikator for storulykker per år - normalisert mot arbeidstimer

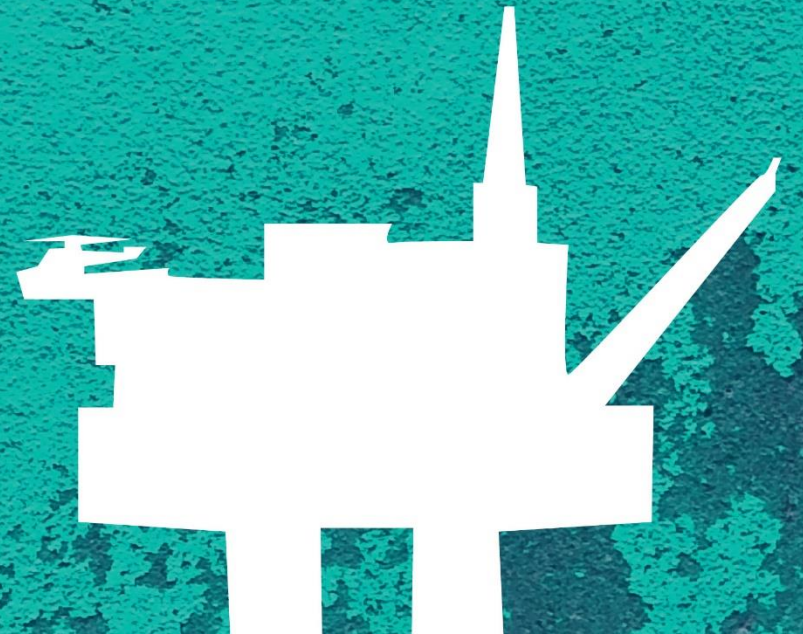


Vektet i forhold til
potensielt tap av liv



Brønnintegritetsstatus – NCS

Nina Ringøen

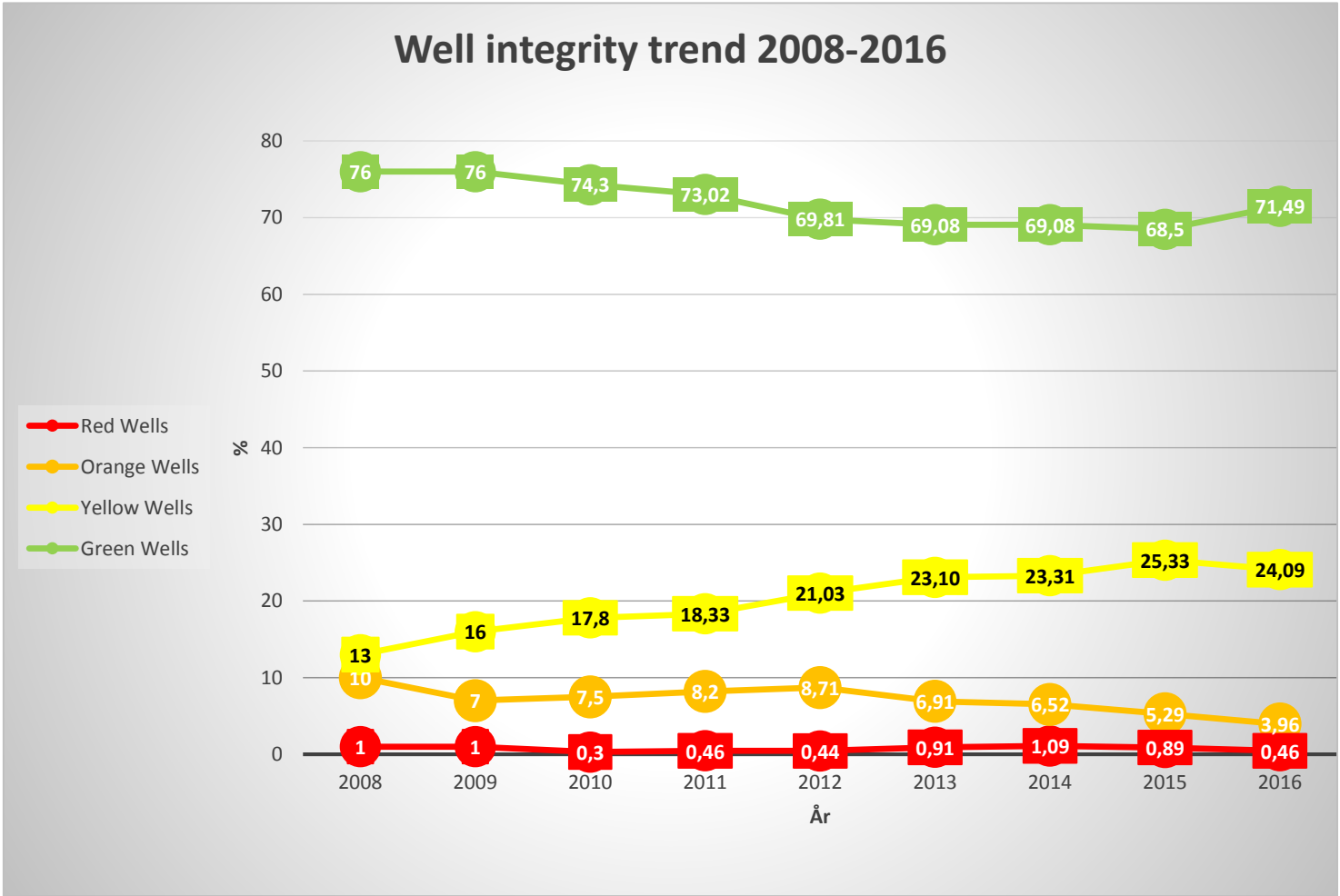
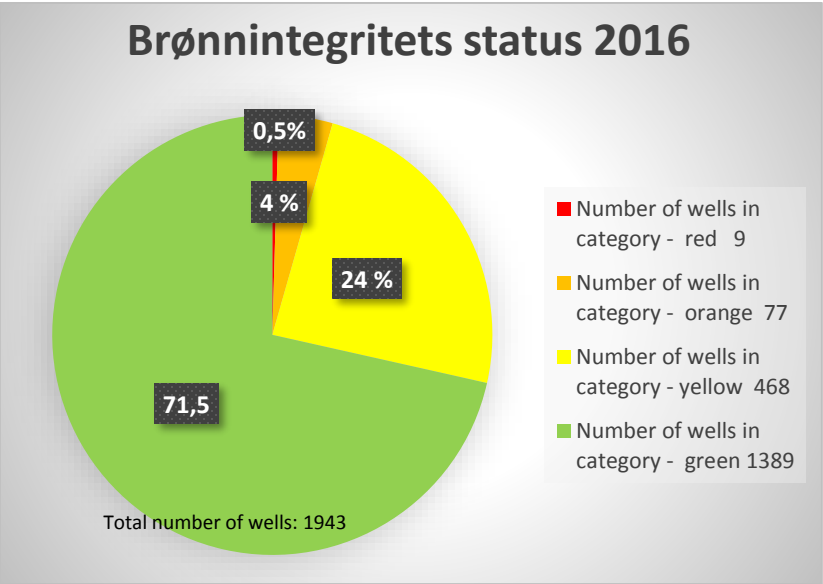


Brønnintegritets status – brønner i drift

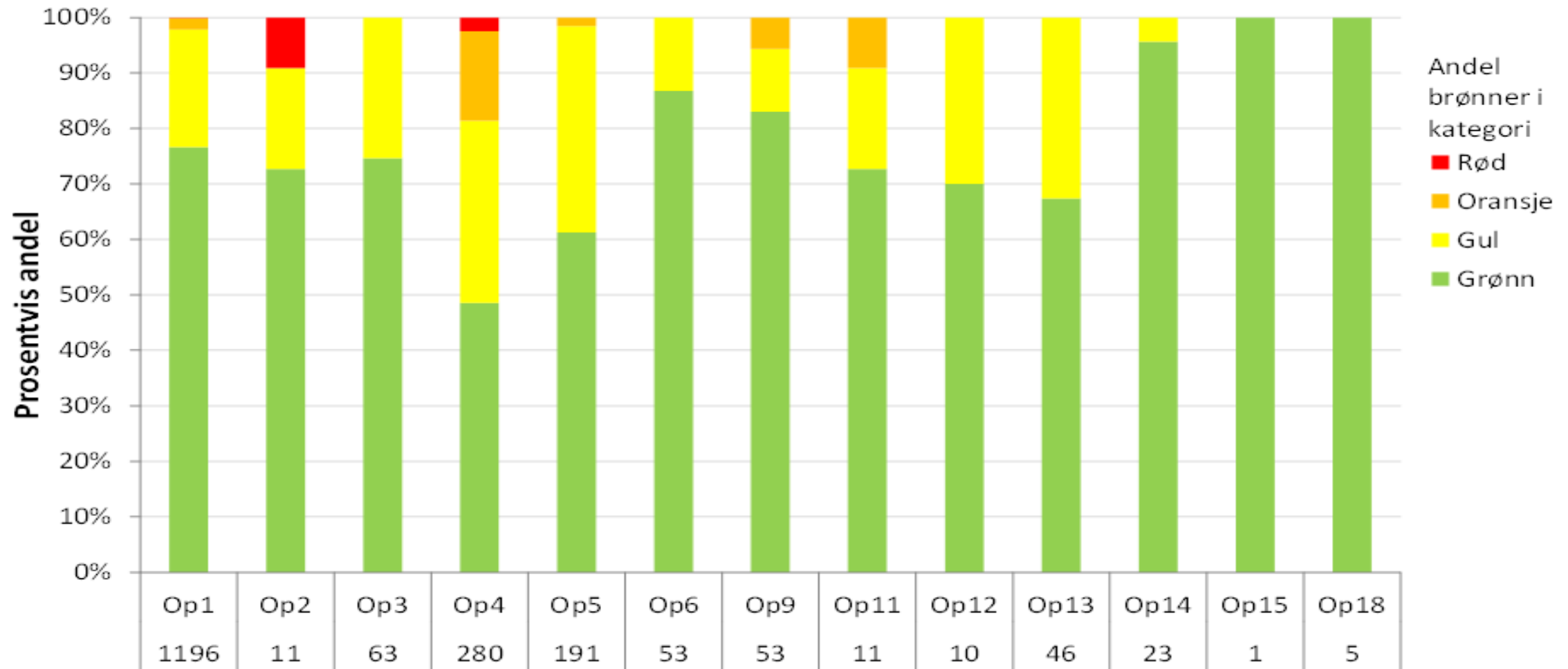
Category	Principle
Red	One barrier failure and the other is degraded/not verified, or leak to surface
Orange	One barrier failure and the other is intact, or a single failure may lead to leak to surface
Yellow	One barrier degraded, the other is intact
Green	Healthy well - no or minor issue

Table 0-1: Overview of category principles

2016 : 1943 «aktive» brønner

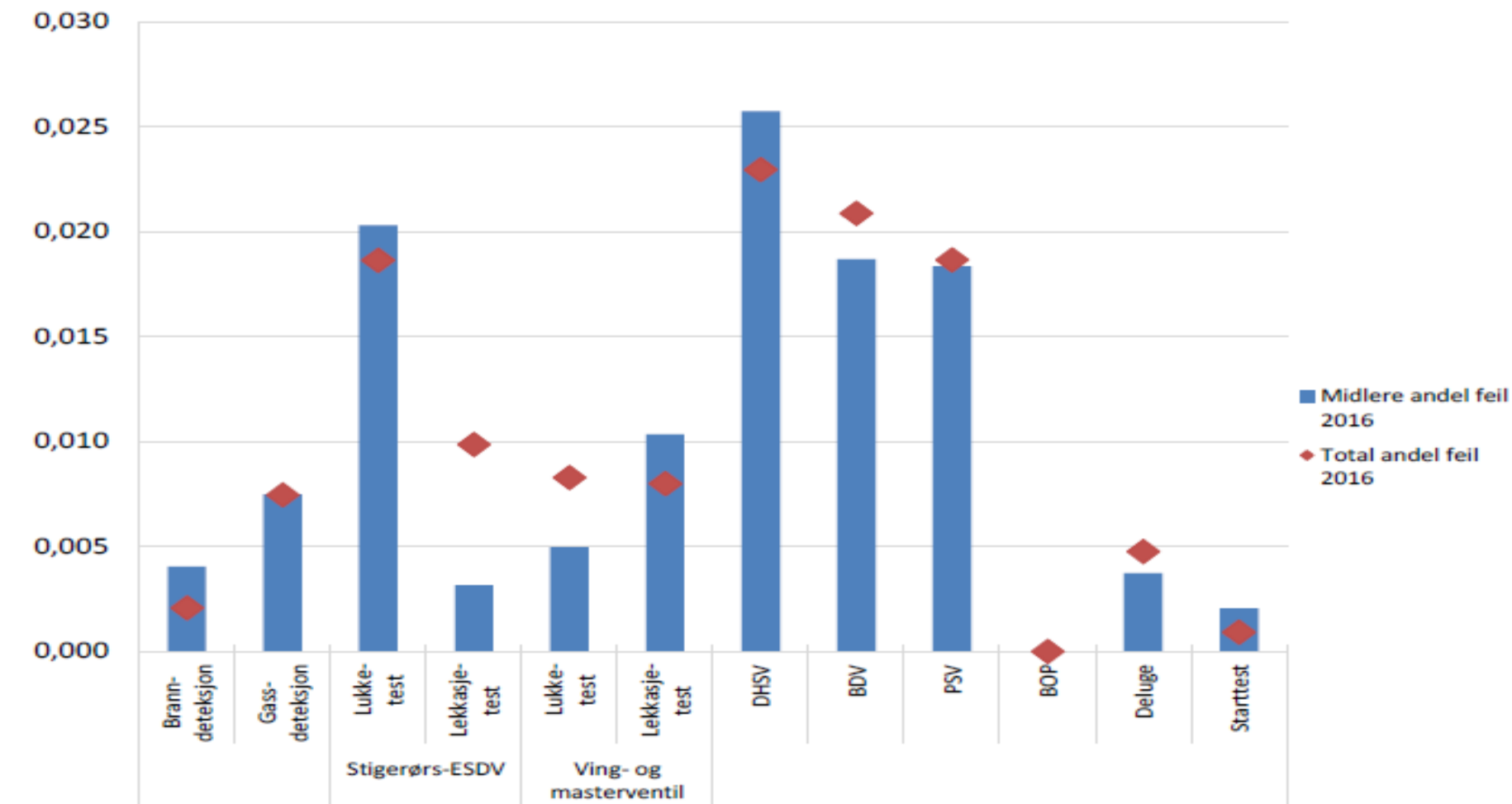


Brønnkategorisering 2016



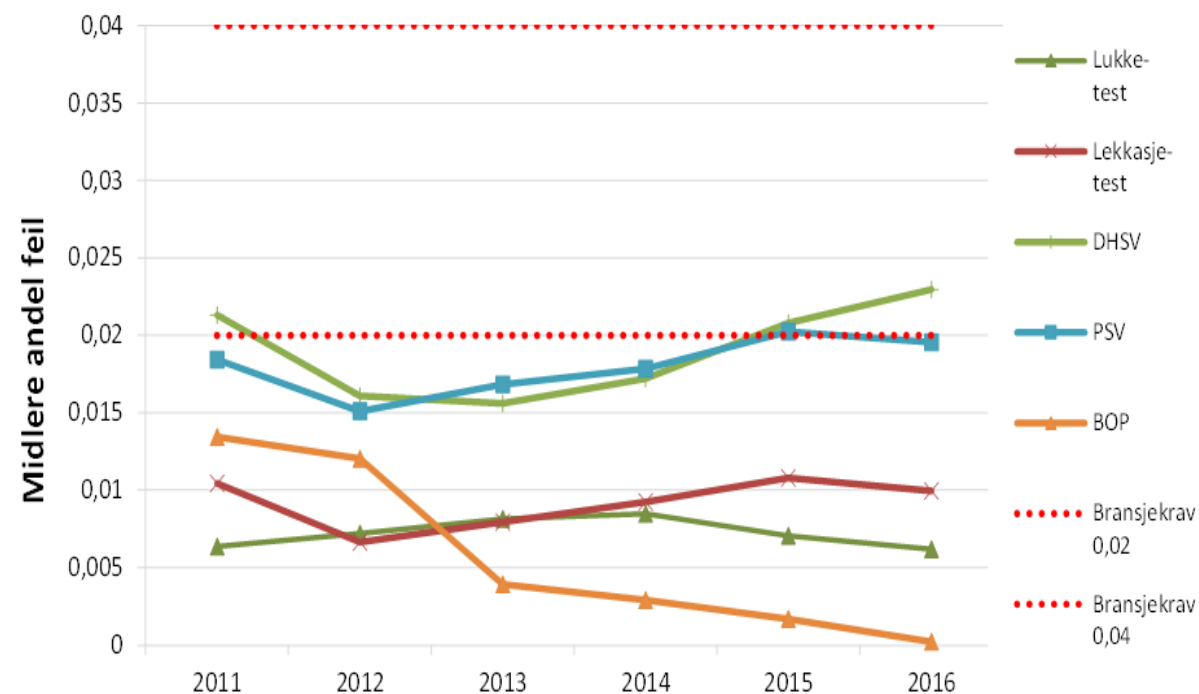
Brønnkategorisering, fordelt på operatører, 2016

Barrierer i produksjons- og prosessanleggene

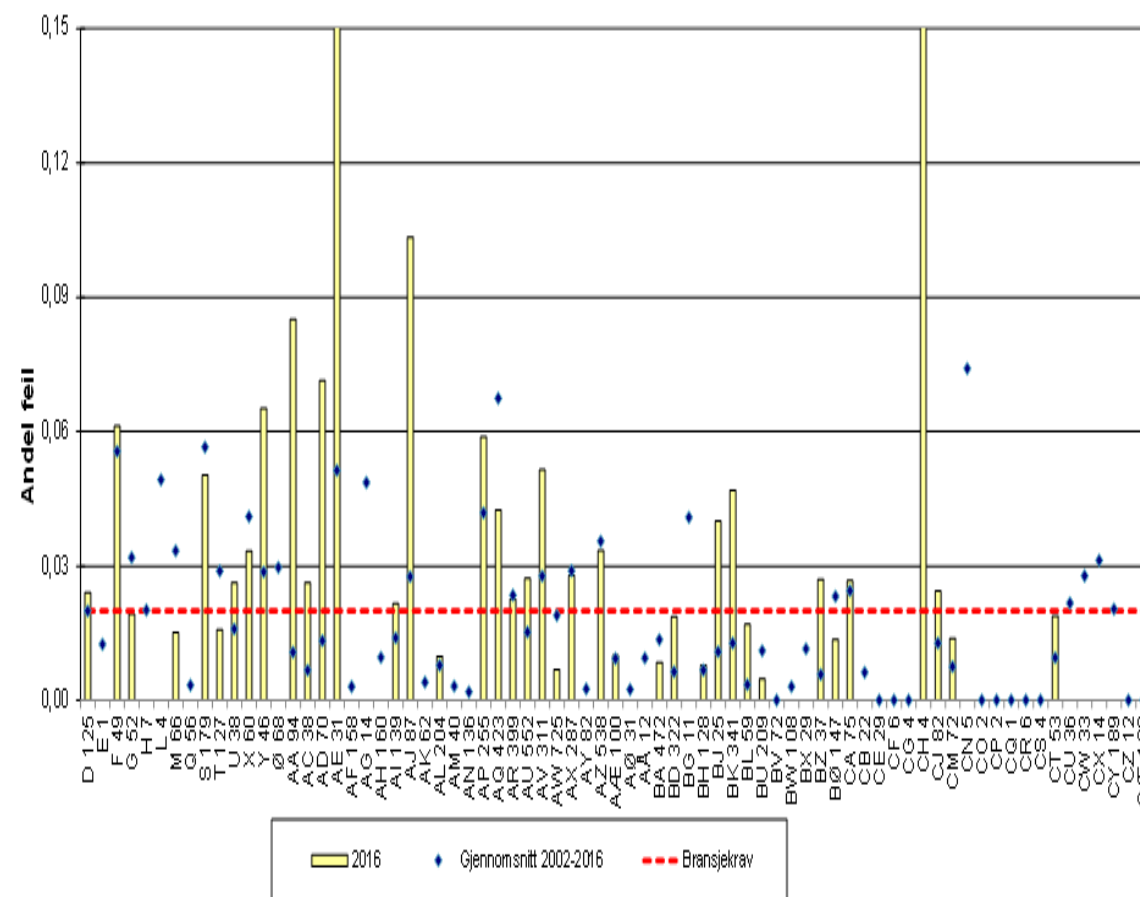


gur 65 Midlere og total andel feil i 2016

Barrier data DHSV



Midlere andel feil med 3 års rullerende gjennomsnitt



BOP test data 2015 -2016

	2015	2016
Total number of BOP's Fixed installations	29	21
Surface	27	19
Subsea	2	2
Total number of BOP's MODU	34	27
Surface	13	10
Subsea	21	17
Total number of Intervention/workover BOP's	71	33
Surface	68	30
Subsea	3	3
Grand total number of BOP's	134	81

BOP tester flyttbare innretninger

Tabell 14 Andel feil for isolering med overflate bore-BOP, flyttbare innretninger

<i>Isolering av overflate bore-BOP</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>
Antall tester	4184	2733	2956
Antall feil	1	17	2
Antall BOP-enheter	22	13	10
Andel feil	0,0002	0,0062	0,0007

Tabell 15 Andel feil for isolering med havbunn bore-BOP, flyttbare innretninger

<i>Isolering av havbunn bore-BOP</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>
Antall tester	12841	9683	8510
Antall feil	149	102	3
Antall BOP-enheter	25	21	17
Andel feil	0,0116	0,0105	0,0004

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