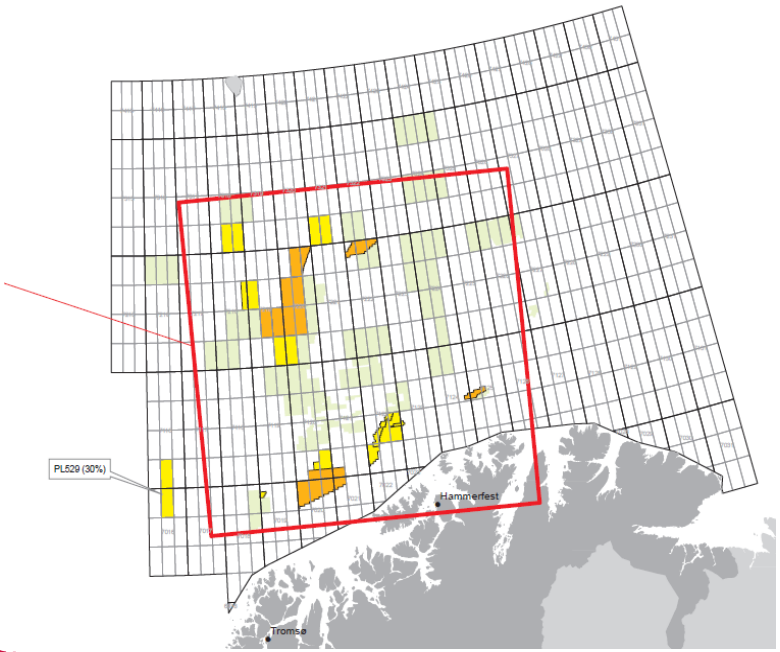
Hvordan utforme robuste beredskapsløsninger for Goliat?

HMS utfordringer i nordområdene – Ellen Waldeland

www.eninorge.com

PL 229 Goliat Location and Partnership

- Lisens tildelt1997
- Lisenshavere
  - Eni Norge AS (op) 65%
  - Statoil Petroleum AS 35%
- Oppstart produksjon medio 2015

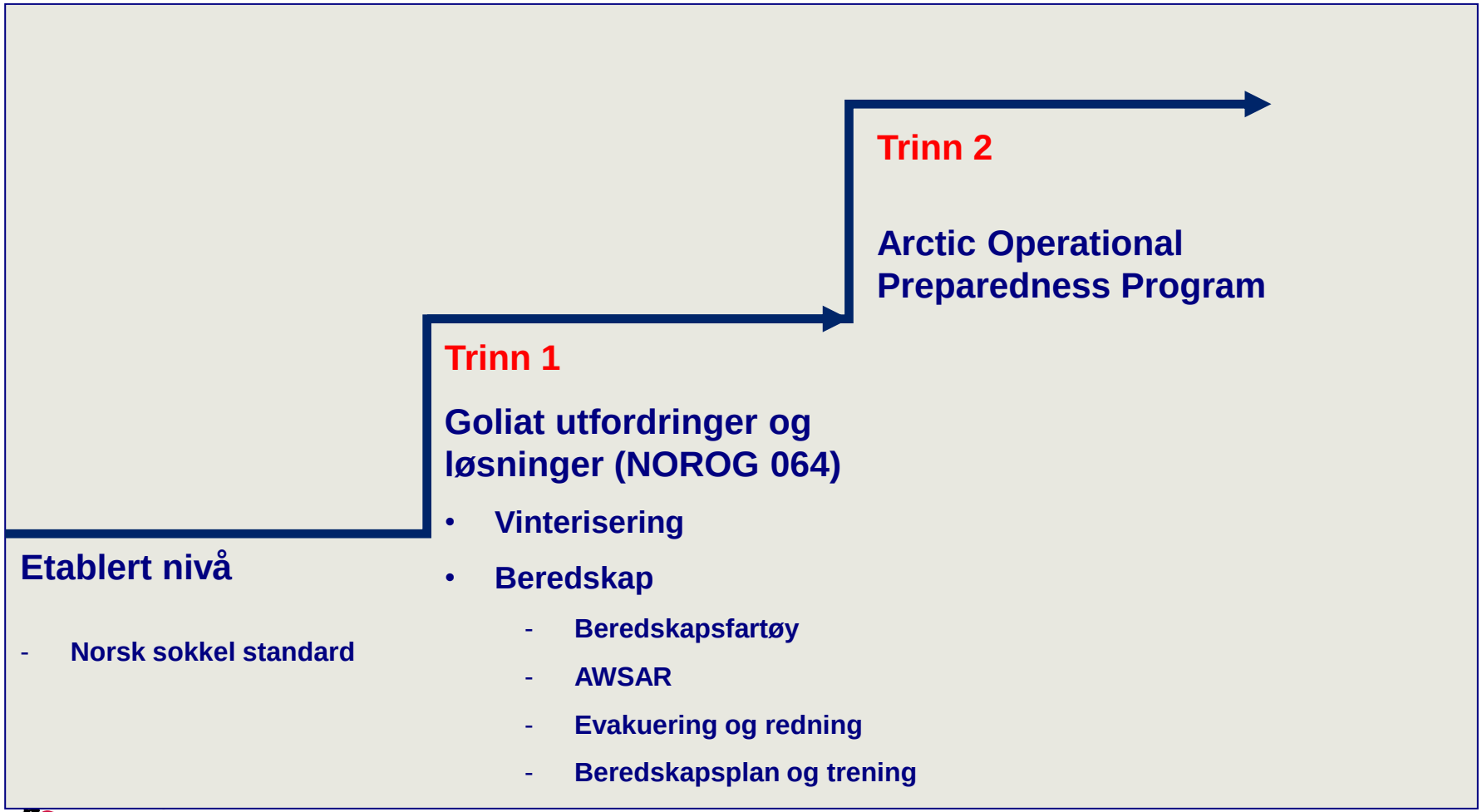


GOLIAT

- Geostasjonær FPSO
- Behandling av olje
- Kraftforsyning fra land
- Integrert med kraftgenerering på FPSOen
- Stabilisert olje eksporteres via tankskip

- Assosiert gass reinjiseres
- Høyt fribord – beskyttelse mot grønn sjø og islaster

Utvikling av beredskap på Goliat…



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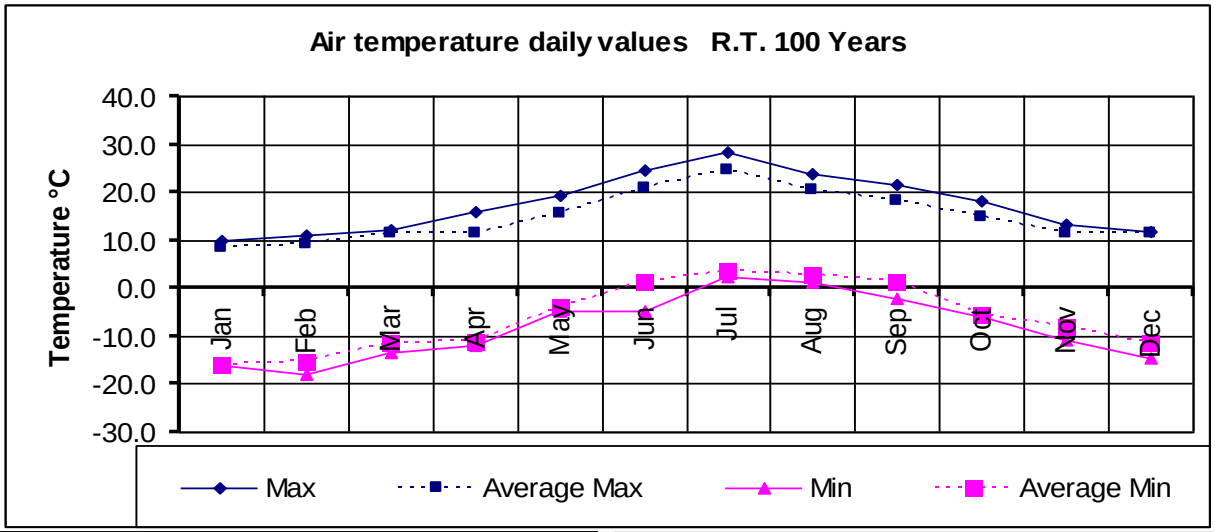
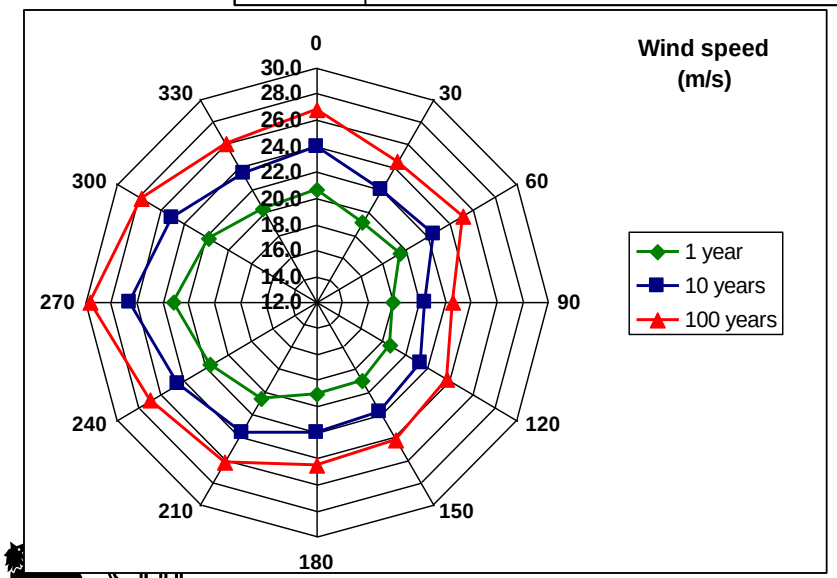
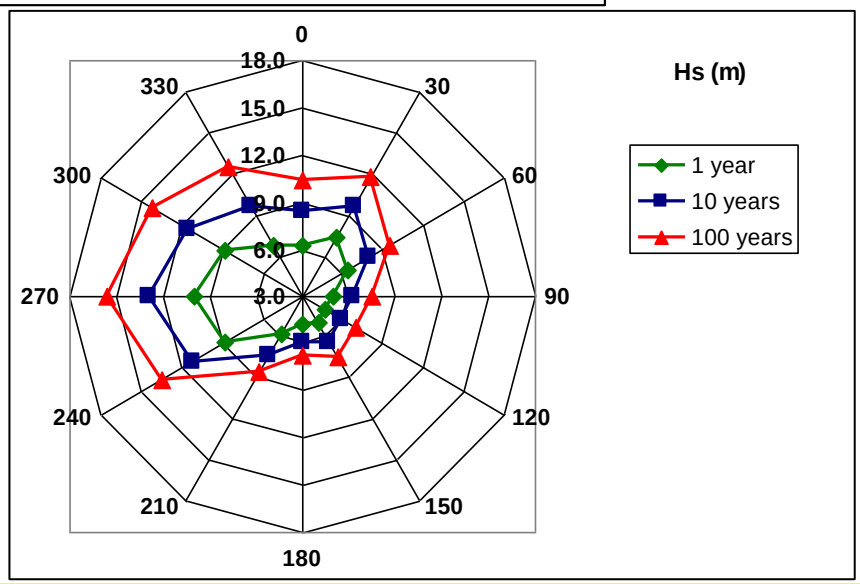
Metocean Data







Sub-arktisk klima

- **Utfordringer:**
  - Arbeide utendørs
  - Søk og redning
  - Beskyttelse av teknisk utstyr (brannvann, gassdetektorer etc)
  - Rømningsveier
  - Evakueringsutstyr
  - Kort avstand til land (+ og -)

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Det var beredskapsutfordringene...

….. og nå beredskapsløsningene

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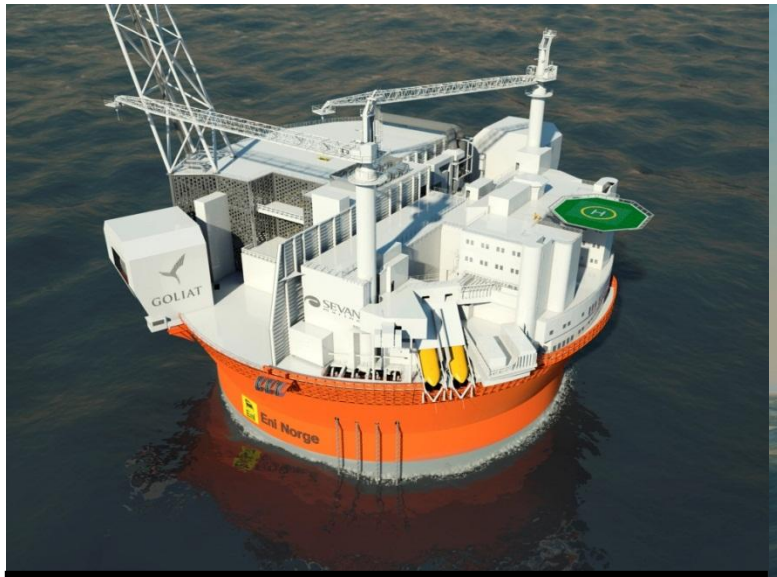
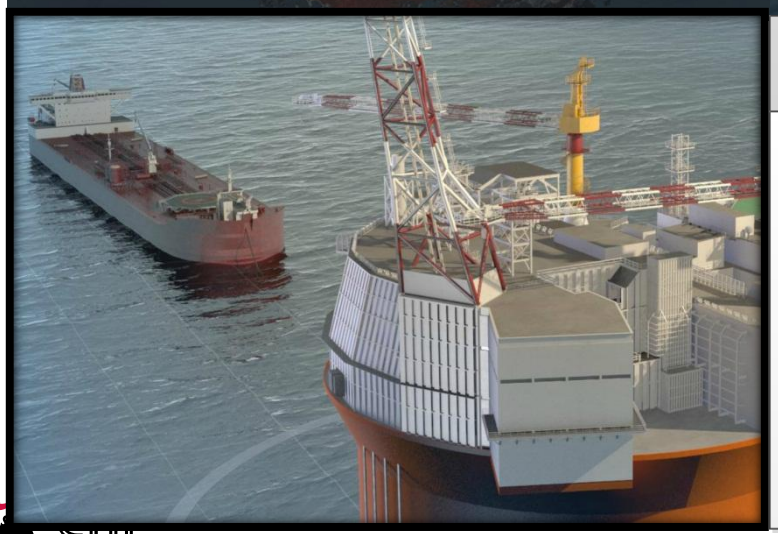
Beredskapsløsning - vinterisering





Cold Climate Operations Manual

Technical Design Solutions

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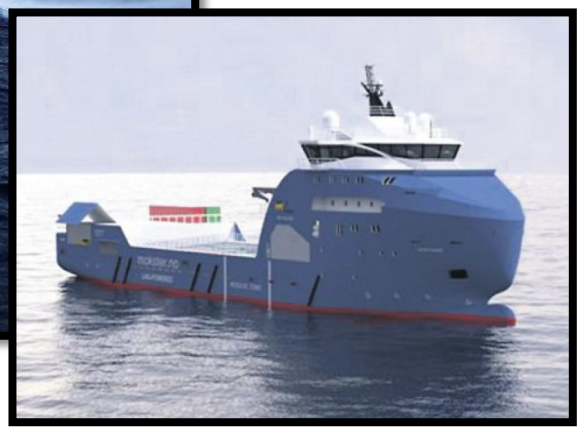
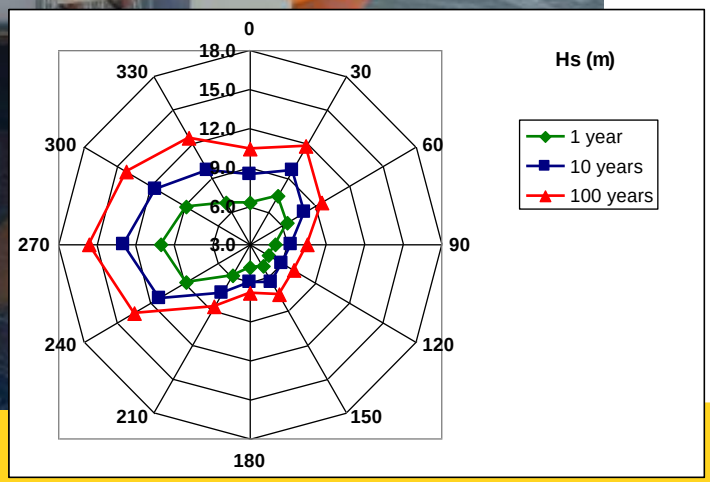
Fartøy på Goliat



Beredskapsløsninger – mønstring, redning & evakuering

Offshore.no

Sintef



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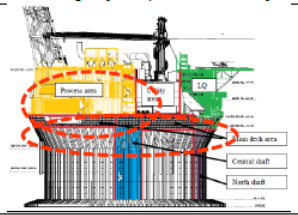
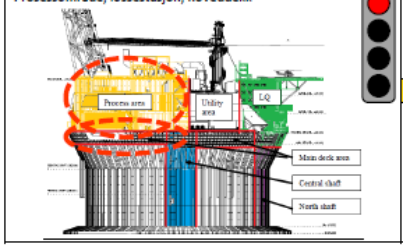
DFU fra EPA og førsteside på aksjonskort

Summary of DSHA 2.1

DSHA no. 2.1:	Fire and Explosion due to hydrocarbon leakage in process areas
Type of DSHA:	Design Accidental Event (DAE); Accidental event with significant contribution to the risk
Frequency:	4.3E-04 per year (one event every 2300 year)
Area:	 Leak areas: Process area (incl. offloading station) and main deck area
Consequences (ref. /1/):	
Personnel risk	FAR = 0.86 (32% of total FAR for the installation)
Environmental risk	0.0018 per year (oil spill to sea) (16% of total oil leak to sea frequency from the FPSO)
Any Main Safety Function	Fire: 4.4E-5 per year. This is 44% of risk acceptance criteria. Impairment of MSF1 (prevention of escalation) and MSF5 (escape routes) are the highest contributors. Explosion: 7.8E-5 per year. This is 78% of risk acceptance criteria. Impairment of MSF1 (prevention of escalation) is the highest contributor.
Dimensioning for EP:	**Dimensioning for response teams:** General requirements apply. No specific performance requirements. **Dimensioning for the hospital and medical treatment:** Min POB (40): 2 persons seriously injured Max POB (120 hot platform): 2 persons seriously injured and 3 persons minor injured **Dimensioning for the EER means:** Escape to muster areas Evacuation – availability of evacuation means Search and rescue of injured personnel
Challenges/aggravation wrt EER availability:	Fires on main deck can cause impairment of escape routes from central shaft and riser area. Smoke contamination of helideck and/or lifeboats incl. muster areas
Challenges for the emergency response teams:	Search and rescue of injured personnel in an area contaminated with heat and smoke
The event might escalate into:	DSHA 03 – Acute pollution DSHA 12 – Injured personnel, acute illness DSHA 17 – Personnel in sea during emergency evacuation DSHA 18 – Loss of power

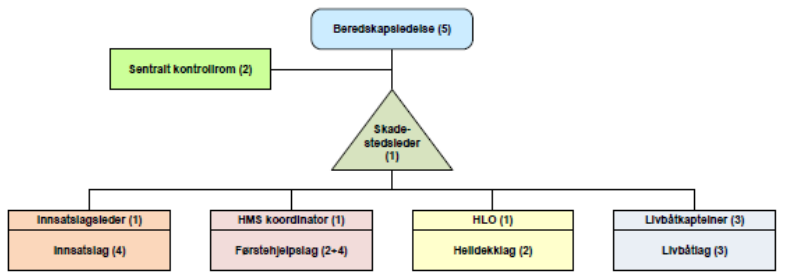
DFU 2.1: Brann og eksplosjon pga. lekkasje i prosessområdet

Område (og risiko for personell eller miljø)	Mulig eskalering
Prosessområde, lossestasjon, hoveddekk 	• DFU 3: Akutt forurensning (oljeutslipp) • DFU 12: Skadet personell, akutt sykdom • DFU 17: Personell i sjø under nødevakuering • DFU 18: Tap av kraft
	Spesielle forhold/utfordringer
	• Helidekk utilgjengelig • Mønstringssted utilgjengelig • Rømningsveier fra sentralskaft og stigerørs-område utilgjengelig • Isdannelse pga. brannvann

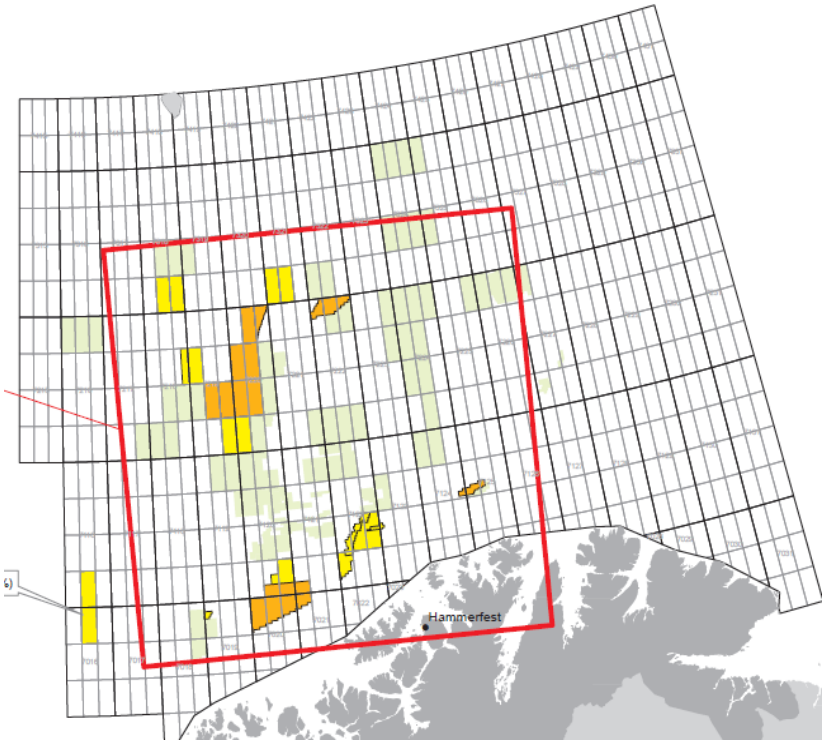
PA-melding:

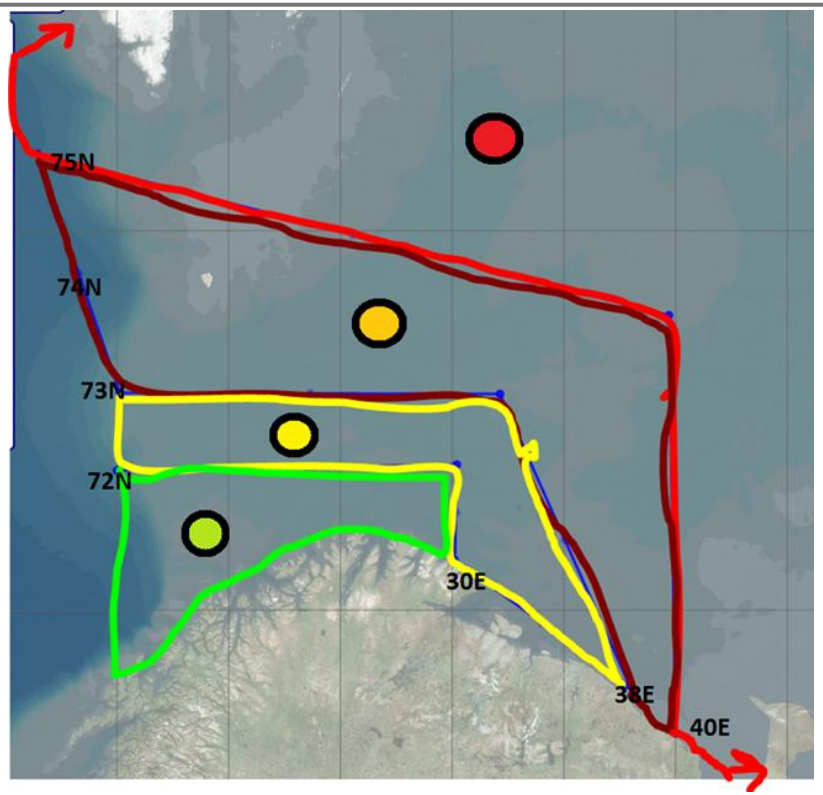
Trykk: "Generell alarm" – la alarmen gå i 30 sekunder	Varsling	Telefon
Hør etter – hør etter: - Vi har en brann/eksplosjon i prosessområdet. - Alt personell mønstrer i henhold til alarminstruks.	Esvagt Aurora	90 02 10 71
	Møkster PSV	
Attention – attention: - We have a fire/explosion in the process area. - All personnel muster according to station bill.	SAR Hammerfest	74 86 33 33
	HRS Bodø	75 55 90 00
	Beredskapsvakt	916 56 480
Gjenta melding ved behov	*(Eksterne ressurser)*	

Interne personellressurser - beredskapsorganisasjon



Veien videre…





- **Area 1 :** Cold, darkness, meteorological data
- **Area2 :**Cold, darkness, meteorological data ,communication, remoteness
- **Area 3:** Cold, darkness, meteorological data , communication, remoteness, iceberg
- **Area4**Cold, darkness, meteorological data ,communication, remoteness, iceberg, ice edge

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Areas-Progressive approach to the Arctic

	Area 1: South –West Barents	*Area 2: Midle –West Barents*	*Area 3: North–East Barents*	*Area 4: Extreme Barents*
Area classification				
Technology Approach	Qualification of existing technological solutions	Adaptation of existing technological solutions	New technology approach based on known concepts	Game changing innovation
Objective	Prove the performance & reliability of existing technology	-Improve the performance & reliability of the known technology. -Diversification of the risk	New technology development, based on known concepts	New technological innovative concepts
Cost	$	$$	$$$	$$$$
Time				
Challenges by Area	**-Cold temperature** **-Darkness** **-Meteorology & forecasting** **-Lack of existing infrastructures**	**-0-10% Probability Icebergs** **-Remoteness** **-Deep water(??)** **-Communication coverage** **-Few available empirical data**	**-10-20% Probability of Icebergs** **-High Remoteness** **-No available empirical data**	**-40-50% Probability Icebergs** **-Extreme Remoteness** **-Sea ice edge**
Key Factors	Cold Darkness Meteorology prediction	Communication coverage Remoteness	Icebergs	Permanent Ice –Ice edge

Videreutvikling av beredskap…