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# DIALOGUE

A JOURNAL FROM THE PETROLEUM SAFETY AUTHORITY NORWAY

**Statistics which created concord**





# The **whole** story

The unique survey of trends in risk level in the petroleum activity (RNNP) measures the effect of the Norwegian industry's work on safety and how good the companies are at managing risk.

When these annual reports are presented, the industry listens expectantly – which way are the trends moving, have the efforts made yielded results, what areas must be prioritised, where are the biggest challenges?

The RNNP can celebrate its 20th anniversary in 2021, and we are marking the occasion by taking a closer look at the work involved.

This edition of *Dialogue* explains how the process originated, and how it has been built up.

We seek to show the effect of the RNNP work on collaboration between companies, unions and government over risk reduction. And we reveal something of the plans for further development and improvement of the tool.

Enjoy.

Øyvind Midttun  
*Editor*

*Front cover: Without able specialists such as Torleif Husebø, there would be no RNNP. He has headed this major risk trend process for more than two decades, and also serves as the PSA's discipline manager for process integrity. Read what he believes the RNNP has meant for safety progress in the industry on page 26. (Photo: Anne Lise Norheim).*

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# THE CHALLENGE

BY INGER ANDA

# Two decades of building **trust**

Mistrust can be destructive and drive people apart. But disagreement and doubt can also form the basis for community, respect and mutual understanding.



**T**hat was how things were 20 years ago, when the parties in Norway's petroleum sector – companies, unions and government – clashed over what the safety position actually was.

Since 20 April 2001, the industry has witnessed an annual spring phenomenon – as surely as the sap rises, a status report appears on safety developments for the petroleum industry.

Those who are concerned with safe working in this business, both offshore and on land, attend to the message of the figures and delve into the extensive material.

**Vision** This presentation is no small feat. The trends in risk level in the petroleum activity (RNNP) process is the product of a vision, a dedication and a formidable commitment.

But its birth was anything but auspicious. In the late 1990s, the members of the recently established Safety Forum disagreed sharply over whether safety was rising or falling.

This issue prompted long and heated discussions, with the unions convinced that safety was in decline and the employers insisting it had never been better.

As the regulator, the PSA (then part of the Norwegian Petroleum Directorate – NPD) was uncertain about the real picture.

**Systematise** The Safety Forum, as the most important arena for tripartite collaboration on this issue in Norway's oil sector, established a project to identify and systematise data on the safety level.

The aim was to give the parties an answer they

could agree on, and thereby provide a tool for information about and management of safety work.

Many contributors with great expertise on risk and safety took part – operator companies, other petroleum-sector players, government, consultants, scientists and educational bodies.

Preliminary work began in 1999-2000 and, as mentioned above, the first report could be presented in 2001. It lived up to expectations.

All sides nodded in agreement when the extensive presentation was laid before them. This collaborative project had succeeded in establishing credible figures and a shared view of reality.

Safety Forum members could now drop their time-consuming discussions on which way things were headed, and concentrate instead on the facts revealed by the RNNP.

They also agreed to continue developing the tool and the method.

The pilot report presented two decades ago was no less than unique. Nothing to equal it is thought to exist either in Norway or internationally – whatever the industry.

**Extended** The first report looked only at NCS facilities. In 2002, the process was extended to a questionnaire-based survey to determine how offshore workers *experienced* risk and the safety culture.

Interviews were also conducted with selected representatives of the parties and other industry specialists.

The aim was to supplement the picture provided by facts and figures with views and information from the people with personal

experience of the realities.

Since then, the questionnaire-based survey has been conducted every other year.

**Division** The Storting (parliament) decided in 2004 on a division of the NPD, with the newly established PSA responsible for safety in the petroleum sector and the NPD retaining responsibility for managing oil and gas resources on the NCS.

In the same year, the PSA was given supervisory authority over safety at Norway's eight onshore petroleum plants, from Melkøya in the north to Slagentangen in the south-east.

That meant these units also had to be integrated in the RNNP, and the first overall review of both offshore and onshore activities appeared in 2006.

**Spills** The process was further extended in 2010, when a separate report on acute spills (AU) was included in the family. This communicates information on incidents, near-misses and assessments of accident risk related to environmental discharges.

For technical reasons, the RNNP AS overview appears several months later than the rest – usually in September.

Taken together, the overall annual RNNP package comprises about 450 pages of statistics and takes some 3 000 working hours to prepare in the PSA alone.

**Attention** The RNNP reports have attracted great attention from the start, both in the industry and among the Norwegian public.

They represent the most important source for monitoring how risk is developing in the petroleum

sector and how the industry is working on safety.

These reports form the basis for identifying where the biggest problems lie and thereby how the parties in the industry should work to improve safety – both collectively and at company level.

Knowledge of risk and what makes the biggest contribution to safety is much higher than 20 years ago, and risk understanding has also greatly improved. A joint effort has yielded good results.

**Disagreement** Although support for the RNNP as a tool must be regarded as unison today, disagreement also emerges – every year.

This relates not to the credibility of the data but to which figures, trends and results are the most important, and which perspective should be applied in reading and understanding them.

Both the big support for the RNNP and the debate between the parties over its interpretation are certain to continue year by year.

But such controversies also play an important part in attracting attention and commitment to making constant improvements in safety conditions for the petroleum industry. ★





“ **Frode Alfheim, president, Norwegian Union of Industry and Energy Workers**

The RNNP meant that we went from being in savage disagreement over the realities of HSE on the NCS to being able to come together. That’s allowed the parties to work purposefully together to tackle the challenges.

This has meant that it’s safer to work on the NCS and that the social contract between the industry and both the political arena and the nation as a whole has been maintained.



“ **Hilde-Marit Rysst, president, Norwegian Union of Energy Workers (Safe)**

The RNNP is an important instrument for understanding the past and taking the right action for the future – an important arena for the parties in the industry.

Having objective feedback to relate to when discussing conditions in the sector and when considering changes and the need for measures is incredibly important.

Through the questionnaire-based survey, employees get the chance to report their own experiences, challenges and possible concerns, while government, employers and unions can read in black and white how the level of risk is actually experienced. That’s unique.

What’s important now is to ensure even more people respond and that the survey covers as many workers as possible. There’s still room for improvement there – among supplier personnel, for example.



“ **Anders Opedal, CEO, Equinor**

The RNNP is very important for the industry. It puts safety on the agenda, provides good data, and creates the basis for positive discussion about the level of safety on the NCS and on land. Being able to base such discussion on shared facts is very important.

Where we in Equinor are concerned, the RNNP provides an important tool for our improvement efforts. We use its results actively in our Norwegian operations, both internally and in interactions with our suppliers.

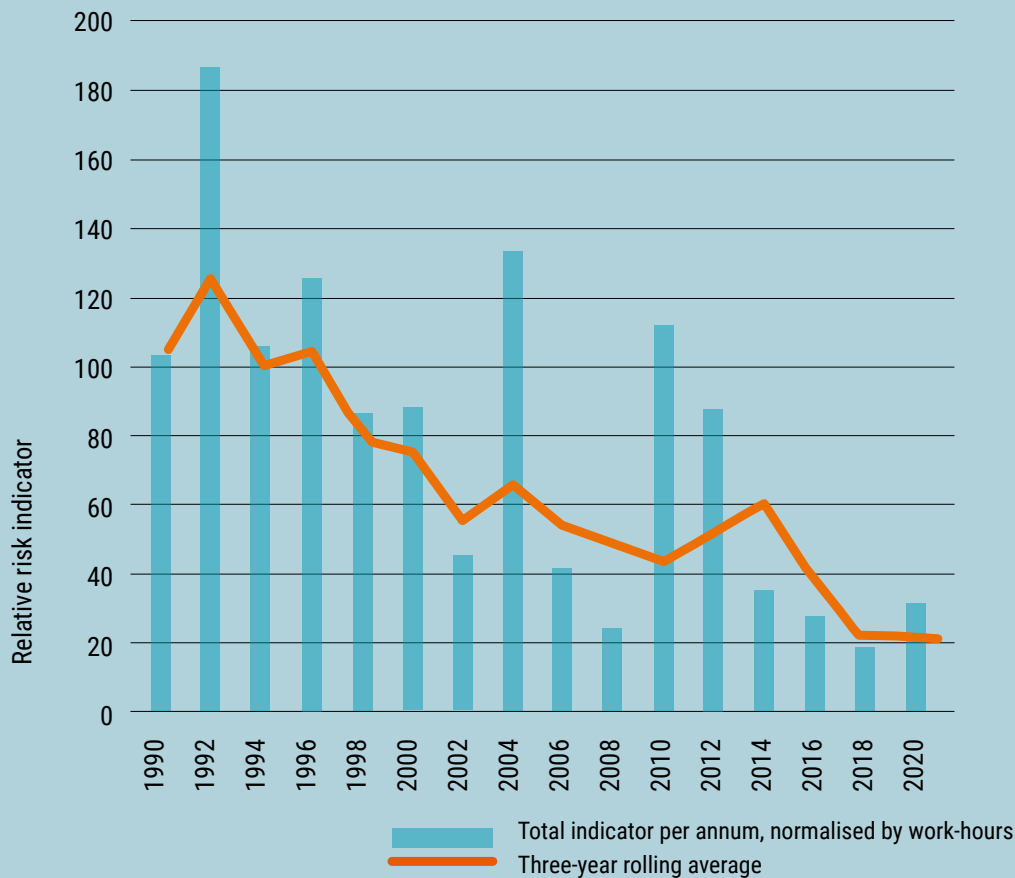


# Long-term trends

Major accident risk is difficult to measure directly. So the RNNP survey uses many underlying indicators which reflect how far the industry is succeeding in managing factors affecting the risk.

Viewed over a number of years, the major accident indicator gives a clear picture of how this risk is changing. Annual variations can be substantial, but the long-term trend is the most important.

If developments appear to be heading in the wrong direction over time, it will sound a warning that the cause must be identified and possible action taken to reverse the trend.



# Ambitions for updating

The petroleum industry will soon be able to get updated RNNP results several times a year. This is just one of several steps being taken to continue developing the tool.

**T**o maintain its significance, we must ensure that the RNNP is relevant and maintains a high level of quality," says Finn Carlsen, director of professional competence at the PSA.

"It has to reflect both technical progress and developments in the industry. That means it must be adapted to the changes which occur and the sector's position at any given time."

**Broad** Over the past two decades, the RNNP has grown from a relatively small set of indicators to a broad survey of the risk picture in the industry.

There are no ambitions at present to make the tool much larger. So any changes will be more a question of adaptations and adjustments where appropriate.

More frequent updates and more active efforts to make data accessible are among the measures currently being assessed, Carlsen reports.

"We're looking at solutions which make it

possible to update parts of the RNNP more often. That applies to typical indicators based on quantitative data, such as near-misses.

"Ideally, we should be able to renew these results three-four times a year. So efforts are being made to secure more effective data flow between the players and to us, and to simplify data capture and quality-control processes."

More frequent updating would provide newer information, he points out. "That basically has greater value than older data, and allows the industry to react more quickly where necessary."

**Available** "We're also looking at how we can make even more RNNP material available on the web, so that the companies can find and assemble their own data sets in a simple way.

"We already have a good deal of data posted to the rnp.no website, and signals from the industry are that it wants even more of this.

"The aim is that companies can extract their

“ The government’s expectation is that the industry applies the RNNP results in its work on risk reduction, and that their commitment and priorities are purposeful and long-term.

specific data from the RNNP, and we expect them to use this opportunity to compare themselves with other players and the rest of the sector, and to ensure mutual experience transfer and learning.”

Carlsen says it is important to emphasise that the companies must also utilise the information they already possess, and notes that an improvement potential clearly exists here.

That applies to data both from incidents and on barrier performance and maintenance. Companies must pay systematic attention to what they already have if gains are to be made.

“The government’s expectation is that the industry applies the RNNP results in its work on risk reduction, and that their commitment and priorities are purposeful and long-term.

“We know that data from the survey are used and discussed in the key fora at sector level, in the industry’s organisations and in the unions.

“That’s positive, and contributes to experience

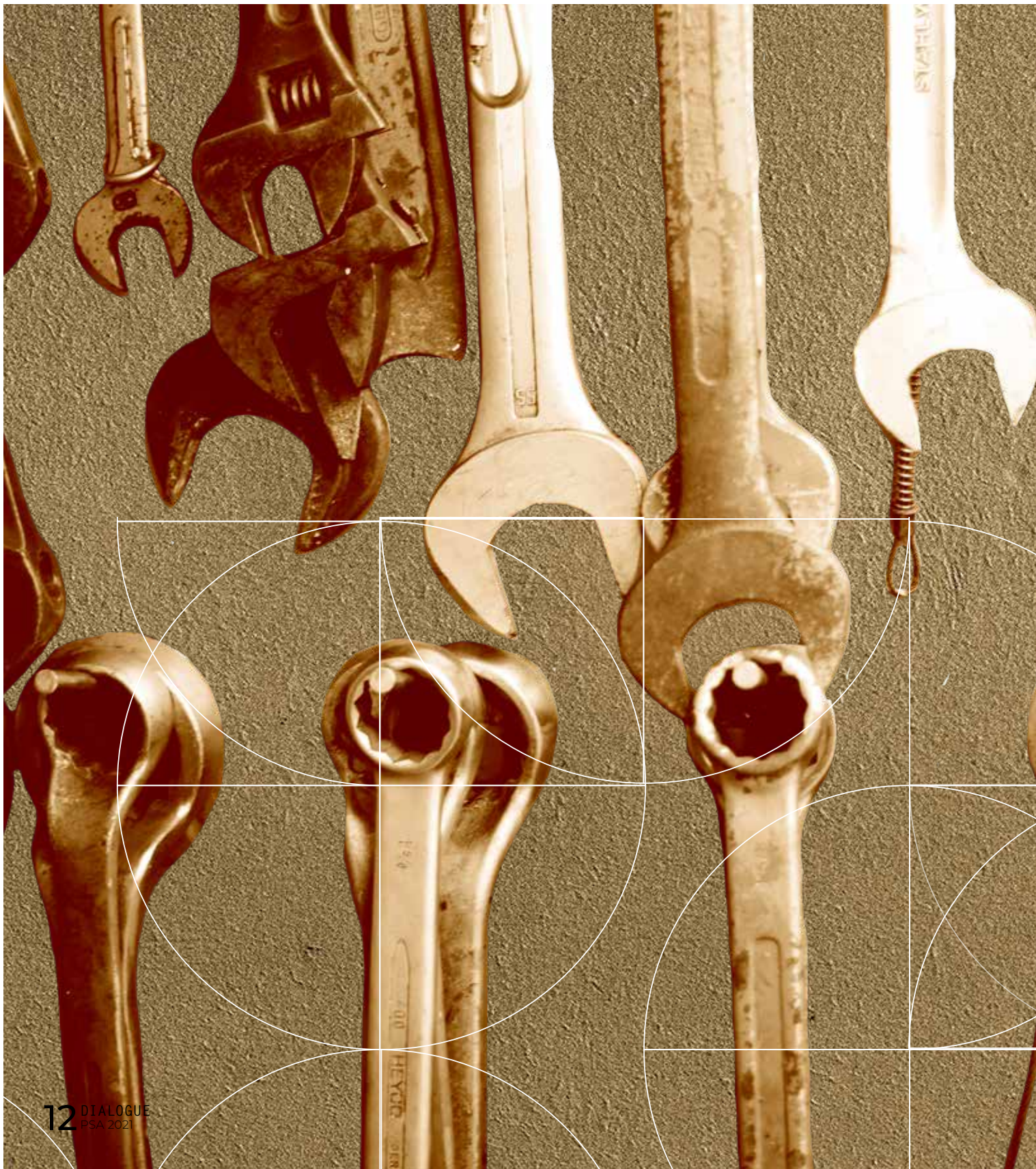
transfer and learning. Similarly, it’s important that the PSA itself utilises the RNNP findings in its audits and regulatory development.”

According to Carlsen, ownership of both the process and its results by the parties is crucial. The industry’s expertise is a key success factor in continuous risk reduction.

**Response** Another important part of the RNNP work concerns increasing the response rate in the questionnaire-based survey, which has been around 30 per cent in recent years.

“That gives a representative sample and is more than enough for us to rely on the results,” says Carlsen. “But we want even more workers offshore and at the land plants to respond.

“So we’ve now begun working to simplify the survey so that it’ll be easier to implement, while making provision for conducting it electronically to the maximum possible extent.” ★



# THE METHOD



BY EILEEN BRUNDTLAND

# From conflict to concord

The RNNP has been given some of the credit for keeping relations between the parties in the petroleum industry temperate in recent decades. Jan Erik Vinnem was among its architects.

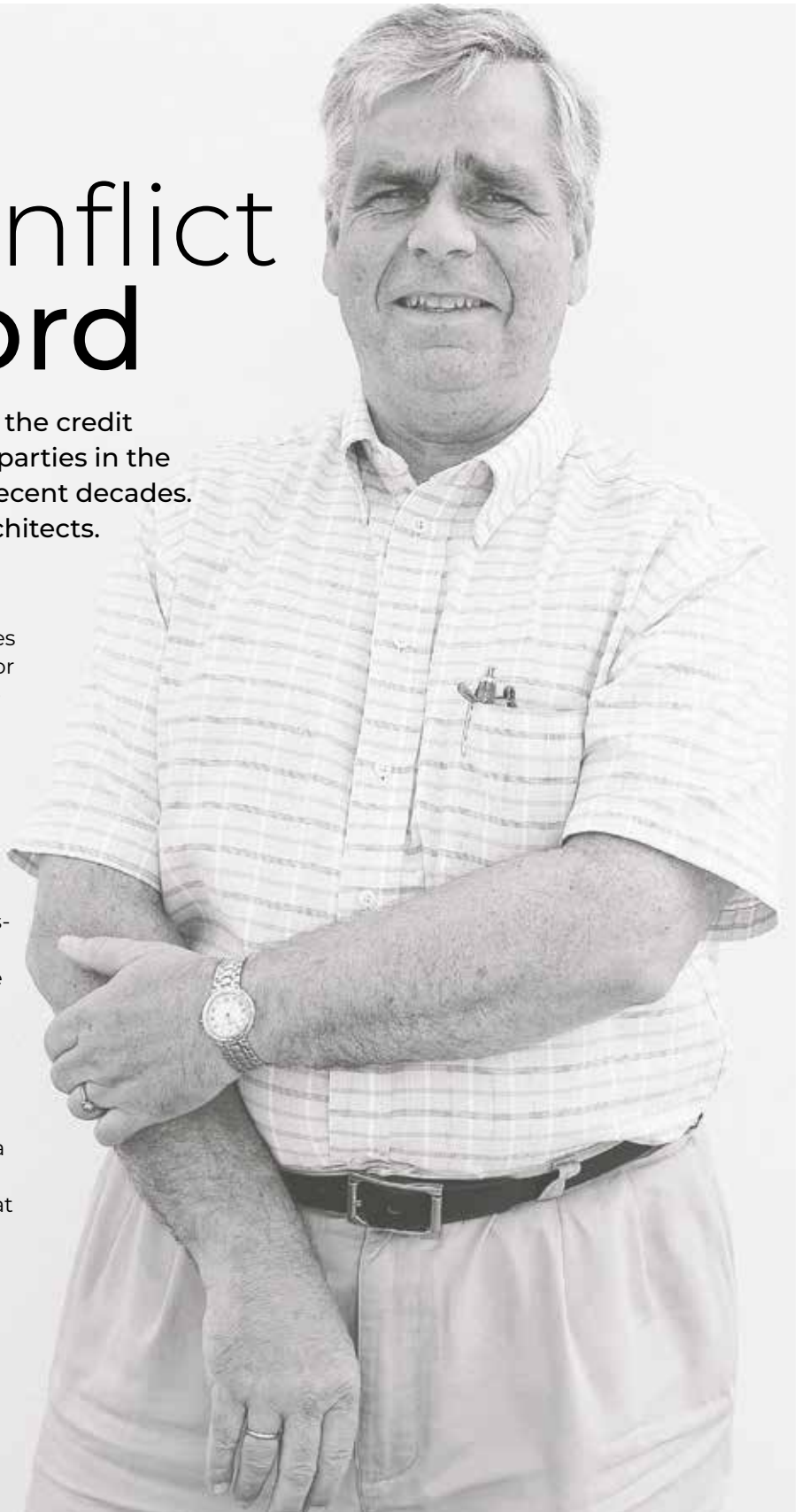
**V**innem has worked on risk analyses in Norway's petroleum industry for many years, and played a key role in establishing the RNNP process in the late 1990s.

He is currently a professor emeritus in the department of marine technology at the Norwegian University of Science and Technology (NTNU).

**Mistrust** Vinnem well remembers the mistrust which prevailed in dealings between companies, unions and government on the NCS before the RNNP was launched.

"This feeling was very pronounced between employers and employees in the second half of the 1990s," he recalls.

"So an express goal of the RNNP was to contribute the most objective possible data and its interpretation, which would mean that we could at last stop fighting over what the real safety facts were."



Vinnem had produced a statistical study on the risk level, and was approached in 1999 by the Norwegian Petroleum Directorate (NPD) – which then incorporated the PSA.

He was asked to help find an even better way to exploit all available data, risk analyses and expert assessments in order to be as specific as possible about future threats in the petroleum sector.

“We used whistleblowing data from the NPD as well as risk analyses,” Vinnem says. “A close dialogue was also pursued with the industry, which then comprised relatively few large companies and units.

“Agreement was reached on voluntary reporting, and we tailored some formats which meant that we obtained data on near-misses as a basis.”

**Pilot** Trust between the parties was minimal when the pilot study was presented, so Vinnem will never forget how the results were received.

“It was almost like a revival meeting. Everyone suddenly agreed that ‘this is how it is – this is the position – now we know that’.

“So the goal of achieving consensus was absolutely achieved. And I believe it would have been hopeless for all the parties to try to move forward if we hadn’t first sorted out this position.”

He thinks the agreement largely reflected an awareness that these findings rested on detailed work, inspiring confidence that the facts were as objective as they could be with people involved.

“So those who claimed beforehand that the safety position was an unimprovable gold standard didn’t get that confirmed. But nor did those who claimed that things were as bad as the 1970s.”

Both camps nevertheless respected the figures which were presented.

**Unique** The RNNP survey was then and is still unique in a global context. As far as is known, only the UK has a similar approach – adopted after the Piper Alpha disaster in 1988.

A tool for systematic data collection about hydrocarbon leaks from facilities on the UK continental shelf was then produced by the British safety authorities.

Unlike the RNNP, however, this information is not processed and quality assured. It is simply presented unfiltered from what has been reported.

“Nobody else does the work we do with collected RNNP data, and the method is talked about beyond our frontiers,” reports Vinnem.

“I think you could say it has become a kind of standard for presenting risk status and trends.”

**Objective** Quality assurance plays a key role in the RNNP, since the aim is to establish the most objective possible data. Collaboration between the parties in the industry as well as academia and government has also been important for progress.

“We started from a core group comprising both practical people and more academically oriented participants,” says Vinnem. “I think that was important for striking a balance between the need for technically acceptable simplifications and realism.”

Vinnem believes that the RNNP has meant a lot for safety in the Norwegian petroleum sector.

“Without it, we might have had much greater disagreement over priorities and would probably have failed to reduce near-misses as much as we have over these years.” ★

*Jan Erik Vinnem believes the RNNP has meant a lot for safety in the petroleum sector. (Photo: Jan Inge Haga, Stavanger Aftenblad/NTB)*

BY EILEEN BRUNDTLAND

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# Consensus creator

The RNNP serves as an important management tool for the parties in Norway's petroleum sector by taking its risk pulse. Contributing to a common understanding of conditions helps to give the tool a key place.

Work on this annual process began in 1999-2000 after a period of deep disagreement over whether the industry was becoming safer or more hazardous.

The decision was therefore taken to systematise information on the safety level, with the PSA at the helm and input from a number of players in companies, unions, government and academia.

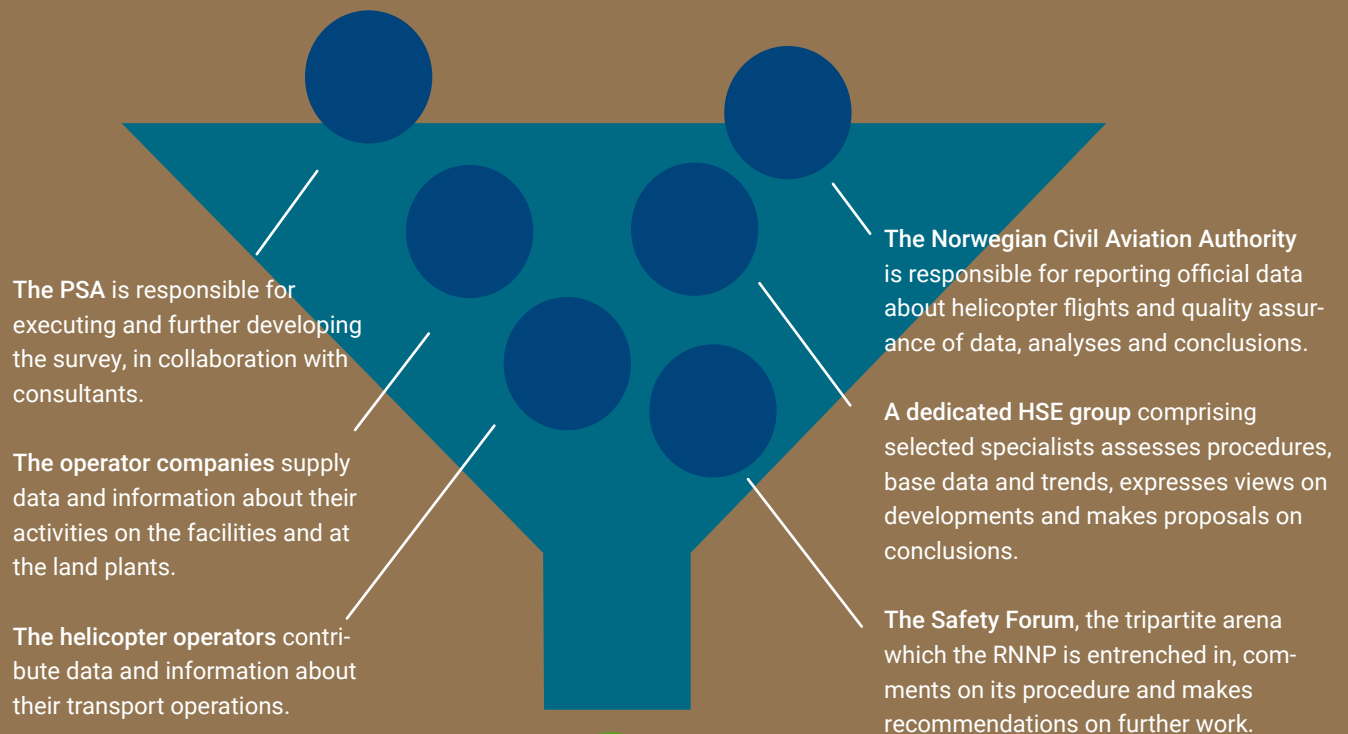
The survey monitors major accident, working environment and acute spill risks, and covers all facilities on the NCS and the onshore plants in Norway.

Work on the RNNP is entrenched in the Safety Forum, the central tripartite arena for collaboration and debate on important HSE challenges in the petroleum sector.

Where the PSA is concerned, conclusions in the annual report provide an important basis for planning its supervisory activities and for developing the regulations. \*



# Joint effort



## UNIQUE

The RNNP tool is unique in part because it unites the parties over shared facts. Many different contributors are responsible for proposals on and analyses in the work.

# Facts with assurance

Huge quantities of data and hundreds of working hours underpin the RNNP analysis of risk level in the petroleum activity.

**T**he calculations build on information related to a large number of indicators, which is acquired from the companies and processed in a statistical model.

Many PSA specialists then work on quality assurance of these data, and a dedicated team draws conclusions before these results are presented to the Safety Forum and the rest of the industry.

Trends in risk level are measured using two methods which complement each other, including a quantitative tool based on incidents, barrier tests and maintenance data.

The other approach utilises social science analyses based on questionnaire-based surveys, interviews, fieldwork and other studies.

Overall, the aim is to provide an integrated presentation of risk which is as nuanced as possible.

**Central** Defined situations of hazards and accidents (DSHAs), results from barrier tests and maintenance data occupy key places in the quantitative part of the RNNP analysis.

To normalise the data, information is also acquired on the level of activity – working hours,

facilities, wells, production volumes and helicopter transport.

“We only collect data which the companies have already registered in their own systems,” emphasises Bente Hallan, who coordinates acquisition of DSHA and barrier data from the players.

“The RNNP is meant to create as little extra work for the industry as possible, but we must nevertheless accept that data acquisition and quality assurance are demanding jobs.”

Since this involves securing information from many sources and with different reporting criteria, Hallan emphasises the need for a good dialogue with the players.

She emphasises that the companies put their backs into contributing to the best possible product.

**Incidents** A key part of the RNNP analysis involves data about incidents. In line with the HSE regulations, the companies must report all hazards and accidents to PSA, broken down by different DSHAs.

“Our specialists quality-check all the incidents



*Work on preparing the annual RNNP reports calls for contributions from many dedicated specialists in the PSA. Inger Danielsen is responsible for reviewing and quality-assuring all reported cases of personal injury and the assessment of their seriousness. (Photo: Anne Lise Norheim)*



and weight them for their potential before we analyse the results together with external consultants,” explains Hallan.

The PSA is now developing a common incident-reporting tool to make notifying and reporting easier for both companies and government from 2021. A similar tool for reporting to the RNNP is also in the offing.

**Precondition** Intact barriers are a precondition for safe operations. Test data for selected safety-critical barriers therefore represent a significant contribution to the RNNP.

“In part, this type of indicator says something about the barrier’s ability to function when needed,” says Eivind Jåsund in the PSA’s HSE management discipline.

**Maintenance** The companies also report information on maintenance, which represents an important aspect of barrier management.

This includes an overview of how much equipment is tagged as HSE-critical, and the status of preventive and corrective maintenance as well as backlogs/outstanding amounts of such work.

“We go through the information which comes in, assess the figures against earlier years, and request more input if anything is unclear or looks wrong,” says Jåsund.

“The data are then incorporated in graphs which have been developed over time to show trends. Barrier and maintenance information is important for monitoring year-on-year trends and assessing where they’re heading.”

**Personal injuries** Serious personal injuries are another key area for the RNNP. The companies report these in such categories as fatalities, serious injuries and cases involving lost time or medical treatment.

Injuries suffered offshore during off-work time are also reported, in order to cover the whole period spent out on a facility.

“We review all reported injuries and assess their seriousness,” says Inger Danielsen, who handles these statistics in the PSA. “The serious ones are the main concern in the RNNP.”

**Survey** The RNNP’s questionnaire-based survey is conducted every other year and covers all employees offshore and at the plants on land.

In addition to experience of the working environment, the HSE climate and safety risk, it asks about the employee’s perception of their own health, illnesses and accidents.

This survey also helps to throw light on underlying conditions which could contribute to explaining results from other parts of the RNNP work.

**Qualitative** As part of the RNNP survey, a qualitative study is carried out every other year to enhance the quantitative picture of HSE and risk and to dig deeper into various causes of these conditions.

“The qualitative methodology lets us access interpretations of HSE conditions by the various players,” says Elisabeth Lootz in the PSA’s occupational health and safety discipline. ★

## Helicopter safety

Although the PSA is not the supervisory authority for civil aviation, helicopter safety appears in the RNNP because such flights form a big part of the risk picture on the NCS.

The Norwegian Civil Aviation Authority contributes quality assurance, analyses and conclusions based on data reported by the helicopter operators. A dedicated expert group has also been established to work specifically on helicopter safety in the RNNP.

## What are DSHAs?

Defined situations of hazards and accidents (DSHAs) are a key part of the base data in the RNNP.

These are defined as a collection of possible observable incidents which the companies must defend against in order to pursue prudent petroleum operations.

They cover incidents with major accident potential, such as hydrocarbon leaks and well control incidents, as well as other events like personal injuries and occupational ill health.

*The following DSHAs are included in the RNNP\**

- DSHA 1 Unignited hydrocarbon leak
- DSHA 2 Ignited hydrocarbon leak
- DSHA 3 Well incidents/loss of well control
- DSHA 4 Fire/explosion in other areas
- DSHA 5 Ship on collision course
- DSHA 6 Drifting object
- DSHA 7 Collision with field-related vessel/facility/shuttle tanker
- DSHA 8 Damage to a facility's structure, stability/anchoring/  
positioning failure
- DSHA 9 Leak from riser, pipeline and subsea production facility
- DSHA 10 Damage to riser, pipeline and subsea production facility
- DSHA 11 Evacuation
- DSHA 12 Helicopter incident
- DSHA 13 Man overboard
- DSHA 14 Occupational accidents
- DSHA 15 Work-related illness
- DSHA 16 Full loss of power
- DSHA 18 Diving accident
- DSHA 19 H<sub>2</sub>S emission
- DSHA 20 Crane and lifting operations
- DSHA 21 Dropped objects

\* The land plants supply data for a selection of DSHAs.

# Discharging a duty of care

Risk management is about preventing a spectrum of incidents. Facts about acute discharges to the sea make an important contribution to this work.

**T**he PSA has issued a report on trends in risk level in the petroleum activity – acute spills (or RNNP AU) every autumn since 2010. This combines discharge data with the fact base in the rest of the RNNP, and assesses events which have or could have caused acute pollution.

In addition to crude oil, the report covers spills of other oils and chemicals and from the injection of drill cuttings.

It includes analyses of trends for incidents with a major accident potential – capable of causing loss of life, acute pollution and/or loss of material assets if several barriers fail.

The development potential with regard to oil pollution is assessed as part of the work.

“The industry must take an integrated approach to preventing harm to people, the natural environment and material assets,” explains Finn Carlsen, director of professional competence at the PSA.

“The RNNP AU contributes to that, since it analyses the same base facts, data, DSHAs and barriers as the rest of the RNNP – with the natural environment as its starting point.”

He emphasises that all types of incidents must be investigated in order to make sure that weak signals are picked up.

“When something happens, it’s important to establish why the barriers intended to prevent it have failed. That applies whether the incident has consequences for people, the environment or material assets.

“Complete barriers are a basic safety requirement.” ★

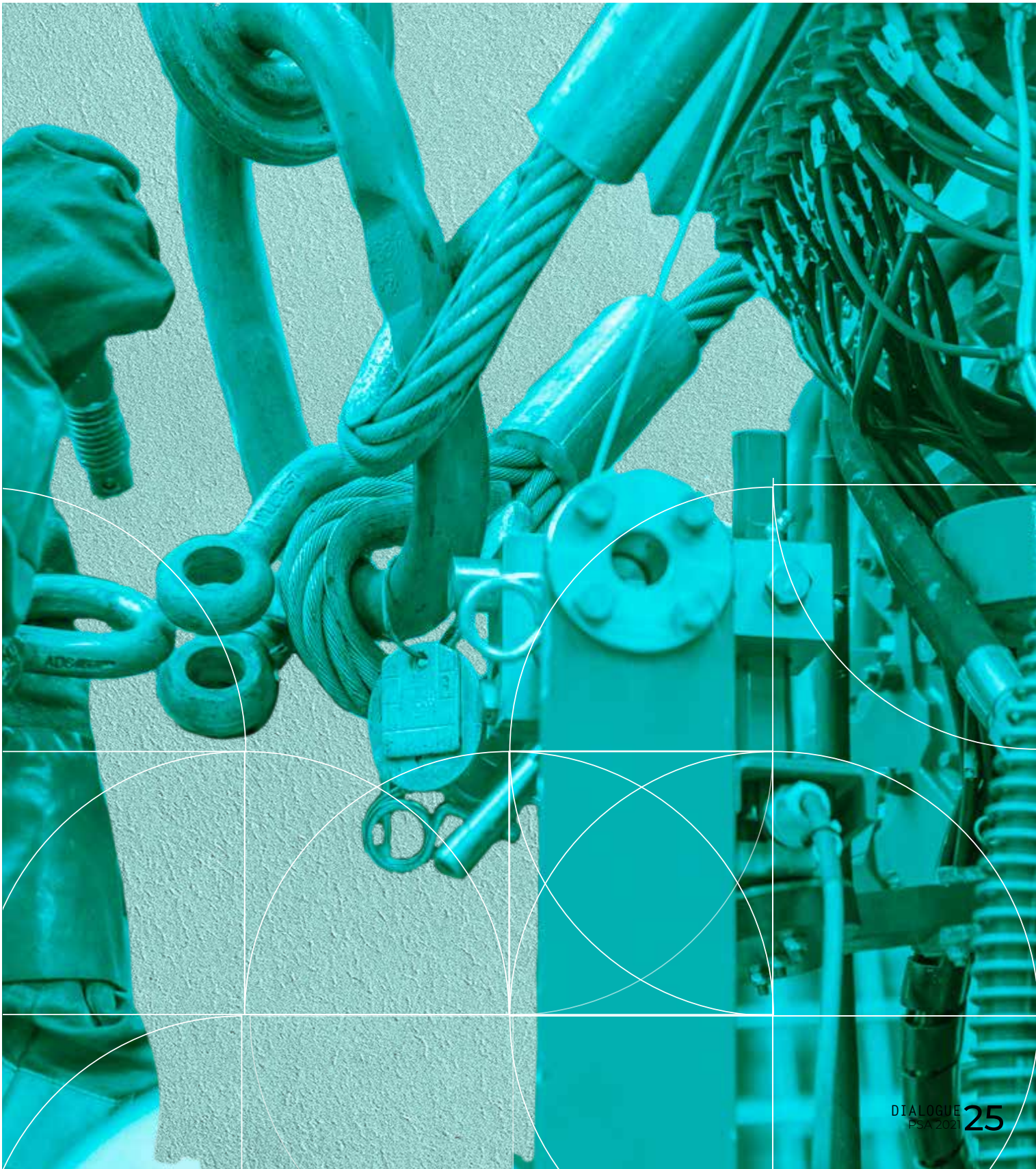






# THE SIGNIFICANCE





# Process for **better** risk management

Norway's petroleum industry has got steadily better over the past 20 years at managing important factors which influence risk, thanks to data provided by the RNNP.

**T**hese figures have identified the challenges and shown where efforts should be concentrated.

Since the measurements began to be collated by this process in 2021, the overall picture for trends in risk level has developed by and large in a positive direction.

That applies both to incidents with major accident potential and acute spills and to the questionnaire-based survey of industry personnel, although results there have fluctuated rather more.

**Variations** Breaking down the information to facility or plant level, however, shows big variations between players and over time. Some reveal signs of a wide gap compared with comparable facilities/plants.

But Torleif Husebø, who has led the RNNP process at the PSA over many years, is nevertheless cautious in attributing this trend to the project's findings.

"It hasn't contributed in itself to reducing risk," he points out. "That job has been done by the industry and the parties involved in it.

"The most important role of the RNNP has been to provide companies, unions and government with a common platform for discussions on safety

trends. It's also helped to identify HSE-related challenges at sector level."

**Entrenched** Husebø points out that the RNNP is entrenched in the Safety Forum, the key arena for HSE in Norway's petroleum industry. Its members always get to see and discuss the report's findings on the basis of the updated picture these provide.

The RNNP describes the status, and provides the basis for joint discussions between the parties on new initiatives.

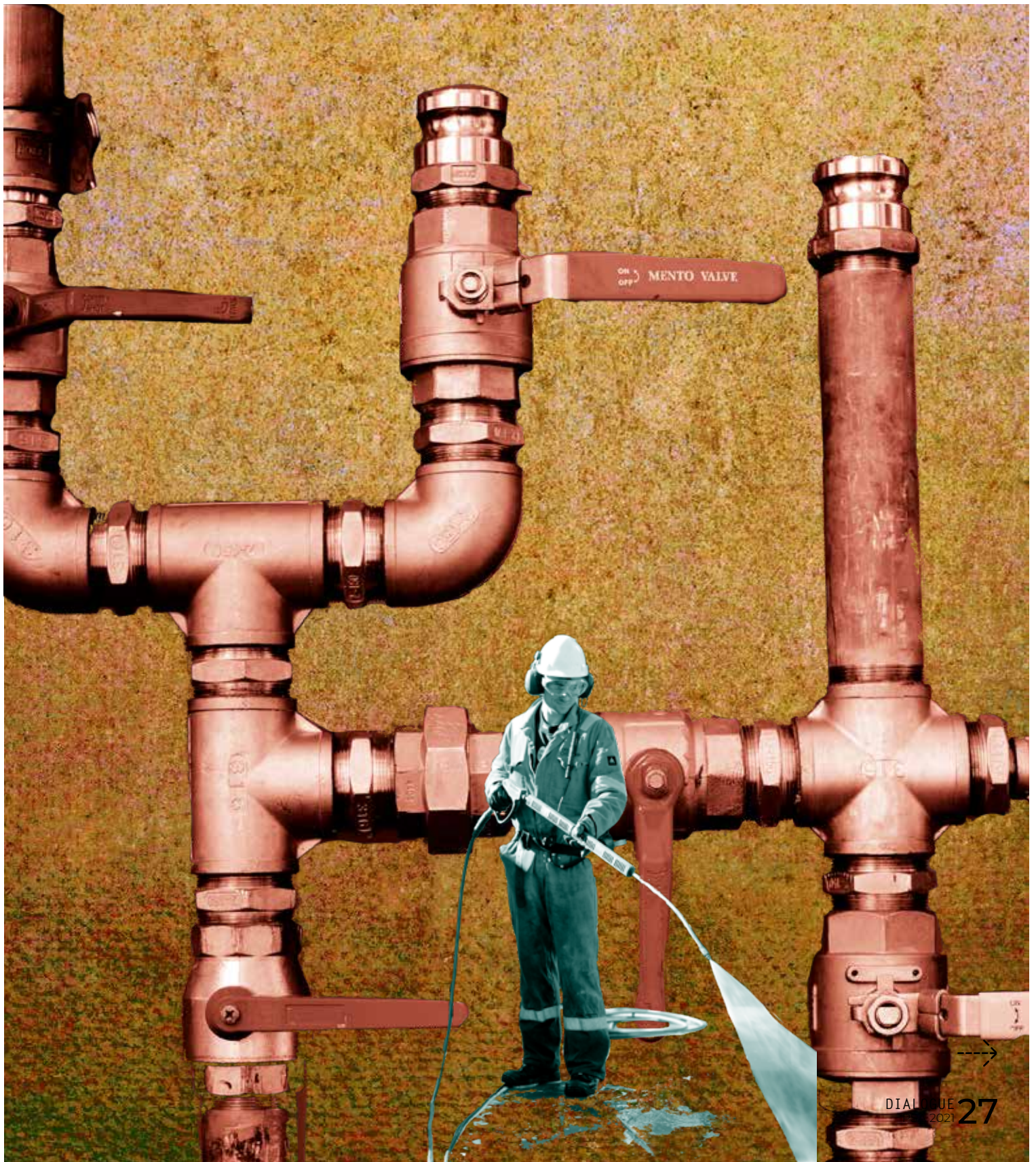
"This process has helped to identify and illuminate challenges and to create agreement between the parties on priorities, initiatives and measures to improve safety," says Husebø.

A good example he cites is industry efforts to cut hydrocarbon leaks and well-control incidents. The process has also provided valuable insights into the industry's work in other risk areas, such as maintaining and managing barriers.

"So the RNNP has supplied information and knowledge and has been part of the process for understanding the position and being able to work purposefully on risk reduction," Husebø says.

**Priorities** Where the government is concerned, the RNNP provides an important basis for setting





ON  
OFF MENTO VALVE

technical priorities, planning and implementing audits and other activities.

Signals from the PSA to the industry about necessary improvement measures often take their starting point from the report's figures.

"The RNNP is primarily a trend tool," explains Husebø. "It takes a retrospective look and helps us to see things over a long period.

"Annual variations will always occur, and we are therefore cautious in using the results in an overly specific way. Their big value lies first and foremost in painting the long-term picture.

"A positive trend over 20 years indicates both that we have a regime which functions and that we have an industry which gets to grips with the challenges.

"At the same time, we know that safety is a 'perishable commodity'. We must always look ahead and remember that history gives us no guarantees about the future."

**Crucial** Quality assurance of the figures has been a crucial factor in generating agreement over the RNNP results, Husebø points out.

"A goal for the process throughout has been to concentrate attention primarily on the results. We've largely succeeded with that so far.

"We achieve this by devoting substantial resources, both internally at the PSA and out in the industry, to checking the quality of the information included in the RNNP."

An in-depth study has been conducted for the 2021 report to assess the extent of erroneous and inadequate reporting to the RNNP, Husebø reports.

"The results strengthen our belief that underreporting to the process isn't so great that it affects the conclusions."

But he says it is important to note that the quality of the RNNP figures rests entirely on the industry reporting the information it is supposed to.

"The RNNP is part of our interparty collaboration. The parties themselves have a collective responsibility for making this work. That applies to reporting and quality assurance of the information – and not least to the use of the results." ★



*"The RNNP hasn't contributed in itself to reducing risk. That job has been done by the industry and the parties," says Torleif Husebø. He has headed the process for 20 years. (Photo: Anne Lise Norheim)*

# Pushing to curb escapes

Purposeful and long-term work has allowed Norway's petroleum industry to achieve a sharp decline in hydrocarbon leaks. The results of this drive show up clearly in the RNNP.

Putting a stop to escaping gas or oil was identified in the early 2000s as a key objective for lowering the risk of major accidents in the Norwegian offshore sector.

Forty-three such incidents exceeding 0.1 kilograms per second were recorded on the NCS in 2000, prompting the Norwegian Oil and Gas Association and the operator companies to launch a gas leak reduction project from 2003 to 2007.

One of a number of projects and activities aimed at overcoming the problem, this identified a need for greater expertise about conditions relevant to prevention, says Knut Thorvaldsen, deputy director general of Norwegian Oil and Gas.

The number of leaks above 0.1 kg/s was down to 10 by 2007. Once the project had ended, however, developments began to move in the wrong direction and 16 incidents were recorded in 2009.

**Project** In 2011, therefore, Norwegian Oil and Gas launched its hydrocarbon (HC) leak project.

"We analysed the incidents which had occurred in order to identify their causes, and to understand where measures should be applied," Thorvaldsen reports.

This analysis showed that more than 60 per cent of the leaks had arisen in connection with work on hydrocarbon-bearing equipment in the production phase.

The next step was to establish how planning and execution of activities involving piping systems could be improved, and guidelines on this were produced.

Since 2013, the industry has issued fact sheets

on oil and gas leaks larger than 0.1 kg/s on the NCS. They provide anonymised descriptions of incidents, including an overview of causes.

Also including lessons learnt from internal investigations by the companies, these studies are now due to be published with a new searchable user interface on the Norwegian Oil and Gas website.

**Transfer** The 2018 White Paper on HSE in the petroleum industry identified a need for better experience transfer after incidents, and the Safety Forum was mandated to look more closely at how the industry could improve.

Several reports were published in 2019, including one on learning from incidents. According to Thorvaldsen, this document was followed up in various industry fora.

The latest figures from the RNNP show five hydrocarbon leaks on the NCS in 2020 – a very considerable improvement on the figures from 20 years ago.

Thorvaldsen acknowledges that the long-term trend is positive. But he says management and employees in each company must continue to pay great attention to this issue if major accidents caused by hydrocarbon leaks are to be avoided.

He emphasises that the annual RNNP reports are very important for the industry: "They provide a unified picture of HSE conditions on the NCS.

"We use the data actively and adopt measures where they'll have the greatest effect. The ambition is continuous HSE improvement." ★

# Doing well



*Attention to the issue – in part through the RNNP – and a long-term commitment to learning and experience transfer have helped to reduce well-control incidents on the NCS. Monica Ovesen (left), PSA discipline manager for drilling and well, and Tove Rørhuus, manager for drilling and well at Norwegian Oil and Gas, both agree on that. (Photo: Anne Lise Norheim)*

## Systematic efforts, with the emphasis on learning and experience transfer, have helped to reduce the number of well-control incidents on the NCS.

**T**en events of this kind were experienced in Norway's offshore sector during 2020 – the lowest figure since records began two decades ago.

All incidents were moreover classified as “green” – in other words, a regular occurrence where the operator recovers control of the well with the aid of standard procedures.

“The data we have from 2010-20 are very much better than those for the previous decade,” says Monica Ovesen, discipline manager for drilling and well at the PSA.

**Macondo** She explains this trend as an indirect result of the Macondo blowout in the Gulf of Mexico in April 2010, which focused much greater government and industry attention on well control.

While incidents were previously rated as either serious or non-serious, “ownership” of the categories was transferred from the PSA to the Norwegian Oil and Gas Association.

The latter produced a separate guideline in 2011 on classifying well incidents, introducing a more fine-meshed system utilising four levels of seriousness categorised by colour.

“Our main impression of the industry is that it works well,” says Ovesen, who is also the PSA's observer at the Drilling Managers Forum (DMF).

“Operators in Norway share an exceptional amount of information with each other, and that's not usual in international terms.”

The DMF brings together drilling and well specialists from 29 operator companies, plus state-owned Petoro, once a month to review and discuss all well-control incidents on the NCS.

In the wake of Macondo, operator companies and members of the Norwegian Shipowners Association also established the Well Incident Task Force.

This group is responsible for producing “learning packs” about incidents with a big potential for offering lessons. These are open to all on the Norwegian Oil and Gas website.

**Culture** Ovesen believes that culture plays a big part in this area, and that the oil industry in Norway is more concerned to avoid accidents than to conceal errors.

Tove Rørhuus, manager for drilling and well at Norwegian Oil and Gas, agrees with that impression: “If one fails, everyone fails. A serious incident on the NCS would hit the whole industry.”

In her view, experience transfer and information sharing in the industry make a positive contribution to progress.

The learning packs have been reviewed by offshore drilling contractors, and are also used by educational institutions for teaching and training on well control.

“There's actually also demand internationally, and the packs can naturally be freely used and shared,” Rørhuus reports.

Ovesen notes that several serious incidents have occurred since 2000, including gas blowouts on Snorre A in 2004, Gullfaks in 2010 and Troll in 2016. These three were very different.

“No matter how much we analyse the data, we can't predict when and how an incident can occur,” she adds. That explains why giving more attention to prevention and reducing risk are important. ★

# Aiming to make people **safer**

Personal injuries in the Norwegian petroleum sector were relatively numerous in the 1990s. But a fixation by companies on lost-time incidents (LTIs) created a distorted picture of reality.

**B**efore the RNNP, industry players were largely concerned to count harm suffered by people who had to take time off work as a result.

These LTIs were used as an indicator, especially with contractors, and were easy to manipulate, says Øyvind Lauridsen, who has played a key role in the PSA's RNNP work from the start.

"During the 1990s, we saw company figures for such LTIs fall sharply and actually get close to zero towards 2000. That looked great on paper, but the reality was unfortunately very different."

The truth was that the number of incidents involving harm to individuals was relatively high during the decade, with far more serious injuries and fatalities than today.

**Robust** One aim of establishing the RNNP was to obtain more robust reporting and sounder figures on the risk of suffering harm. Rather than counting LTIs, the statistics were based on the definition of serious personal injuries in the regulations.

"With the RNNP, we've shifted industry attention away from LTIs and over to serious injuries," says Lauridsen. "That made it clear there were far too many of them, and that the companies had to get them down."

**Accountable** Active use was made of the personal injury statistics to emphasise company responsibility and to achieve a positive trend, he explains.

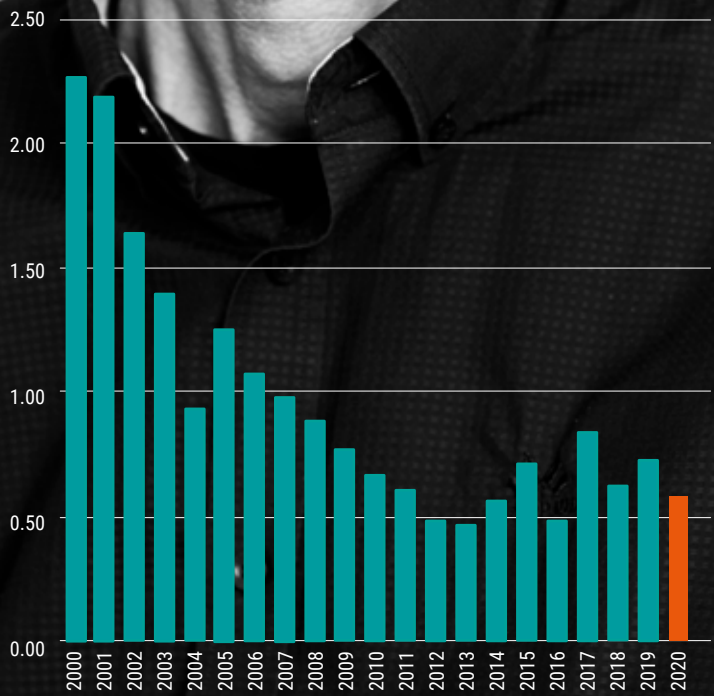
"The RNNP gave us a better measurement tool, both sides in the industry trusted the figures presented, and we therefore spent less time arguing over the numbers.

"Instead, the companies devoted their time to identifying measures which gave results. Looking back two decades later, the figures show a positive trend for serious personal injuries and fatalities throughout these years.

"The improvement has been marked. We were down to 0.6 serious personal injuries per million hours worked in 2020, compared with 2.3 in 2000. That's a sharp reduction." ★

*"With the RNNP, we've shifted industry attention away from LTIs and over to serious injuries," observes Øyvind Lauridsen, who has played a key role in this process from day one. "That made it clear there were far too many of them, and that the companies had to get them down." (Photo: Anne Lise Norheim)*





Serious personal injuries per million working hours, production and mobile facilities, 2000-20.



# Now hear this

Noise measurements in the oil industry have found an echo in international standards for the working environment. It all started with the RNNP.

**T**he office walls at Brekke & Strand Akustikk in Stavanger are decorated with mathematical formulae, while equipment old and new is on display in glass cases.

The latter include a measuring device presenting sound as waves in several colours. It was this machine which persuaded six-year-old Magnus Ognedal to follow in his father's footsteps.

Dad Tønnes and he are both acousticians, and Magnus also self-identifies as "a bit of a nerd" – a positive quality when spreadsheets have to be converted to databases and then made understandable for and simple to use by non-specialists.

**Diminishes** "In the ultimate analysis, noise is something which induces hearing loss and diminishes your quality of life," explains Tønnes.

His father-in-law was a ship's captain, and when he served at sea it was normal that the engineers on board suffered from deafness. That was just the way things were.

It was not until the late 1960s and 1970s that society became sufficiently aware of the link between noise exposure and hearing loss to do something about this.

*"In the ultimate analysis, noise is something which induces hearing loss and diminishes your quality of life," explains Tønnes Ognedal. He played a key role in developing an RNNP indicator for noise.*

Long-term exposure to an average sound level of 85 decibels (dB) is regarded as the ceiling for noise before hearing risks being damaged.

The scale is such that each time the sound level doubles, decibels increase by three. So the impact of 83 dB is twice as high as 80 dB.

The 85 dB limit applies for an eight-hour working day. But offshore personnel put in a 12-hour shift, and the ceiling then is 83 dB.

"We live in a good country where great attention is paid to the working environment, and where the acceptability of harm at work is low," observes Tønnes.

"The oil industry is more concerned about this, and has more money to do something about it," adds Magnus.

**Low demand** When his father qualified as an acoustician in 1980, demand for this speciality was so low that he had to work as a civil engineer as well.

But he eventually got more do in his field, and started the Sinus company in 1992. Around 2000, he was contacted by the PSA to help lay the basis for the RNNP reporting tool.

The question was whether a simple method



existed for calculating noise loads. This marked the start to extensive sound mapping on facilities where people do different jobs in various places over a working day.

Sinus proposed selecting the two jobs with the highest noise level, along with the two longest periods spent working in the noisiest areas.

That made it possible to calculate the average noise exposure. This in turn provided an indicator which could be incorporated in the RNNP.

**Data** The PSA acquired its first noise data from the operators in 2005 and forwarded them to Sinus, where Magnus was mainly responsible for processing the information.

He continued with this job until 2015, when the noise indicator became one of three to be put on hold because they no longer functioned as intended.

Explaining this, Sigvart Zachariassen at the PSA says there was too much cut-and-paste in the reporting from year to year and insufficient attention paid by the operators to preventive work.

The database remains publicly available, although facility and plant names are anonymised. Both the PSA and the companies themselves can access data for their facilities and plants.

*Employers have a duty to ensure that no worker is exposed to noise levels which could cause hearing damage. Noise measurements, mapping and calculation require both solid expertise and the right equipment of the kind offered by Tønnes Ognedal (facing page, left), Magnus Ognedal and Øistein Nessler at Brekke & Strand Akustikk. (Photo: Jonas Haarr Friestad)*

Should this prove desirable, the indicator could be revived. Brekke & Strand Akustikk, which Sinus became part of in 2018, benefits greatly from it in its own work.

“We can use the indicator for estimates when we produce noise zone maps and risk assessments, or to assess measures for the highest-risk areas,” says Øistein Nessler, offshore manager at Sinus.

**Standard** Tønnes chaired the work group which led in 2009 to the adoption of ISO 9612, the international standard for measuring noise in the working environment.

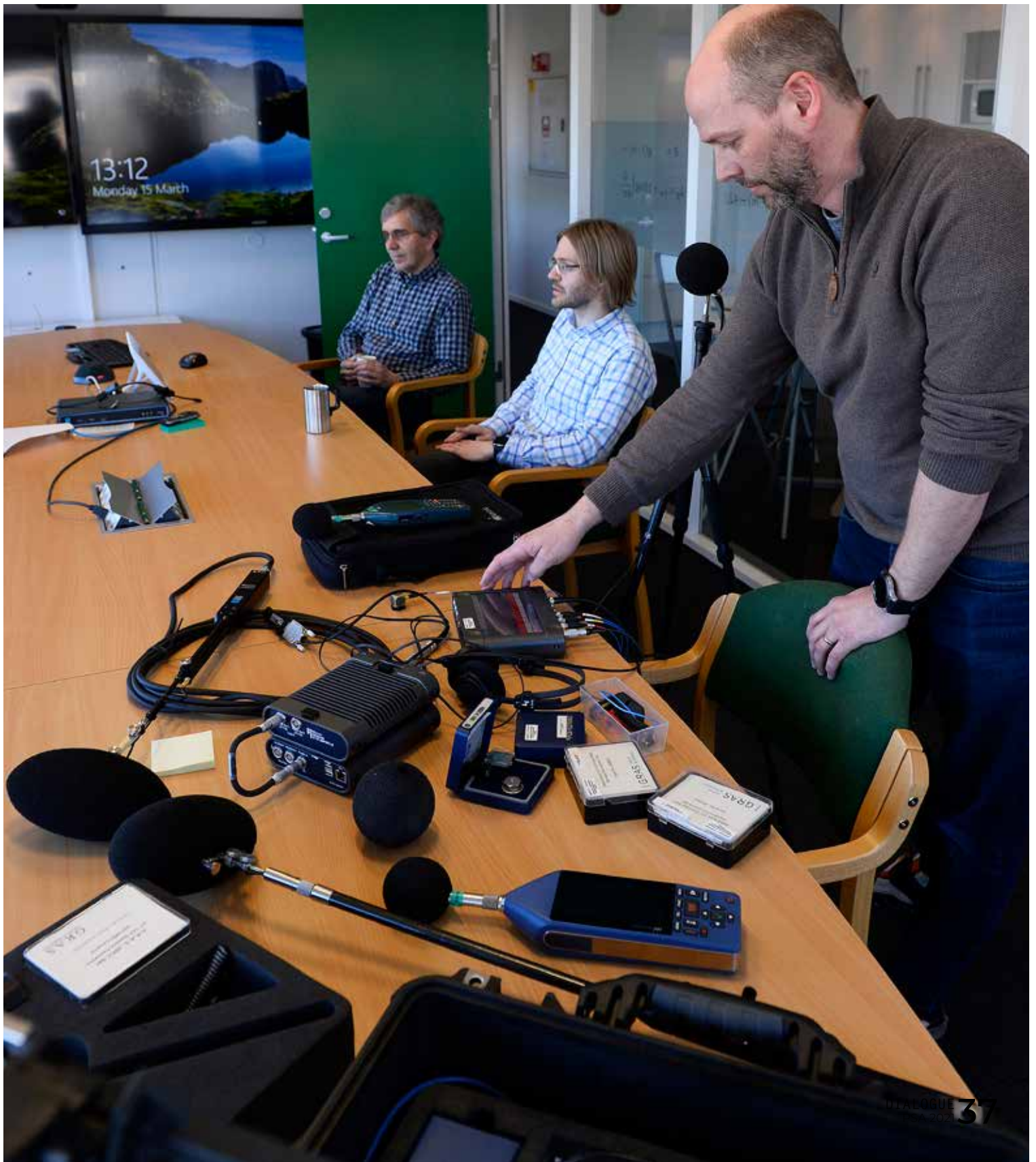
Experience with the RNNP indicator also contributed to the project on noise in the petroleum industry run by the Norwegian Oil Industry Association (now Norwegian Oil and Gas) in 2011-13.

The association wanted an overview of how much noise was generated by different types of hand-held tool, and Sinus produced this database through extensive field measurements.

“Checking on the spot is important because supplier data doesn’t always quantify the noise generated by tools in actual operation,” explains Magnus.

The database provides an instrument for making detailed assessments of noise exposure, and for





calculating vibrations from work tools.

It also serves as an important reference for the authorities. When the PSA conducts an audit, one question is whether active use is being made of the database.

The støydata.no noise data website has around 40-50 users every week, and a big oil company in Norway has had the calculator adapted to measure noise and vibration for its own use.

"If you send somebody to do a job and wonder whether they'll be exposed to excessive noise, you can use the database to calculate how much hearing protection they need and how long they can work on a specific job," explains Tønnes.

Sinus still devotes a lot of time to maintaining støydata.no, which is freely available. On its own initiative, and in collaboration with supplier Beerenberg, the team has also produced a database on vibration damping by various work gloves.

Nessler reports that more than 7 000 measurements were made with "a heap of gloves, with a heap of different tools".

One of their findings was that some gloves actually reinforce vibration. The results are freely available at hansker.sinusas.no.

"We believe that the more we share, the more we get back ourselves," says Tønnes. ★

*From noise to vibration: hand and arm vibration from equipment at work can also cause damage. That makes the choice of gloves a factor when calculating risk, as Magnus Onedal in Brekke & Strand Akustikk demonstrates. (Photo: Jonas Haarr Friestad)*



BY ASTRI SIVERTSEN

# Prevention before protection

Noise is still a problem for the industry, maintains Henrik Solvorn Fjeldsbø at the Norwegian Union of Industry and Energy Workers (Industry Energy).

**W**e know it's demanding to suffer hearing problems as a result of noise exposure," says Fjeldsbø. "It can involve anything from sleeplessness to tinnitus - a constant ringing in the ears. Such effects destroy your quality of life."

These problems can affect those working in catering, on the helideck or out in production. In his view, they need to be dealt with at source – preventing the damage rather than trying to reduce it.

"It's a matter of buying less noisy equipment as well as getting better at using it and at conducting risk assessments. Noisy equipment needs to be insulated and packed in to prevent people being overexposed and ultimately harmed.

"That in turn depends on involving workers as

early as the planning phase, where the chief safety delegates can make their comments."

The goal must be a working environment which meets all the requirements, including for noise.

**Last resort** Hearing protection is actually a last resort when all other measures have been tried out, Fjeldsbø affirms.

"It's too simple just to buy in equipment and then make hearing protection compulsory. Such devices also vary in quality, and can be used and maintained incorrectly.

"We must deal with the causes, not the symptoms."★

*Henrik Solvorn Fjeldsbø,  
Industry Energy.*







# A three-legged stool

Employers, employees and government would not have collaborated as well as they do in Norway's petroleum sector without the RNNP, says professor Ole Andreas Engen at the University of Stavanger.

A specialist in risk management and societal safety, Engen has led several large studies of the safety regime in the oil and gas industry.

These included the tripartite committee which submitted a report on HSE conditions in the industry to the government in 2017.

He believes the RNNP has played a key role: "Without it, I don't think there would actually have been any basis for writing an HSE report.

"The only reason we ultimately managed to arrive at some formulations which everyone could more or less agree on was that we had the RNNP as a starting point."

Also known as the Engen report, this document formed the basis for a White Paper on health, safety and the working environment in the petroleum sector which was adopted in 2018.

**Barometer** Engen describes the RNNP as a barometer of safety and risk conditions in the oil and gas industry. This tool and its reports also function as an information channel between

companies, unions and government.

The indicators and statistics presented by the process provide a frame of reference for a whole industry. Combined with an agreed factual base, that creates trust.

In Engen's view, it helps to make the expectations which the parties have of each other predictable.

"That can make people more secure, and helps them to know more easily what the other side will have to say during a discussion," he says.

Engen points out that a shared factual basis does not necessarily mean people agree or are not cross with each other. But it prevents them stalking off and refusing to cooperate.

"That's undoubtedly the most important aspect of the whole RNNP exercise – that you create the terms and basis for discussion and perhaps also a dialogue.

"In some circumstances, you're likely to reach agreement. On other occasions, you can establish what the disagreement is fundamentally about."



*Tripartite collaboration between employers, unions and government has long traditions in Norwegian working life. In the petroleum sector, this means they work together constructively to improve safety and the working environment. (Illustration: Janne-Beth Carlsen N'Jai)*

**Legitimacy** Engen maintains that the RNNP has great legitimacy in the industry. When chairing the HSE committee, he saw that the employers had a clear understanding of – and used – the RNNP in their safety mindset.

That implicitly gives the RNNP an influence on the level of safety, he notes. “When you get an RNNP report which identifies negative or critical trends in the industry, it has an effect.

“There isn’t a safety vice president in Equinor who would sit and say: ‘no, we don’t believe the RNNP figures, so we’re not taking this seriously’. That would be to commit hara-kiri.

“The RNNP isn’t a kind of management document, but it also provides signals on whether the PSA’s supervisory strategy is working – and thereby influences government regulation.”

**Unique** Although Engen acknowledges that employers and employees collaborate all around the world, he says the role played by the Norwegian government in this context is unique.

That applies particularly in the petroleum sector, where it facilitates collaboration through the Safety and Regulatory Fora and the RNNP.

“A three-legged stool is only stable when all the legs are in place,” Engen points out.

He believes the overall collaboration would have looked different if the parties had not possessed a common foundation such as the RNNP to form the basis for their discussions.

“I’m not saying the tripartite collaboration wouldn’t have functioned without the RNNP, because other mechanisms would certainly have come into play. But this tool is undoubtedly important for it.” ★



“ The RNNP represents the most important basis for a shared understanding of the reality concerning and communication about risk level on the petroleum sector. The parties in the industry must continue to support work with and further development of the RNNP.

Summary of the Engen committee’s report, 2017.

*Ole Andreas Engen, professor in risk management and societal safety at the University of Stavanger, believes the RNNP helps to give the industry a shared factual basis and frame of reference. “That creates trust,” he affirms. (Foto: Marie von Krogh)*

# THE RNNP



- \* measures the effect of HSE work in the industry
- \* helps to identify critical areas for HSE and where efforts to identify causes must be prioritised to prevent undesirable incidents and accidents
- \* increases understanding of the possible causes of accidents and their significance for the risk picture
- \* identifies areas where efforts must be devoted to amending the regulations and to research and development.
- \* the RNNP process yields four annual reports – the main, land and offshore summary reports are published in March-April, while that on acute spills appears in September-October.

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**HSE:** Health, safety and the environment  
**NCS:** Norwegian continental shelf  
**PSA:** Petroleum Safety Authority Norway  
**RNNP:** Trends in risk level in the petroleum activity



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