

## Noise in the Norwegian Oil Industry

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The Norwegian Petroleum Safety Authority, PSA, has followed the trend on noise exposure for offshore personnel and also looked into the development of hearing damages. The noise exposure is not decreasing significantly and the amount of hearing damages are increasing. The association of the oil companies (OLF) has taken the challenge to improve the knowledge about noise. Improvement is aimed at on several fields such as reduction of area noise levels, decreasing noise exposure from handheld operations, improved real field hearing protection and improved the understanding of the human mechanism for hearing impairment. Recommended practice documents will be prepared for the industry in relevant fields.

### 1 Introduction

Noise at levels which can damage hearing is a working environment factor in the petroleum industry, both offshore and at land-based plants. A number of reports, including *Trends in risk level in the petroleum activity* (RNNP), indicate that substantial groups of workers in the petroleum sector are exposed to high levels of noise, and that the risk of consequent hearing damage is not insignificant. See figure 1 (source: RNNP 2008-2010).

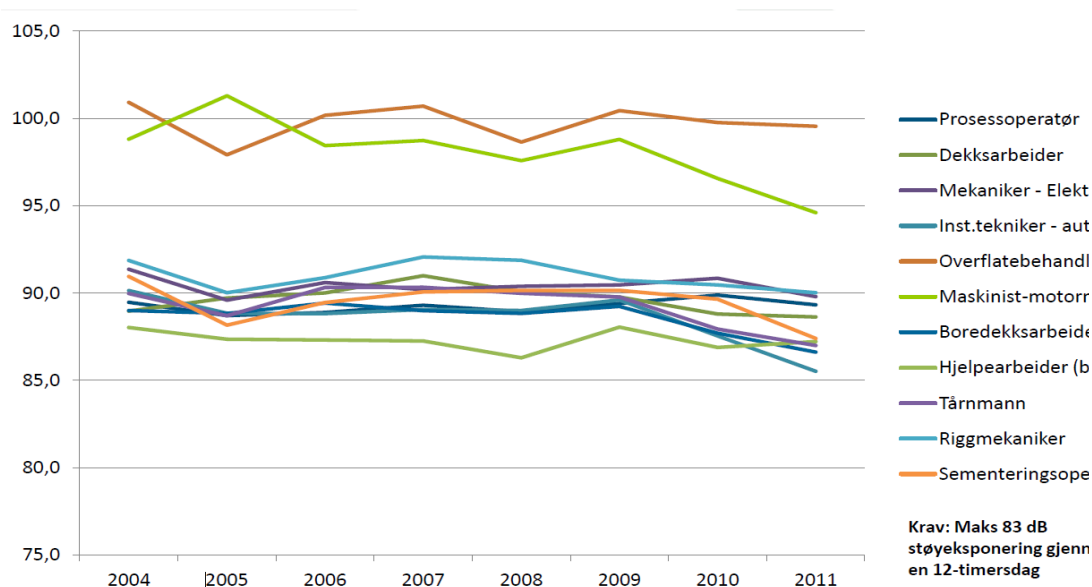


Figure 1: PSA - Noise exposure indicator from 2004 to 2011.

Hearing damage caused by noise represents the second most frequent occupational health condition, after musculoskeletal disorders, reported to the Petroleum Safety Authority Norway (PSA).

Over a 10-year period, the annual RNNP reports reveal that the average noise indicator presents a flat curve without clear signs of a significant reduction in noise-related risk. (Average noise indicator: the indicator for noise exposure is calculated on the basis of noise level and time spent in the noisiest areas as well as the contribution from noisy work operations. The numerical value of the average noise indicator normally provides a relatively good picture of noise A-weighted exposure expressed in dB.) Assuming that the noise indicator reflects actual noise exposure, data from the RNNP show that most of the job categories (embraced by the RNNP) have an A-weighted noise exposure above 83 dB, which is the upper limit for a 12 hour shift specified in the facilities regulations issued under the Petroleum Activities Act. Similar findings have been made at the land-based plants.

Although the industry has adopted a number of measures and established action plans aimed at reducing noise risk in the facilities, the experience gained by the PSA through its contacts with the industry, case management and audits is that the potential for reduction measures remains large.

Noise exposure related to noise from handheld tools (such as the use of hand tools for needle scaling, angle grinding and so forth) is particularly high. A need for innovative thinking has been identified here in relation to alternative work processes, along with a requirement to influence the development of new types of tools which reduce noise and vibration exposure.

## **2 Ambition – what improvements should the project contribute to?**

The petroleum industry's ambition is to be characterised as:

- a pioneer for HSE results
- in control of noise exposure offshore and at land-based plants, which will conform to regulatory requirements
- seeking objective criteria which can indicate that the risk of future hearing damage has been reduced.

## **3 Transfer value/transmitting knowledge to other industries?**

Noise is not a problem specific to the petroleum industry.

However, special conditions prevail in offshore petroleum activities in that operations are concentrated on a single platform or rig where work processes take place at a height. That makes it difficult to “build away” from a noise source on an offshore facility. At a land-based plant, however, opportunities will exist for placing the noisiest processes in the remotest spot on the industrial site – as can be done at a number of other factories.

Seeking knowledge from other land-based industries is regarded as important for the project. It is also extremely important for the project that its deliveries can be used by other industrial sectors. That includes the need to identify and contribute to developing hand tools with low noise and vibration. Through the NI, the project has already established contact in its start-up phase with the Norwegian Rental Association. This is an industry association in the Confederation of Norwegian (NHO) on the same footing as the NI and the OLF for companies which, among other activities, lease tools to the construction industry and the like. Ensuring that equipment manufacturers and suppliers can contribute their expertise to the project is important. In addition, this sector will represent an important recipient of the project's deliveries. The supplies industry delivers equipment and services both to the petroleum business and to land-based sectors such as rig fabricators, shipbuilders, engineering, construction and so forth. Through its user position, the petroleum sector can help to develop new technology and alternative work processes with this project. That will have an effect on and a transfer value for a number of industries, far beyond the petroleum business.

## **4 Organisation**

The management committee for the project will comprise representatives from the Safety Forum's members – the OLF, the NI, the Norwegian Confederation of Trade Unions (LO), IndustryEnergy, the Norwegian Union of Energy Workers (Safe), the Norwegian Organisation of Managers and Executives, the United Federation of Trade Unions and the Cooperating Organisations (DSO). The Federation of Norwegian Coating, Insulation and Scaffolding Contractors (KIS)

have also been invited to participate in the project. The PSA will sit on the committee as an observer. In addition, the Norwegian Labour Inspection Authority (Atil) will be invited to attend as an observer. A simplified project structure is shown in figure 2.

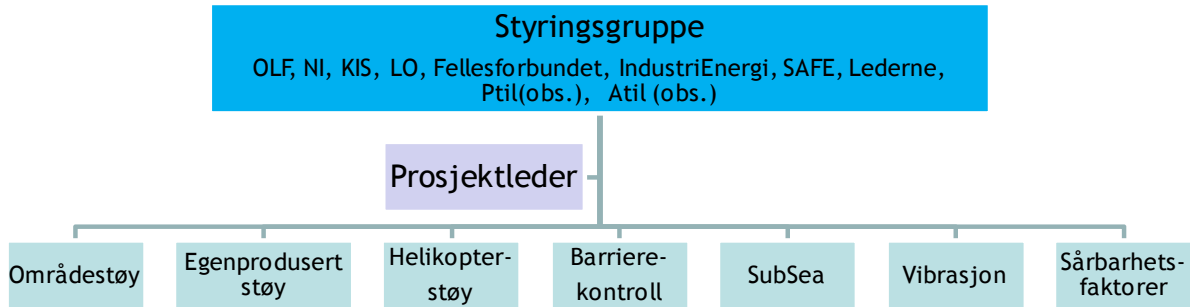


Figure 2: Project structure showing the various sub projects. (English translation in text below)

Subject projects listed in the boxes in the figure above are:

Area noise Self-generated noise Helicopter noise Barrier control Subsea Vibration Vulnerability factors

The intention is to develop documents that describes : Best practice, Work processes, R&D, Low-noise work practices Benchmarking Analyses, Knowledge transmission, Improvement of industry standards and Health monitoring

## 5 Methodological approach

Various subject areas have been proposed for the project. It has also been proposed that these be organised as sub-projects/action teams with a professional manager for the various sub-projects/action teams. The action teams will comprise personnel and specialists from the industry (companies and unions), specialists from other industries, external specialists and so forth.

### 5.1 Area noise

This describes issues related to noise from the facility (facility-wide processes, compressors, turbines and so forth). Responsibility for area noise rests largely with the operators.

### 5.2 Self-generated noise

This describes noise from sources which are not a permanent part of the facility, but related to work processes/tasks. It includes noise from hand tools used for such purposes as rust removal (needle scaling, water jetting, sandblasting, angle cutting, grinding and so forth). Self-generated noise is often related to jobs done by contractors. As a result, the supplies industry has primary responsibility for this subject. It is for many employees the major noise source during the work and levels for many operations may be extremely high.

### 5.3 Helicopter noise

This makes a substantial contribution to total noise exposure for personnel working offshore. Helicopters are used for all personnel transport to and from offshore facilities. The subject covers noise exposure of passengers, helideck crew and pilots. It is primarily owned by the operators, but involving the helicopter companies and manufacturers in this

project will be desirable. Deliveries from the project will accordingly also have a transfer potential/influence on the helicopter industry.

## **5.4 Barrier control**

The noise-reducing measures most frequently used both by the petroleum sector and by other industries in Norway are personal ear protectors and restrictions on the time spent in noisy areas. The project will highlight examples of noise screening and insulation. New types of ear protection and the limitations of the various types of such equipment should be studied. Great transfer value exists to other industries in Norway where noise can represent a problem.

## **5.5 Subsea**

Diver assistance is used for various subsea repair and maintenance assignments, and underwater noise during certain jobs (such as the use of angle grinders) can be considerable.

## **5.6 Vibration**

Many noisy work operations and facilities also generate vibrations. As a result, the project must also assess vibration and anti-vibration measures. Conditions related to ultrasound, low-frequency noise and structural noise should also be addressed and assessed. Like the subject above, this issue will have great transfer value to other industries.

## **5.7 Factors affecting vulnerability**

The robustness of the ear or hearing to damage can vary between different individuals because of factors affecting their vulnerability. The project will identify and spread knowledge about these factors, including ototoxic chemicals, medications and the like. This sub-project will be just as useful for other sectors as for the petroleum industry.

# **6 Activities**

Each action team will have to decide on the various activity categories which cut across the subject areas – in other words, assess the need to establish activities related to:

- identifying or developing best practice
- assessing current work processes and opportunities for innovative thinking
- assessing the need to initiate research and development activities
- assessing current work practices and presenting proposals on new low-noise work practices/organisation
- seeking knowledge and experience from other industries and parts of the Norwegian business community, and from national and international centres of expertise
- undertaking analyses of available data and assessing the possible need to acquire additional data in certain specified areas
- deciding on how collected and newly acquired knowledge can be conveyed to the petroleum sector and other industries
- submitting proposals for improving standards (S002 for modification projects, for instance)
- assessing health monitoring/screening and hearing checks, and registering changes in hearing.

# **7 Budget**

The following assumptions are made:

- a substantial own contribution from the companies, where specialists are dedicated to a greater or lesser extent to following up this project

- the OLF's administration makes the project secretariat available.

It is emphasised that the budget depends on the necessary funds being appropriated by the OLF and the NI. The project has applied for and been granted funds from the NHO's working environment fund, and must assess possible opportunities for support from other sources (such as the Research Council of Norway). At August 2011, the project had NOK 1 500 00 in project funding from the OLF and funds from the NI to finance the manager for the self-generated noise sub-project for the 2011 project year. Possible supplementary funding from the NI must be clarified. The NHO's working environment fund has appropriated NOK 1 500 000 for the whole project period.

## **8 Schedule**

The following schedule is lined out by the leading committee:

- Establishing the Noise in the Petroleum Industry project: 23 March 2011
- Management committee for the project constituted: 10 May 2011
- Tentative conclusion of the Noise in the Petroleum Industry project: 31 December 2013

A project duration of two and half years assumes that the necessary financing is obtained, as well as entrenchment with relevant sponsors and organisations

## **9 Deliveries**

The project will draw up proposals for measures which can support its ambitions.

The project will draw up proposals for cost/benefit analyses of various noise-reducing measures.

The project will contribute to deliveries which can be implemented on a continuous basis in the petroleum sector and other industries, so that its goal has been reached by the end of the project period.

Each sub-project must draw up its own sub-project description, which will detail deliveries from the sub-project.

Knowledge transmission

The project will seek out knowledge in the industry (internal company projects and standards) and pursue new learning through research programmes. It will also assess contact with national and international centres of expertise.

The project will transmit knowledge through experience transfer in established industry fora, industry seminars large and small, the development of guidelines and best practice documents, and so forth.

## **10 Evaluation of effects – how are these to be measured?**

The short –term effect can be evaluated by the use of the generated recommendations and documents. It is assumed that the long-term effect of the project will show up in the HSE results identified in the annual RNNP process.