Risk Level in the Norwegian Petroleum Industry
Response and results from diving personnel questionnaire 2018

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More than half remains

The NPD presents annual resource accounts with an overview of total recoverable petroleum. These build on data reported by the operator companies, the NPD's own assessment of fields and discoveries, and its estimate of undiscovered resources.

Where 2018 is concerned, the accounts show that – after almost 50 years of production – remaining resources still exceed those already produced. At 31 December 2018, total recoverable petroleum resources were estimated at 15.6 billion scm oe. Of this, 7.3 billion scm oe had been produced and sold. The expected value for the remaining recoverable resources was 8.3 billion scm oe. It is estimated that around half of this still remains to be proven. Today's estimate for total recoverable resources is about 50 per cent higher than in 1990.
Operated producing fields in the North Sea such as Balder and Ringhorne will undergo major redevelopment.

The first license awarded on the NCS in 1965, PL 001 in the Balder field area, is currently subject to an extended production horizon towards 2045.
The total number of manned and unmanned installations that have been in operation in the Greater Ekofisk Area is close to 30.

The oldest one is from 1973, the newest one started operation in 2015. Several of the installations have been removed and disposed.

At the same time the owners have invested in re-development - and the fields are prepared for the next 40 years.
Johan Sverdrup is one of the five largest oil fields on the Norwegian continental shelf.

With expected resources estimated at 2.7 billion barrels of oil equivalent, it is also one of the most important industrial projects in Norway in the next 50 years.
Time perspective for the Norwegian Petroleum Activity

Offshore petroleum activity (and diving?) – time perspective

➢ 2050 ? Yes
➢ 2075 ? Maybe
➢ 2100 ? ????? Hmmmmmmmmmmmm
Status of Offshore Diving in Norway

Modern fleet of DSVs
- Saturation depth range (25m – 180m).
- All DP3 Class vessels
- Surface depth range LDCs (0 – 30m)
Barents Sea, summer months - campaigns 2015 - 2019
Risk Level in the Norwegian Petroleum Industry
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➢ Risk level investigation by use of questionnaire for offshore diving personnel (divers, supervisors) and other diving related personnel

➢ Same format and purpose as for the questionnaire for other offshore personnel

➢ For work on Norwegian sector only


➢ Questionnaire sent to the diving companies, which re-distributed to the vessels
  ➢ Operators were informed by the PSA

➢ Questionnaire available only in English (electronic version and paper copies)

➢ The questionnaire was administered by NORCE. Project manager: Kari Kjestveit
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Questionnaire
➢ Based on the general questionnaire for offshore personnel, but adjusted for specific diver/supervisor related issues.

➢ References to PSA project with STAMI to develop questionnaire for diving personnel

➢ Further development of questionnaire by a tripartite group (NOROG, IE, Fellesforbundet, diving contractors (employee, employer) and PSA)

➢ Final touch in cooperation with NORCE

Comparison of datasets possible for
➢ HSE environment
➢ working environment
➢ perceived risk
➢ sleep
➢ health issues
RNNP 2018

Offshore Diving Personnel

QUESTIONNAIRE

TRENDS IN RISK LEVEL ON THE NORWEGIAN SHELF

1. Age
   - [ ] 20 years or younger
   - [ ] 21-24 years
   - [ ] 25-30 years
   - [ ] 31-35 years
   - [ ] 36-40 years
   - [ ] 41-50 years
   - [ ] 51-60 years
   - [ ] 61 years or older

2. Nationality
   - [ ] Norwegian
   - [ ] British
   - [ ] Other

3. Education
   - [ ] Apprenticeship
   - [ ] University
   - [ ] Upper secondary school (no trade certificate)
   - [ ] Skilled with a trade certificate
   - [ ] Skilled with more than one trade certificate
   - [ ] Classified

4. Approximate. How much of your working time during the last year has been spent on the Norwegian Continental Shelf (NCS) or onshore facilities in Norway performing:
   - [ ] Offshore diving operations
   - [ ] Other offshore operations
   - [ ] In offshore-related activities onshore
   - [ ] In other work/education

5. How much offshore experience do you have?
   - [ ] 0 - 3 mo.
   - [ ] 4 mo. - 1 year
   - [ ] 11 - 15 years
   - [ ] 2 - 5 years
   - [ ] 6 - 10 years
   - [ ] 16 - 20 years
   - [ ] 21 years or more

6. By which company are you employed? Please use capital letters.

7. What is the name of the vessel (DSV/ROV) where you are currently working? Please use capital letters.

8. Current position on board?
   - [ ] Surface supplied diver
   - [ ] Diving supervisor
   - [ ] Diving superintendent
   - [ ] Offshore manager
   - [ ] Deep technician
   - [ ] Lift support technician
   - [ ] Lift support supervisor
   - [ ] ROV operator

9. Do you have permanent or temporary employment?
   - [ ] Permanent
   - [ ] Day rate
   - [ ] Other temporary contract

10. If day rate or other temporary employment: What is the duration of the contract?
    - [ ] 1 offshore period
    - [ ] Less than a year
    - [ ] More than 1 year

11. Job experience: How long have you held your present position?
    - [ ] 0 - 3 mo.
    - [ ] 4 - 12 mo.
    - [ ] 1 - 2 years
    - [ ] 3 - 5 years
    - [ ] 6 - 10 years
    - [ ] 11 - 19 years
    - [ ] 20 years or more
CHARACTERISTICS OF THE RESPONDENTS (N = 115)

37 % worked on same vessel (last 12 months)

Nationality:
• British: 67,5 %
• Norwegian: 10,5 %
• Other: 22 %

Employment:
• Permanent employee: 5 %
• Dayrate: 81 %
• Other temporary contract: 14 %

Work category:
- Diver (sat/surface): 64 %
- Supervisor (related to diving): 26 %
- Other: 10 %
Risk Level in the Norwegian Petroleum Industry
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Work periods last 12 months (sectorwise), % of divers and supervisors (n=101)
**Risk Level in the Norwegian Petroleum Industry**  
Response and results from diving personnel questionnaire 2018

<table>
<thead>
<tr>
<th>Use of NORSOK saturation/decompression tables</th>
<th>Very/somewhat preferable</th>
<th>Indifferent</th>
<th>Somewhat not/not at all preferable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Divers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of saturation periods</td>
<td>67.4%</td>
<td>31.3%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Mandatory break in bell</td>
<td>76.8%</td>
<td>5.6%</td>
<td>7.6%</td>
</tr>
<tr>
<td>In water time</td>
<td>73.8%</td>
<td>10.9%</td>
<td>15.5%</td>
</tr>
<tr>
<td>Long-term follow up of diver's health</td>
<td>52.1%</td>
<td>25.4%</td>
<td>22.4%</td>
</tr>
<tr>
<td>Length of stay on board</td>
<td>39.7%</td>
<td>25.4%</td>
<td>34.9%</td>
</tr>
<tr>
<td>Restriction of umbilical length</td>
<td>39.7%</td>
<td>22.2%</td>
<td>37.1%</td>
</tr>
</tbody>
</table>

Opinion of general work environment factors (n = 101)
Perception of risk related to various elements (n = 101)

**Risk Level in the Norwegian Petroleum Industry**

*Response and results from diving personnel questionnaire 2018*

### Perception of Risk

<table>
<thead>
<tr>
<th>Element</th>
<th>Divers</th>
<th>Supervisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas cut</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Mechanical breakdown during diving operations (e.g. cranes, bell handling, hot water)</td>
<td>30.9%</td>
<td>42.3%</td>
</tr>
<tr>
<td>- Personal diving equipment (including bail-out)</td>
<td>21.2%</td>
<td>19.2%</td>
</tr>
<tr>
<td>Work inside structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Automated control systems failures during diving operations</td>
<td>19.7%</td>
<td>12.3%</td>
</tr>
<tr>
<td>- Manual control systems failures during diving operations</td>
<td>28.4%</td>
<td>14.6%</td>
</tr>
</tbody>
</table>

Legend:
- Slight hazard (1,2)
- Medium hazard (3,4)
- Great hazard (5,6)
Risk Level in the Norwegian Petroleum Industry
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Safety behaviour during diving (n = 72)

Did time pressure make it hard to follow operational procedures?

- Divers
  - Quite/very rarely or never: 56.3%
  - Sometimes: 36.6%
  - Quite/very often or always: 7.0%

Were you worried about your own safety during diving?

- Divers
  - Quite/very rarely or never: 80.3%
  - Sometimes: 16.9%
  - Quite/very often or always: 2.8%

Have you asked for a break?

- Divers
  - Quite/very rarely or never: 69.1%
  - Sometimes: 27.9%
  - Quite/very often or always: 2.9%

Did you work with divers or diving personnel that you regarded incompetent?

- Divers
  - Quite/very rarely or never: 66.2%
  - Sometimes: 26.8%
  - Quite/very often or always: 7.0%

Did you work with supervisors or support personnel that you regarded incompetent?

- Divers
  - Quite/very rarely or never: 81.7%
  - Sometimes: 14.1%
  - Quite/very often or always: 4.2%
HSE climate indexes: Comparing Offshore (2017) and Diving personnel (2018)

Response scale 1-5: High value is positive

- Open communication
  - RNNP (diving personnel) 2018: 3.80
  - RNNP (offshore) 2017: 3.73
- Cooperation and communication
  - RNNP (diving personnel) 2018: 3.59
  - RNNP (offshore) 2017: 3.65
- Organisation’s engagement
  - RNNP (diving personnel) 2018: 4.24
  - RNNP (offshore) 2017: 4.55
- Conflict of safety goals
  - RNNP (diving personnel) 2018: 4.12
  - RNNP (offshore) 2017: 3.86
- Management engagement
  - RNNP (diving personnel) 2018: 4.44
  - RNNP (offshore) 2017: 4.17
- Colleagues' engagement
  - RNNP (diving personnel) 2018: 4.22
  - RNNP (offshore) 2017: 4.39
- Own safety behaviour
  - RNNP (diving personnel) 2018: 4.66
  - RNNP (offshore) 2017: 4.65

- Totally different samples: 6000 (offshore 2017) vs 115 (diving 2018)

- **Diving personnel:**
  - Have better results on most HSE climate indexes
  - Report somewhat better on general work environment
  - Report higher perceived risk on comparable situations (not diving-related)
  - Perceive lower sleeping quality (both before and after the trip)
  - Report lower sick leave and less health complaints
  - Report better general health
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Summing up – diving personnel

➢ General work environment factors
  ➢ Divers are more positive than supervisors – especially related to use of NORSOK decompression tables
  ➢ Least satisfied with a) length of saturation periods and b) stay onboard

➢ Perceived risk in diving operations
  ➢ Divers report gas-cut, human error/mechanical failure, personal diving equipment, exhaustion, and error in automated and manual control systems to represent the major contributing factors to risk in diving operations

➢ Safety behaviour during diving
  ➢ Divers have a positive view of their own safety behaviour

➢ Health issues
  ➢ Divers have less health problems than offshore workers («Healthy worker» effect?)
Risk Level in the Norwegian Petroleum Activity.
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Conclusions?

➢ It’s a first time for everything:
  ➢ 2018 was the first time using RNNP questionnaire for diving personnel
  ➢ Includes the diving population in the rest of the offshore workforce

➢ Number of respondents are low (n=115)

➢ Firm conclusions should be avoided!

➢ New risk level investigation questionnaire for diving personnel in 2020
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