

# Subsea Operations Conference

Haugesund

10<sup>th</sup> - 11<sup>th</sup> of August 2022

**Something used and worn, something old, and some regulatory requirements  
that goes along with it.**

Trond Sundby, principal engineer  
Petroleum Safety Authority Norway



# Areas of responsibility

## The PSA supervisory responsibility embraces

- oil and gas activities on the whole Norwegian continental shelf in addition to eight petroleum facilities on land and associated pipeline systems.
- offshore renewable energy production and CO2 management.

## Petroleum operations

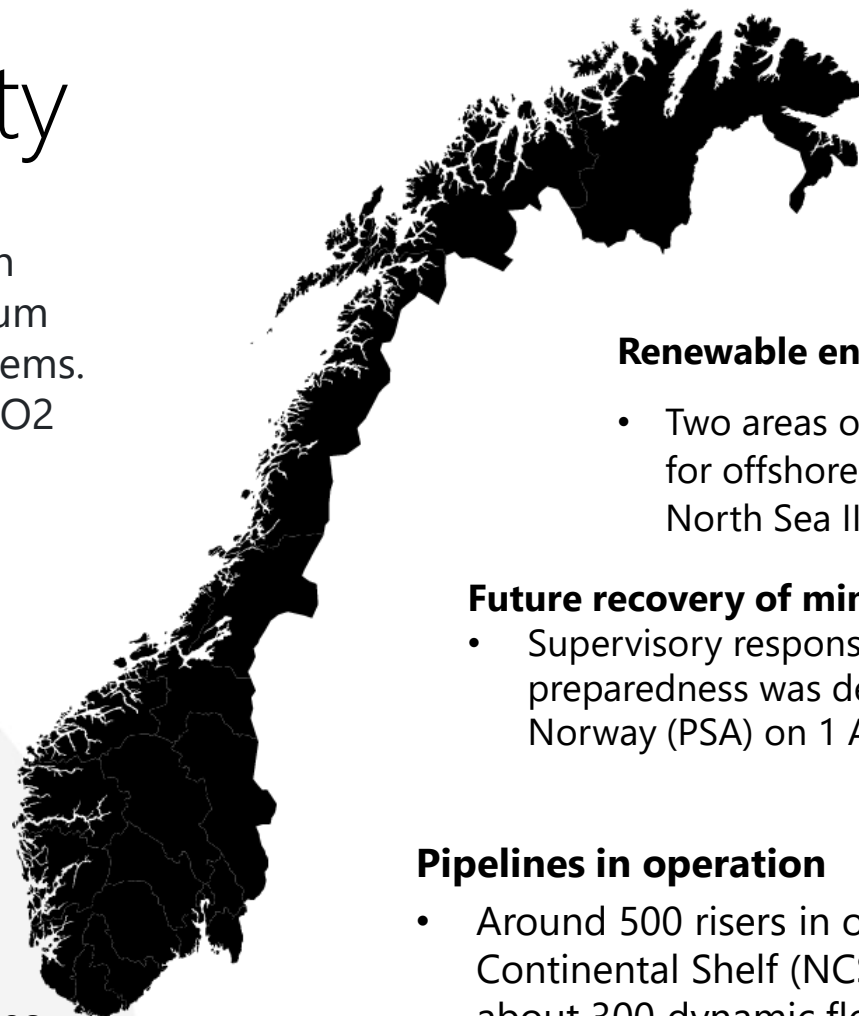
- 94 fields on stream
- 85 fixed facilities
- 49 mobile facilities with an AoC
- 25 000 employees offshore
- 17 400 kilometres of pipeline
- 350 subsea facilities (single/multiwell templates)

Updated 1 January 2022

## Cables / umbilicals

- Around 4 000 km of control cables, power cables and service lines in operation (about 400) – great variation when it comes to type and scope

PTIL/PSA



## CO2 transport and injection

- Facilities under construction. Part of Longship, the government's demonstration project for full-scale CO2 management

## Renewable energy production offshore

- Two areas of the Norwegian continental shelf opened for offshore wind power: Utsira North and Southern North Sea II

## Future recovery of minerals from the seabed

- Supervisory responsibility for safety and emergency preparedness was delegated to the Petroleum Safety Authority Norway (PSA) on 1 April 2022.

## Pipelines in operation

- Around 500 risers in operation on the Norwegian Continental Shelf (NCS) – about 200 rigid steel risers and about 300 dynamic flexible risers
- Around 650 static flowlines (about 16 500km) in operation, around 500 of these (about 16 000km) rigid pipelines and around 150 of these ( about 500km) static flexible flowlines.
- Several hundred spools, pipe ends / terminations and jumpers attached to these pipelines and risers
- Crossings, rock dumps, mattresses etc..

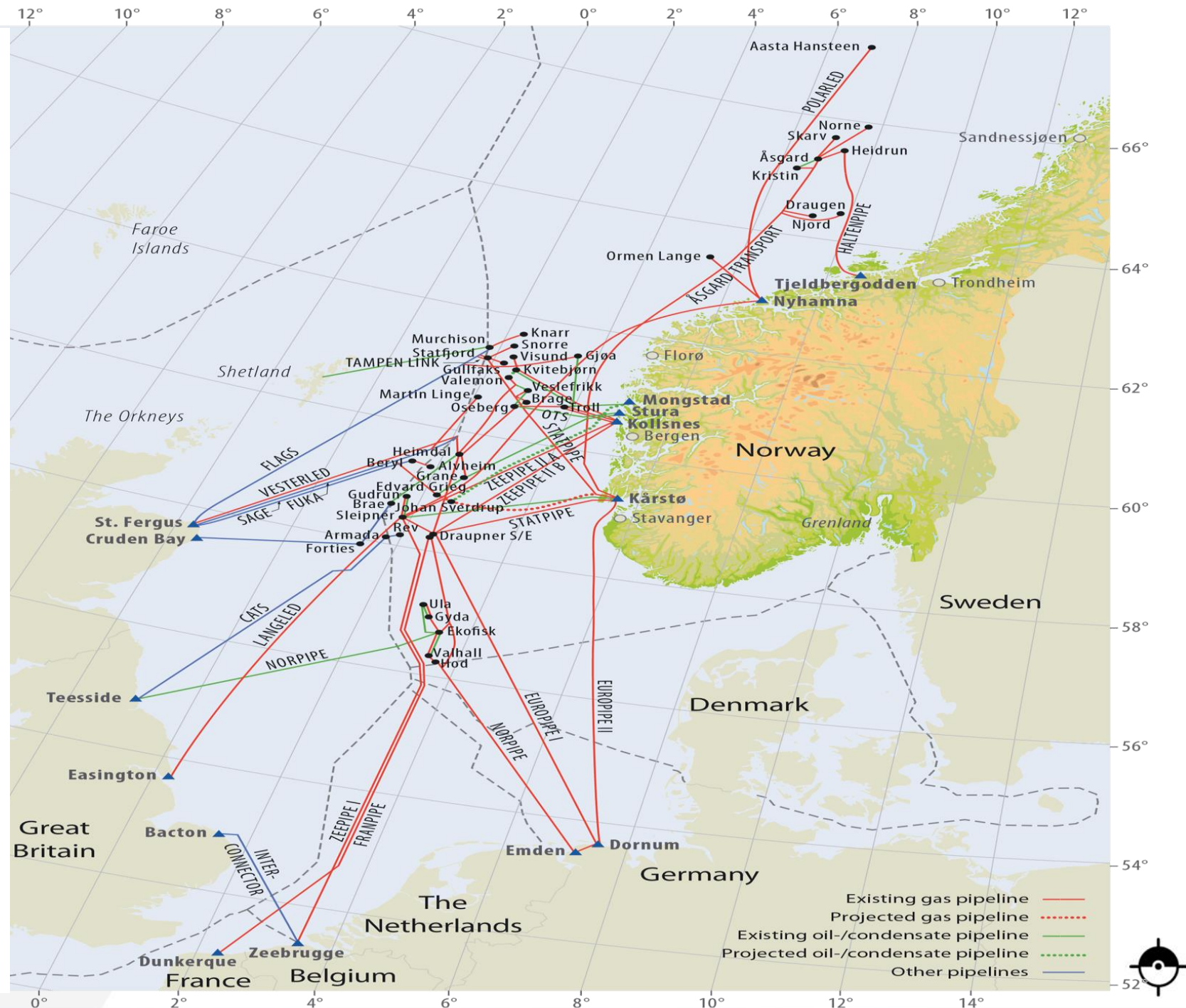


## Assumed cessation and disposal cases for pipelines in the future?

- In a 10 year perspective we expect disposal / removal of 1-2 offshore surface facilities with belonging pipeline infrastructure and subsea facilities per year – dependent on framework conditions and other external factors
- [Experience report NPD on disposal of facilities, including pipelines](#) (Norwegian only – Markedsrapport knyttet til avslutning og disponering av utrangerte innretninger, 23.4.2018)

## Pipelines taken out of service

- Around 150-200 risers taken out of service (about 60% rigid steel risers, about 40% flexible risers).
- Around 1 100 - 1 200 km (about 120) pipelines taken out of service (5/6 rigid steel pipelines, 1/6 static flexible pipelines – some removed – some are temporarily abandoned awaiting disposal of entire fields and others are disposed at the seabed)



# Framework and regulations

- [Act 29 November 1996 No. 72 relating to petroleum activities – Chapter 5 on Cessation of petroleum activities](#)
  - **Section 5-1 Decommissioning plan; Section 5-2 Notification of termination of use;** Section 5-3 Decision relating to disposal; Section 5-4 Liability; Section 5-5 Encumbrances; Section 5-6 Takeover by the State
- [Framework Regulations section 30 on cessation plan](#)
- [Framework Regulations section 45 on development concepts](#)
  - *'The design, engineering and construction of the individual facilities in a development concept shall allow them to be placed, operated and, if applicable, **removed in a prudent manner.**'* (facility in this context also comprises pipelines and subsea systems)
- [Management Regulations section 25 on consent requirements for certain activities](#)
  - *The operator shall obtain consent before offshore and onshore facilities or parts of these are put into service, and before use of offshore and onshore facilities beyond the lifetime and assumptions that form the basis for approval of the PDO, PIO or main application. When it is decided to initiate a process for possible lifetime extension of a facility, the Petroleum Safety Authority Norway shall be informed. Such application for consent shall be submitted one year before the planned lifetime expires.*
  - *For offshore petroleum activities, the operator shall also obtain consent prior to disposal of a facility, even if a disposal decision has been made pursuant to Section 5-3 of the Petroleum Act, prior to removing or moving a facility that has a significant safety-related function, and that is not subject to a disposal decision pursuant to Section 5-3 of the Petroleum Act.*



# Framework and reports

- White papers and reports from the Government and the Parliament
  - Norwegian Public Enquiry (Norwegian - 1993)
  - Stortingsmelding nr. 47 OED 1999-2000 (Norwegian only, 29.9.200)
- Relevant standards and guidelines
  - Guideline 122 - Recommended guidelines for the management of life extension
  - Norsok Y-002 Life extension for transportation systems (Rev. 2, June 2021);
  - Norsok U-009 Life extension for subsea systems (Rev. 1, March 2011 – under revision);
  - Norsok U-001 Subsea production systems (Edition 5, December 2021)
- PDO-process – cessation plans and PSA Norway's role and follow-up with the operating companies
- Separate consents for removal and disposal – evaluation and consents granted or rejected
- Requirements for cessation plan according to the Petroleum Act – we give advice to our ministry. Plan and Impact assessment including Safety, Health, Environmental and economical evaluations
- After the formal decision of disposal is made by the Ministry of Oil and Energy (Parliament) and infrastructure is disposed and/or removed. PSA has no responsibility or obligations – ref. Petroleum Act – unless there are specific terms and guides in the decision of disposal that states otherwise.



# From stortingsmelding nr. 47 OED 1999-2000

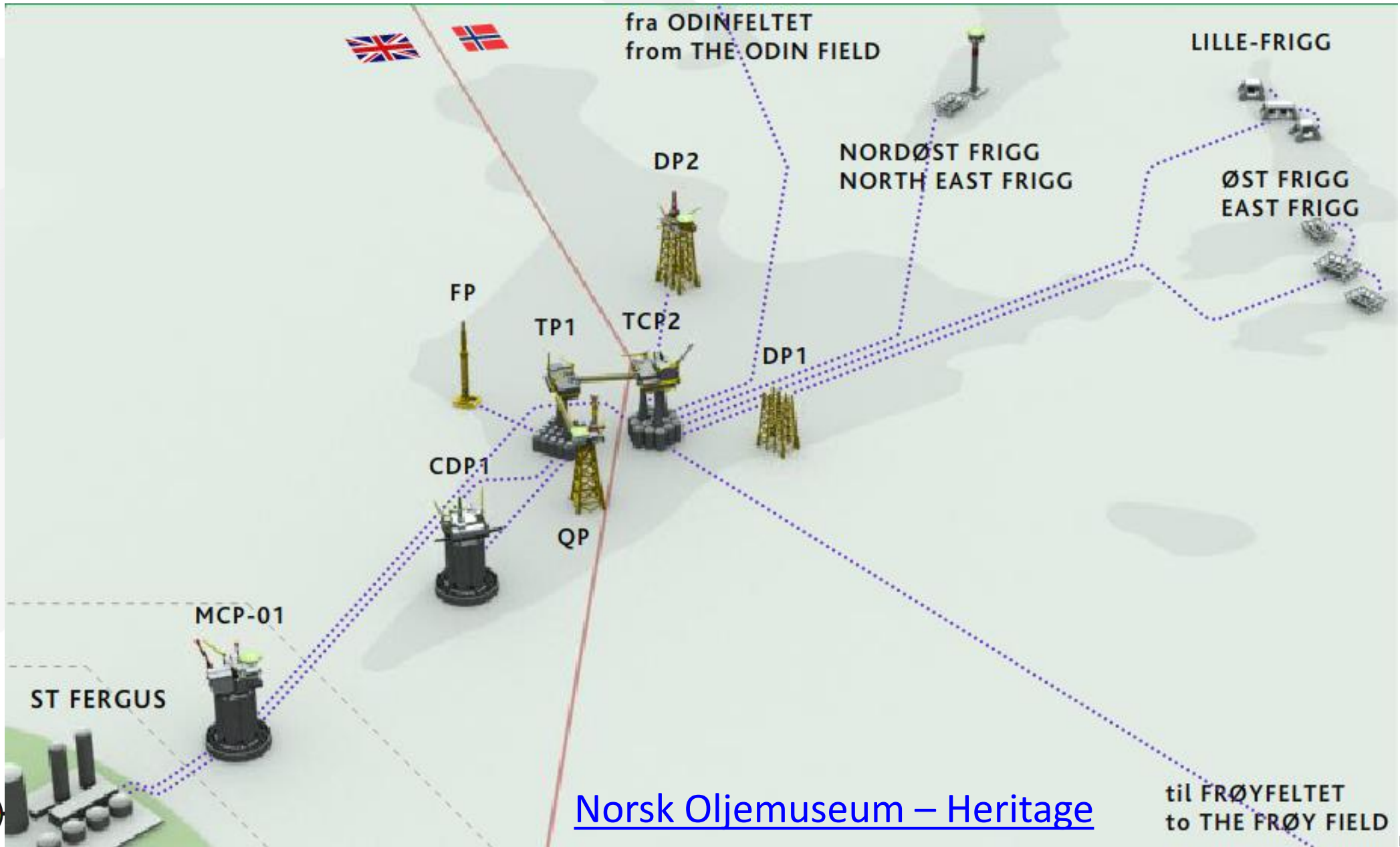
*Table 3.1: Lie of pipelines and cables by type and location (NPD))*

Lie	Export lines			Infield lines			Cables
	NCS	Foreign continental shelf	Sum	Steel	Flexible	Sum	
Trenched, covered	8%	25%	33%	62%	15%	77%	90%
On the seabed	50%	17%	67%	20%	23%	23%	10%
Sum	58%	42%	100%	82%	18%	100%	100%

*Table 3.2: Distribution of export lines by dimension and transported medium in km length*

Dimensjon	Gas	Oil	Condensate	Sum
< 20"	362	85	198	645
20" – 40"	1809	543	228	2580
> 40"	4211	-	-	4211
Sum	6382	628	426	7436





# Background Frostpipe (Frigg – Oseberg Transport System)

- Installed in 1993, 30 years design life,
- 16” oil and condensate transport line, 82 km, about 15km rock dumped / protected
- 95-115m water depth
- Design pressure 167 bar, capacity of 20 000 Sm<sup>3</sup>/day (@145 bar)
- Steel grade API 5L X52, 3-layer PE coating, 40mm concrete weight coating
- part of the Lillefrigg and Frøy development,
- taken out of service in 2001. The line was cleaned, pigged and preserved in 2004.
- During Frigg Cessation Sealines removal campaign, the pipeline was cut and removed from TCP2 to the 500m zone.
- Remaining design life of about 15 years, will be considered for future use and present work will allow the pipeline to be permanently abandoned if not used.
- The Frostpipe Disposal plan was approved in the King Council 12.3.2010.



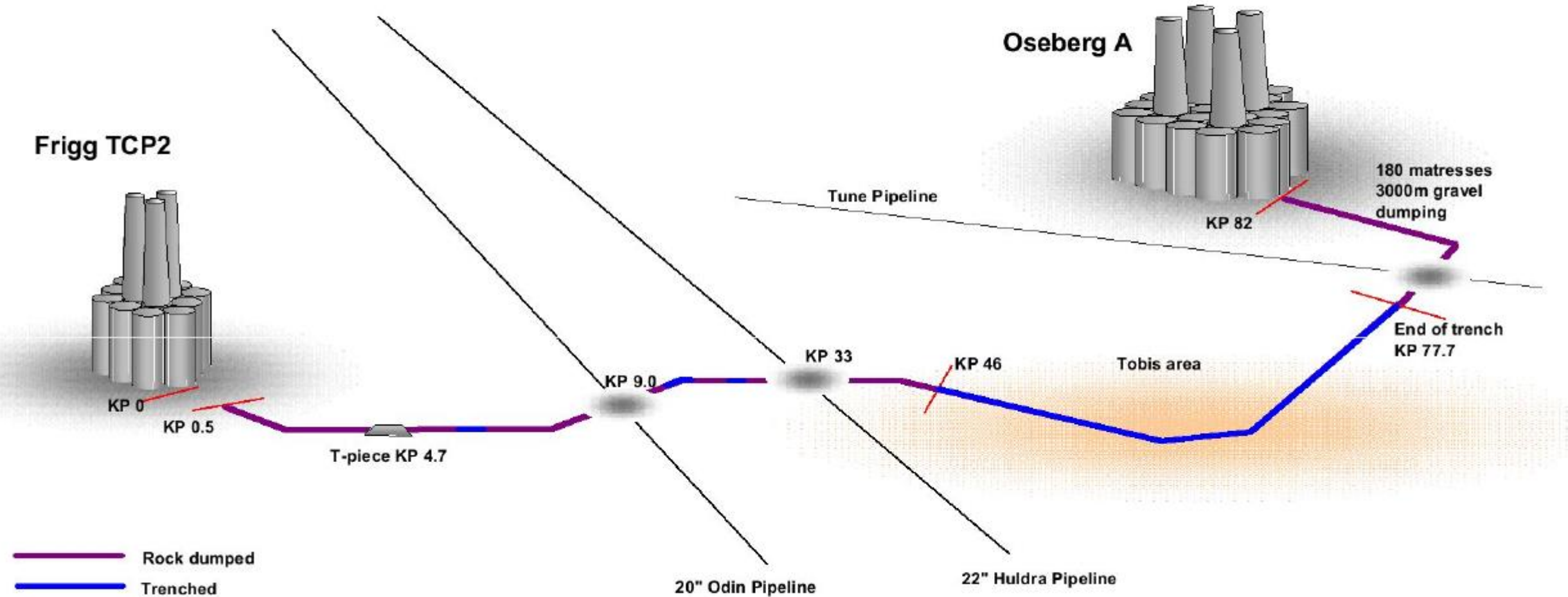


# Alternatives of disposal

1. Leave in place and trench entire length (174 Mill NOK)
2. Leave in place and rock dump entire length (263 Mill NOK)
- 3. Leave in place, trench tobis fishing area and other areas where practicable, and rock dump remaining sections of line (157 Mill NOK)**
4. Leave in place, trench tobis fishing area and rock dump all sections outside this area (219 Mill NOK)
5. Complete removal of pipeline (802 Mill NOK)



# Leave pipeline in place, trench in the tobis fishing area and in other areas where this is practicable, and rock dump the remaining sections of pipeline





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