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DIALOGUE

A JOURNAL FROM THE PETROLEUM SAFETY AUTHORITY NORWAY

FACETS OF RISK

CAMILLA STOLTENBERG - THINA SALTVEDT

AVALANCHE ALERTER **LARS HARALD BLIKRA**

DIALOGUE

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FRONT COVER: Camilla Stoltenberg, director-general of the Norwegian Institute of Public Health. (Photo: Stein J Bjørge)

RISK, DID YOU SAY?

Everything we humans do, from a short local cycle ride to demanding operations on an offshore drill floor, involves risk in one way or another.

But what does risk actually mean? How are we to understand it? How can it be measured and identified? How can we take control of and manage it?

And, not least: how can we communicate risk to the target groups we want to reach? How can we convey uncertainty, probability and consequences – clearly and concisely?

Many approaches exist to the subject of risk and risk management, and many challenges. This issue presents a status report on the level of risk in Norway's petroleum sector – and accompanies the Norwegian Oil and Gas Association high into the mountains to provide a wider perspective on the issues involved.

We also look to other sectors, and present an interview with Camilla Stoltenberg at the Norwegian Institute of Public Health on the risk of and being prepared for pandemics.

And we have talked to Lars Harald Blikra, the man who caused a whole Norwegian community to be evacuated, about landslide threats and the importance of being safe rather than sorry – always.

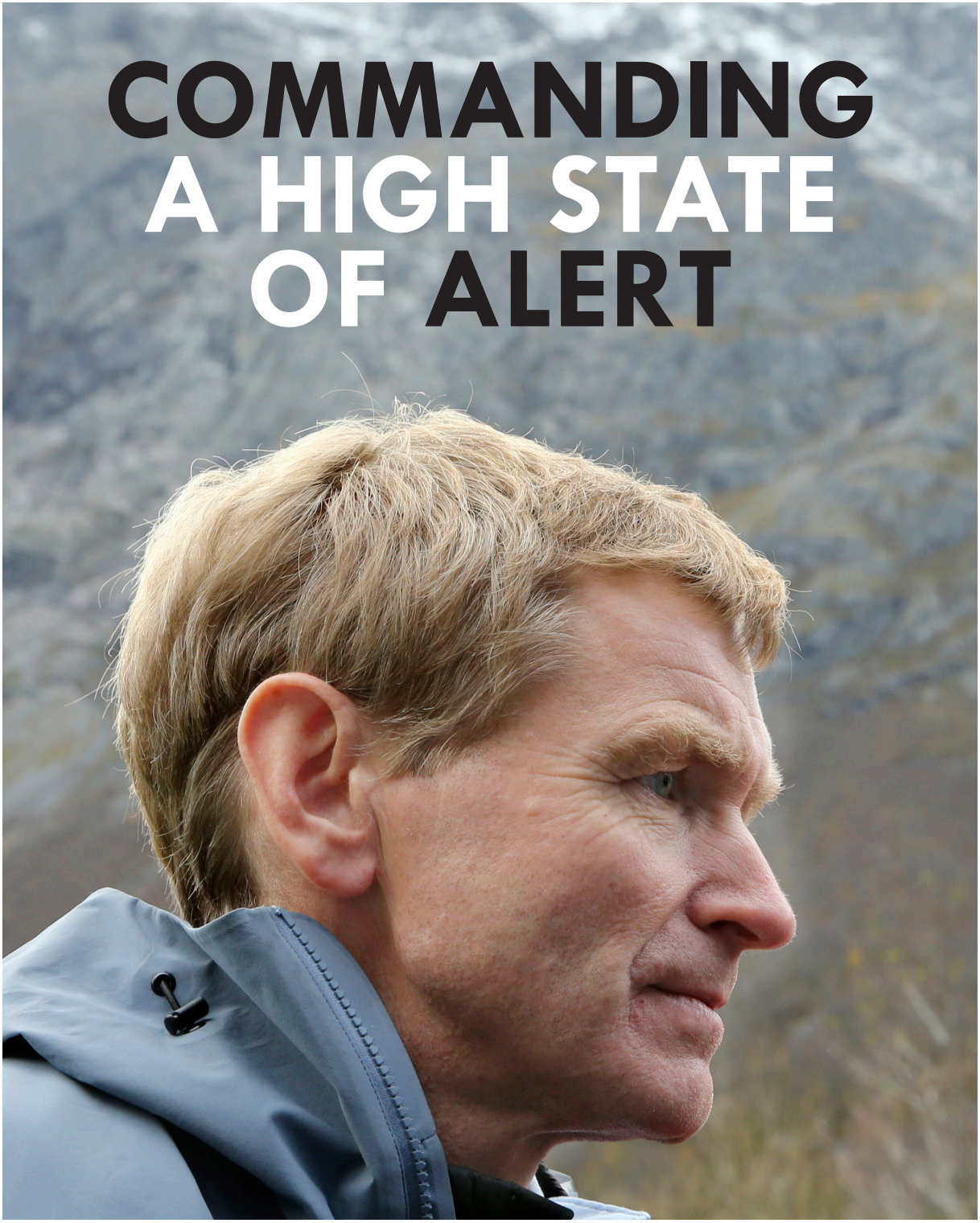
Enjoy!

Øyvind Midttun
Editor

"If society is to be well prepared to tackle a crisis, informing the population about the risk it faces at any given time is crucial."

National risk report 2010, Norwegian Directorate for Civil Protection (DSB)

COMMANDING A HIGH STATE OF ALERT



BY EILEEN BRUNDTLAND

Rauma in the west Norwegian region of Romsdalen was the centre of national attention last autumn following a landslide prediction. Nothing happened, but the man who sounded the alarm stresses that it was right to warn of the risk.

Head geologist Lars Harald Blikra at the Åknes/Tafjord Monitoring Centre – now part of the Norwegian Water Resources and Energy Directorate (NVE) – was keeping a continuous eye on one of Norway's four high-risk mountain regions.

Such big movements had been measured in Mount Mannen during the autumn that part of it looked likely to collapse. Eleven residents from nearby farms were evacuated on 22 October, and the Rauma railway line was closed.

The mountain was the big topic of conversation in Norway for the following week, with everyone asking when the big landslide would happen.

Hordes of journalists descended on the area, cameras were installed for live broadcasts, and the whole population followed developments on tenterhooks.

The landslide was imminent, according to Blikra, who produced daily analyses, forecasts and assessments of acceleration phases.

Meanwhile, it continued to rain, civil defence forces were mobilised, justice and public security minister Anders Anundsen visited the evacuees – and the press was ready to report the latest news.

The tension peaked on 28 October. With displacements in the mountainside of up to seven centimetres per day and more rain expected, the predictions were sufficiently unambiguous for Blikra to forecast an avalanche that day or the following night.

But then the rain ceased, temperatures fell below freezing and the rock stabilised. No landslide occurred.

With the drama over, the journalists packed up their cameras and left the area. By 3 December, the mountain was stable enough for the evacuees to return home.

QUESTIONS. This event poses several questions. How did Blikra feel about appearing on TV and promising an accident which never happened. And were the scientists exaggerating the threat?

Blikra himself became a national celebrity overnight, but took the commotion very calmly. "I haven't given this much thought afterwards. It's just the way things turned out.

"This was straightforward enough in itself.

RAUMA, 27 OCTOBER 2014: *a landslide could occur at any time on Mount Mannen. Geologist Lars Harald Blikra waits expectantly at its foot. (Photo: Terje Pedersen/NTB Scanpix)*

People were evacuated, and our job was to communicate developments on the mountain.

"The crisis management team, which comprised the local authority and the police as well as us, agreed that we had to be honest about the forecast. But we could only report what we knew."

He emphasises that securing the confidence of the general public is an important part of this information process, particularly with regard to the evacuees.

So it was important to be accessible to and clear in the media, but Blikra feels that the big press presence meant that things became a bit exaggerated and sensationalised.

"We felt under a little pressure towards the end to put a date on the landslide. At the same time, I think we managed to restrain ourselves and concentrate on what we actually knew.

"There was a natural desire, particularly on the part of the evacuees, for the rockfall

Council chair Lars Olav Hustad in Rauma local authority (left) briefs Anders Anundsen, minister of justice and public security, on the status of Mount Mannen. Its condition was the big topic of conversation in Norway last autumn – with a huge media presence and nail-biting live transmissions.

(Photo: Terje Pedersen/NTB Scanpix)

to happen. That would have been the end of it. Everyone was hoping for this, so we didn't regard stabilisation of the mountain as a good outcome."

WARNING. Blikra understands why the affair attracted such attention, because it was the first time in Norway that a landslide warning had been issued in this way.

Getting live coverage of an avalanche was a news story in itself. And evacuating residents underlined the seriousness of the position.

The geologist emphasises that it was imperative to issue a warning. "Although much is uncertain, the precautionary principle must be observed.

"Things don't always turn out the way you expect, but we can't afford to wait and see. The consequences of delay could be too great.

"At the same time, such alerts

must be as realistic as possible. We can't constantly issue warnings – our forecasts must be based on what we know.

"Uncertainty can't be allowed to prevail if we're to give clear advice on hazards to society and the police. Things must be sufficiently specific for a choice to be possible."

LONG DAYS. Daily press conferences took place in the last week of October – and everyone wanted a piece of Blikra. It was a case of long days with little rest.

The whole geological team, which worked a 24-hour duty rota, found itself under strong pressure. They learned lessons from that.

Better organisation of the duty roster and improved media management will be needed next time – and there will certainly be another round sooner or later.

Blikra is convinced that Mannen will not remain standing for eternity. But when part of the mountain might collapse, and how large such a slide could be, are more difficult to predict.

"Given what we know now, we're likely to get another period of movement in the rock," he notes. "But such cycles could continue for a number of years before the rock is so weak it collapses.

"In other words, it's not certain that an avalanche will occur this year either. That brings us back to the question of uncertainty.

"We don't know what the rock looks like internally – how weak it is and what's needed to get it moving. All we can do is look at the measurements. For now, we can't do much more than wait."

He says that the only option if the analyses show renewed acceleration at similar speeds as before is to notify the police and local council, who are responsible for evacuation.

SOLUTIONS. Explosives and water-bombing represented possible solutions when Mannen was creaking at its worst last autumn, so the question is why the problem area was not simply blasted away.

"Such human interventions can create even greater uncertainty," Blikra notes. "It's not given that this would have had the

RAUMA, 29 OCTOBER 2014: *the temperature has dropped and snow fallen on Mount Mannen overnight. The mountain has stabilised – for the moment. (Photo: Terje Pedersen/NTB Scanpix)*

desired effect. On the contrary, an even bigger landslide could have been unleashed – and caused more serious damage."

That is because only about 120 000 cubic metres of the mountain began moving last autumn, while the whole unstable rock formation totals 15-20 million cubic metres.

This explains why Mannen is a high-risk area under round-the-clock observation. The other three such sites in Norway are Åkneset and Hegguraksla in Møre og Romsdal county and Nordnesfjellet further north in Troms.

Several independent systems are used to ensure stable and continuous monitoring of these regions, including GPS, ground-based radar, tensiometers, lasers, geophones and angle gauges.

Combined with measuring motion, the water table and temperature in deep boreholes, this allows the geologists to register changes in the movement of the mountain slopes and issue timely warnings.

LANDSLIDES IN NORWAY

Norway's biggest prehistoric collapse of a substantial volume of rock amounted to several hundred million cubic metres, while Tjellefonna on the Romsdal Fjord was the largest recorded slide.

Totalling 15 million cubic metres, that event occurred in 1756. In more recent times, the Ta Fjord slide in 1934 involved three million cubic metres.

Big landslides are rare, with two or three incidents per century in Norway. The northern part of the west coast has been hardest hit.

In addition to the Ta Fjord event, Loen was affected by large avalanches in 1905 and 1936. A total of 175 people died in the three incidents.

Characteristically, the probability of future slides is low but their consequences can be very substantial in the form of wide direct devastation and extensive flooding.

The development of settlements and other infrastructure along Norway's fjords and growing tourism mean that society has gradually become more vulnerable to such events.

Experience from Norway and other mountain areas shows that warnings almost always precede big landslides in the form of creep in the slopes. These findings form the basis for emergency preparedness against avalanches.

Source: Åknes/Tafjord Monitoring Centre

BY EILEEN BRUNDTLAND

PREPARED FOR THE UNFORESEEABLE

The Norwegian Institute of Public Health (FHI) and its director-general, Camilla Stoltenberg, never know what infection may break out – or when. All they can be sure of is that one will come. And that they need to be ready for every eventuality.

No activity can be pursued without risk, but the latter can and must be managed. That recognition is well established in the petroleum industry.

But what if the risk does not clearly relate to a specific activity which can be planned? What if the hazard is contagious and takes the form of a potentially fatal disease?

The FHI is one of the agencies mobilised when influenza and other infectious maladies threaten Norway. It monitors national and international epidemiological conditions and advises the health service, other agencies and the public at large.

"Good risk management systems are crucial for preventing a public health crisis," says Stoltenberg. "Mapping, planning, emergency preparedness and training are major elements here.

"Our problem is that we never know what the next big outbreak will involve. This means we must prepare on a broad basis, because no epidemic is the same."

KEY. As in the oil industry, the precautionary principle occupies a key place at the FHI. Stoltenberg regards it as crucial in seeking to combat infectious diseases.

"We never sit and wait while wondering whether to do something," she says. "We always respond, and have a low threshold for allocating staff resources in order to stay on the safe side.

"The most important consideration is to determine quickly that an outbreak is happening. This means we mobilise large parts of our organisation even if the risk is relatively low. That also gives us the best training."

Following the swine flu scare in 2009, the FHI's decision to recommend vaccination of the whole Norwegian population came in for criticism from several quarters.

Stoltenberg emphasises the importance of taking quick decisions, even though a lot remains uncertain – and even if you get castigated for doing so.

"It obviously wasn't possible in those circumstances to be certain about the right course of action, and it's not given that we'd

THE PRECAUTIONARY PRINCIPLE *is crucial in efforts to combat infectious diseases and pandemics, emphasises Camilla Stoltenberg, director-general of the Norwegian Institute of Public Health. (Photo: Jimmy Linus/FHI)*

VACCINATION AGAINST SWINE FLU

Oslo, 11 November 2009: adults with children under the age of six form long queues to be vaccinated against swine flu. One million doses of vaccine were distributed to Norwegian local authorities to cover the groups defined to be at risk and health personnel. That was in accordance with the quantity regarded as necessary by the Norwegian Institute of Public Health for the first phase of the vaccination programme. *(Photo: Heiko Junge/Scanpix)*

choose the same response again – since we now know more.

"Nevertheless, when summing up the swine flu pandemic, I still believe our standpoint was right at the time.

"The UK, for instance, opted to vaccinate only a modest proportion of the population. It experienced serious outbreaks for many seasons thereafter, with a number of deaths.

"Adding up how many were actually killed or injured by swine flu over the five years from 2009 shows that this epidemic took many more lives than was predictable after the first round."

She says that this has helped to give people a more nuanced view of the matter, and that the FHI has experienced little criticism of late.

WARNING. Infection control is organised internationally through a number of warning systems run by such bodies as the EU and the World Health Organisation (WHO).

All member states are required to use these systems if they think an outbreak could have an international impact. Several major epidemics have occurred on a global basis in recent years.

These include severe acute respiratory syndrome (Sars) in 2002 and Middle East respiratory syndrome (Mers) in 2012, as well as swine flu – which actually reached Norway.

Ebola fever has been the big concern over the past year and, although Norway remains unaffected, its anti-infection organisation has been on high alert.

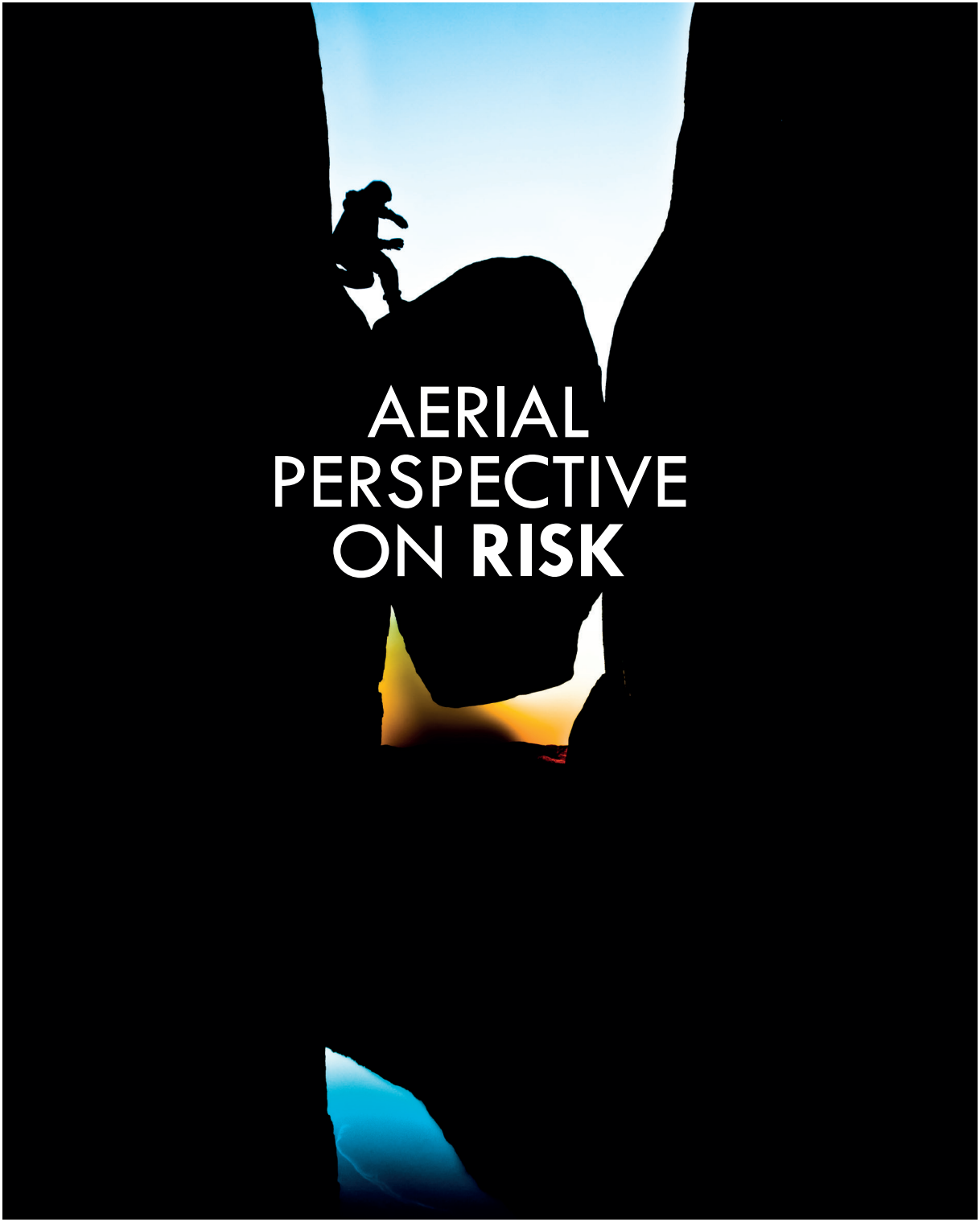
"We must always assume that infection can develop quickly," says Stoltenberg. "So we plan for various scenarios. We can envisage, for example, that an illegal immigrant from west Africa could bring Ebola here.

"Were we to discover a sick person under such circumstances, the country would find itself facing a very acute position."

CHALLENGING. Learning lessons is important for being equipped to cope with challenging new disease outbreaks in the future, and the FHI establishes dedicated strategic groups to analyse such incidents.

Intended to build up more experience with and capacity for continuous analysis of crises, these provide advice and assessments to the operational personnel directly involved.

"We try to envisage scenarios which look completely different, since we never know when a new epidemic will occur," says Stoltenberg. "We only know they'll certainly turn up."



AERIAL PERSPECTIVE ON **RISK**

BY ØYVIND MIDTTUN

The Norwegian Oil and Gas Association went high into Norway's south-western mountains to explain why new ways of thinking about risk is important.

"I've always wanted to stand on Kjeragbolten," says the main character in a new film on risk from the petroleum industry organisation. "It must be a fantastic feeling. A kick."

About 1 000 metres above sea level at the innermost end of the Lyse Fjord near Stavanger, the unnamed person faces a difficult choice. Should he step out onto Kjeragbolten?

This big boulder, five cubic metres in size, has become stuck fast in a deep and narrow crevasse. Posing on the rock has become a test of manhood for many.

It would undoubtedly provide a great photograph. But there is a sheer drop on either side. A slip would mean certain death. He also knows that several thousand people have made the little hop.

"But how dangerous is this actually?" he asks himself in the film. "How big is the risk?"

An expert appears to help him work it out. He notes that nobody has ever fallen from Kjeragbolten, and puts the risk of this happening at a minute 0.000000001 per cent.

"Driving a car, for example, is much more dangerous," the expert concludes. "Standing on Kjeragbolten is safe."

But one thing is lacking from this confident analysis – the level of uncertainty.

INCREASED. "The attention being given to uncertainty – or level of knowledge – and its effect on risk analysis, assessment and management – has increased in recent years," says Bodil Sophia Krohn.

She is head of risk management at Norwegian Oil and Gas, which has been running its own project in this area over the past two years.

The aim has been to acquire a wider

LEFT: FORSAND ON THE LYSE FJORD NORTH OF STAVANGER: *a man steps onto the Kjeragbolten boulder over 1 000 metres above sea level. But how risky is this actually? (Photo: Roy Mangersnes/Samfoto)*

BODIL SOPHIA KROHN
HEAD OF RISK MANAGEMENT AT THE NORWEGIAN OIL AND GAS ASSOCIATION
(Photo: University of Stavanger)

perspective on risk and on how the industry can understand, assess and manage the threat of major accidents.

"A good grasp of risk is fundamental for safety work," Krohn observes. "That's the basis for everything we do. We must improve learning and experience transfer, and thereby contribute to enhancing knowledge which can reduce major accident risk.

"Developing better models and tools for cost-effective risk analyses is an overall objective for the project."

The *Deepwater Horizon* accident in the Gulf of Mexico during 2015 is among the incidents which have focused attention on risk management and on how greater emphasis can be given to uncertainty and the level of knowledge.

Uncertainty is crucial for risk understanding in all relevant regulations and standards. The 2009 international ISO 31000 standard for risk management, for example, emphasises that uncertainty cannot be avoided.

A precise definition of the risk concept has now been incorporated in Norway's petroleum regulations. The guidelines to the framework HSE regulations state: "Risk means the consequences of the activities, with associated uncertainty".

"Knowledge and uncertainty are important aspects of risk, but we need a more practical approach to the way we're going to work with this," says Krohn.

"How can these elements be handled?" she asks. "How can we integrate this in risk analyses and how is the industry to understand the new risk definition?

"And what does the change mean in purely practical terms? These are questions and issues we're trying to come up with answers to."

SUPPORT. The Norwegian Oil and Gas project has sought support from such sources as Terje Aven, professor of risk analysis and management at the University of Stavanger.

A detailed report on the subject is now nearing completion, and two working seminars have been staged for the petroleum industry during the spring.

Focused on what the new definition means for work on risk, one of these sessions addressed quantitative risk analyses while the

other looked at safe job analysis (SJA).

UNCONVINCED. Back in the Kjerag film, the main character remains unconvinced that average probability is the only factor which should count when assessing the risk of stepping onto the rock.

When he thinks about it, many other factors could affect the outcome of such a daredevil feat – from wind and weather, with sudden gusts, to his mental balance and the state of his shoes.

"You talked only about low probability," he tells the expert. "But you knew far too little about conditions up there. You didn't allow for the possibility that something surprising could happen. Your analysis didn't give us the full picture. It provides a false sense of security."

"The film explains in a simple way that you can't base risk management solely on figures and probability," says Krohn. "Uncertainty and level of knowledge must be taken into account."

Efforts to produce a new and expanded perspective on risk are set to continue, she reports, and says that feedback from the industry has been good.

"We see that this project is necessary, and are working now on follow-up proposals. These include looking at risk analyses – how they can be improved and become more cost-effective."

ACCLAIMED EFFORT

Work by the Norwegian Oil and Gas Association to establish an expanded perspective on risk has received a thumbs-up from the PSA.

"We've maintained for years that the industry has had problems in handling and assessing risk, partly because uncertainty hasn't been properly incorporated," says Bjørnar Heide.

A key player in the PSA's work on risk analysis and management, he says it is accordingly pleasing that the industry has joined forces on this project and that the results have been presented in such an easy-to-understand way.

"We feel the practical solutions proposed can contribute to much better risk management, so that the requirements in the regulations get met to a greater extent than they are today.

"It's accordingly important that the various sides of the industry adopt the knowledge and methods developed by the project in an unprejudiced manner."

BJØRNAR HEIDE
IS A PSA EXPERT ON RISK MANAGEMENT
(Photo: Gunlaug Leirvik)

BY ØYVIND MIDTTUN *Photo: Vegard Breie*

GOOD IS NOT GOOD ENOUGH

The RNNP figures presented in April contained much which was positive. PSA director general Anne Myhrvold urged the industry to make active use of this material, and warned it against resting on its laurels.

The PSA's major annual study of the level of risk on the NCS has indicated in recent years that developments are moving in the right direction – and the 2014 results were no exception.

They showed progress with virtually all the indicators – for both major accident and working environment risk – on land as well as offshore.

"The trend is good, no doubt about that," says Myhrvold. "We had a positive year for safety in 2014, without major accidents or fatalities in the petroleum sector.

"Progress has been encouraging for a number of years. But it's important that we don't allow ourselves to be blinded by excellent results."

SERIOUS. The present year was only 14 days old when the first serious incident occurred, with the unintentional launch of a lifeboat from the *Mærsk Giant* rig. Nobody was injured, but the PSA resolved to conduct an investigation.

A series of further cases followed in subsequent weeks. By the end of April, the PSA had started no less than six inquiries in four months.

When this issue went to press, the majority of these investigations had yet to be completed. So it is too early to draw any conclusions about their causes, whether they were isolated cases or had common features.

However, one thing is certain – 2015 has developed in a very different direction from that indicated by the RNNP data.

"Regardless of the reasons, a contrast exists between the good RNNP results for 2014 and the flood of serious incidents at the start of this year," Myhrvold emphasises. "This clearly illustrates that a high level of safety is not something you can bank on.

"Safety demands a continuous commitment to maintaining and further developing its existing level. If we stand still, we'll go into reverse."

KEY. She stresses that the industry must keep up its efforts to reduce major accident and working environment risk, so that the positive trend is not lost. The RNNP occupies a key place in this work.

"Since we launched this process in the late 1990s, it's acquired an important place in the industry and ranks today as a significant management tool for everyone involved.

"We see that the sector has got better at using the RNNP results. That's positive. But we also see clear variations. Some companies are purposeful, others need to make a bigger commitment.

"If we're going to achieve a good and lasting improvement, we have to pull together. The RNNP findings must be used at industry, company and facility levels."

RIGHT **TRACK** WITH RISK

Good progress in a number of areas emerges from the RNNP data for 2014. Some of the most important results are summarised below.

- **The major accident indicator*** was at its lowest level since the RNNP process began.

- **Hydrocarbon leaks** larger than 0.1 kilograms per second totalled seven on the NCS and the same number on land – the second-lowest figure recorded. None had a particularly big potential, and the risk contribution from hydrocarbon leaks on the NCS was the lowest ever.

- **Well control incidents** registered rose from 13 in 2013 to 17. Viewed in relation to the level of activity, this represents an increase for both exploration and production drilling. However, 16 of the incidents were in the lowest risk category.

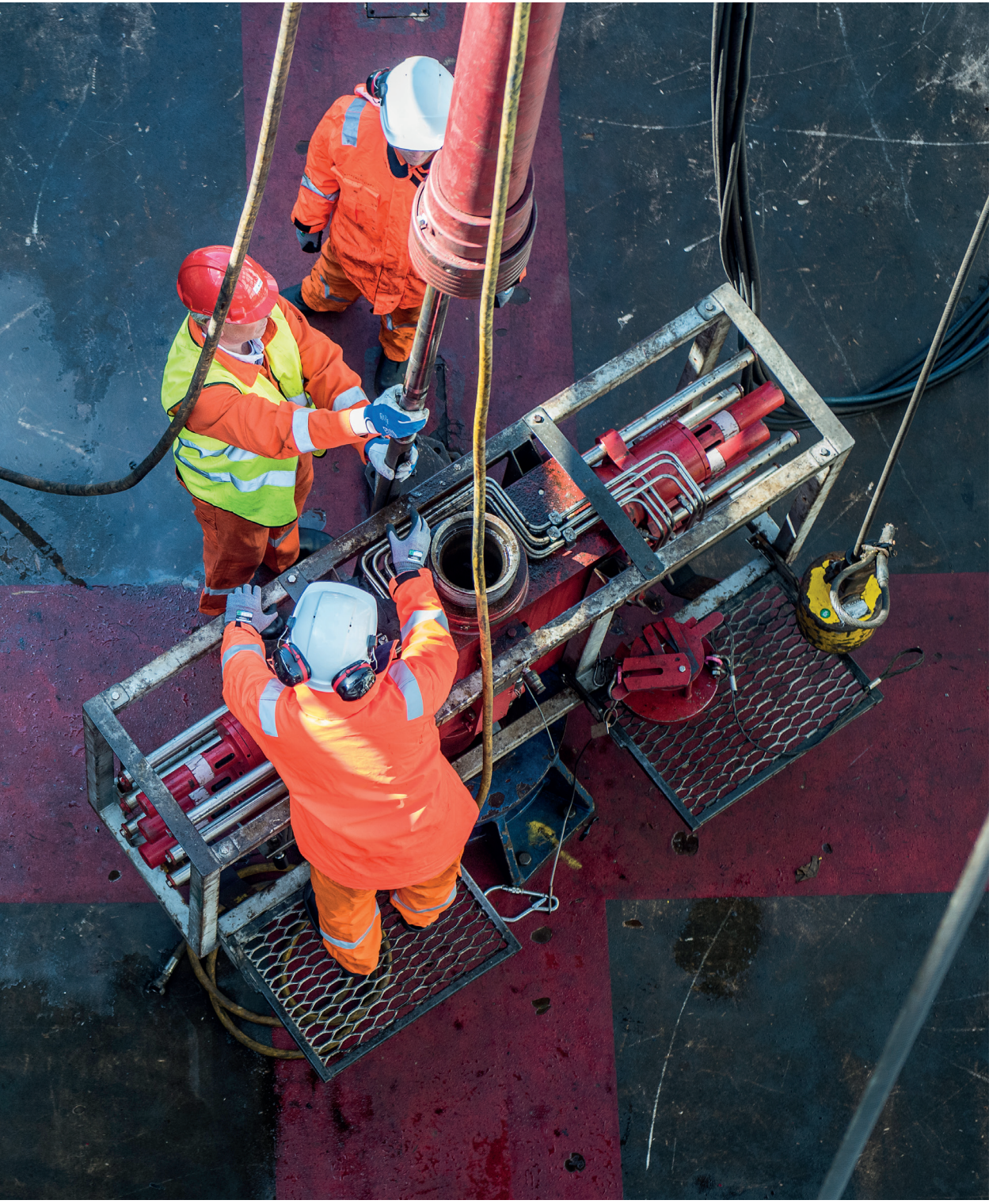
- **Serious personal injuries** showed a slight increase offshore from 2013, but last year's level was nevertheless among the lowest for a decade. The frequency halved at the land-based plants, and was the lowest since 2006.

** **Major accident indicator** The RNNP process analyses a number of underlying indicators which are relevant for measuring major accident risk. These are integrated in accordance with a complex formula where the various contributions are weighted.*

That yields an overall indicator for major accident risk. The method helps to ensure that measures aimed at the most serious incidents can be applied where they are most needed and will have the biggest impact.

"Safety demands a continuous commitment to maintaining and further developing its existing level. If we stand still, we'll go into reverse."

(Photo: Vegard Breie)



OIL ANALYST THINA SALTVEDT *warns the companies against overly short-term thinking. She sees dangers related to safety work, social responsibility and recruitment to the industry. (Photo: Berit Roald/NTB Scanpix)*

BY MORTEN GJERSTAD

BECOMING **ROBUST** IS ESSENTIAL

The current downturn in the international petroleum market will differ from its predecessors, and a solid, efficient, safe and competitive Norwegian oil sector is the only way to counter it.

That view is expressed by oil analyst Thina Saltvedt at Nordic investment bank Nordea Markets, who spends her days measuring risk and uncertainty.

Unforeseen events can hit the petroleum sector in a number of ways, and the industry is used to dealing with cyclical developments created by supply and demand changes.

This is a fairly familiar risk, but few people nevertheless thought in 2008 that dawning US shale production would reach such big volumes and thereby have such a strong impact on prices.

The latter fell by up to 60 per cent in the space of a few months during late 2014 and into 2015, creating panic in the

market. The result has been cost cuts and mass redundancies, particularly in the supplies segment.

Saltvedt notes that today's crisis stands out because the change has primarily been driven by the supply side rather than demand, as was the case in 2009 after the financial crisis.

"Oil prices are unlikely to bounce back any time soon," she says. "Shale production in the USA is resistant because many fields are ready to come on stream as soon as prices reach a certain point.

"That's unlike the position on the NCS, with its much longer investment time frame. Output from a US shale discovery reaches the market quickly."

REINFORCED. She argues that the long-term approach required to operate on the NCS has helped to strengthen the downturn in Norway.

"The willingness to invest has fallen as a result of the uncertainty associated with the upheaval on the supply side.

"High costs, which have risen in line with oil prices since 2002, combined with declining investment will force through an important restructuring.

"The only answer is a robust industry which can compete even with low-cost producing countries such as Iraq, Iran and Venezuela."

She emphasises that maintaining cost reductions and efficiency improvements will be important even if oil prices were to rise again.

DANGERS. Although change cannot be avoided, she warns the companies against overly short-term thinking – and sees dangers related to safety work, social responsibility and recruitment to the industry.

"The companies must appreciate that they have a corporate social responsibility. A major accident like Macondo in the Gulf of Mexico affects large sections of society and the environment.

"It should be fully possible for the industry to think in terms of safety while also enhancing efficiency.

"We're in a vicious circle at the moment, characterised by high pay and lack of exper-

tise in boom times. Competent staff are then shed as soon as prices fall. The result is instability."

Saltvedt notes that young people are turning their backs on oil-related subjects at school. "Those who're coming up for retirement now have nobody to hand over to.

"That could lead to a change of generations which has a negative impact for both production and safety work on the NCS."

UNCERTAIN. The Barents Sea was identified before the price slump as the next big development province off Norway, but the commerciality of several discoveries in these waters is now very uncertain.

"More demanding natural conditions there make bigger demands on field size and technology," Saltvedt observes. "Profitable projects depend on an expansion of infrastructure in the region.

"Nevertheless, we're now seeing signs of declining costs in the Barents Sea because the companies and the supplies industry are collaborating on efficiency enhancements and standardisation."

GREEN. Saltvedt also sees long-term uncertainties in the oil market. She believes that the green transformation will occur quickly, and that people are not fully aware of coming technological changes.

High oil prices have made it profitable to invest in alternative energy, and she says the transformation in the transport sector will have the biggest impact on the market.

"A key reason why prices rose so much over such a long period is precisely that competitive alternatives have not been available in this area.

"We now see that the development of battery technology for electric cars, in particular, has been faster than expected. We're six years ahead of forecast progress, and this will only speed up even further.

"The oil companies must appreciate that they're going to face competition in the energy market at an earlier stage than had been priced in by the market before the downturn began. It'll be very interesting to see which of them can manage the transition."

THE PSA INVITES YOU TO THE

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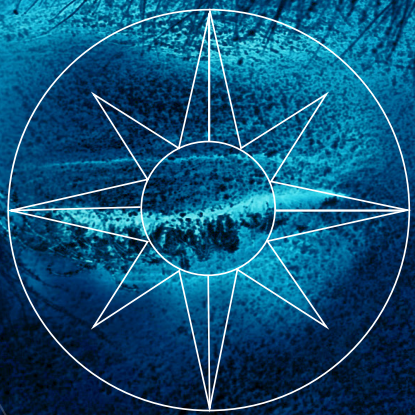

Don't miss one of this year's most important events about the Arctic. As part of the PSA's commitment to the Barents Sea, it is staging a three-day programme which aims to view opportunities for the region in relation to its safety aspects. An overall view, status, requirements, experience and challenges in the Arctic are key concerns.

28 OCTOBER
TOP EXECUTIVE CONFERENCE
FOR SPECIALLY INVITED PARTICIPANTS

The Arctic Safety Summit 2015 will begin with a programme for 140 guests representing the most important decision-makers and policy shapers for safe and forward-looking operations in the far north. Speakers will include **Robert Eriksson**, Norway's minister of labour and social affairs, **Karl Eirik Schjøtt-Pedersen**, director general of the Norwegian Oil and Gas Association, **Tim Dodson**, executive vice president for exploration at Statoil, **Anne Myhrvold**, PSA director general, **Bente Nyland**, director general of the Norwegian Petroleum Directorate, **Ruggero Gheller**, chief executive of Eni Norge, **Kristin Færøvik**, chief executive of Lundin, **Bernhard Krainer**, chief executive of OMV Norge, **Sturla Henriksen**, CEO of the Norwegian Shipowners Association, **Arvid Hallén**, director general of the Research Council of Norway, **Helge Tangen**, regional director at the Norwegian Meteorological Institute, **Morten Hald**, dean, University of Tromsø/Arctic University of Norway, and **Henrik S Fjeldsbø**, HSE manager, Industry Energy.

29-30 OCTOBER
TECHNICAL AND SCIENTIFIC CONFERENCE

organised jointly by the PSA and the University of Tromsø/Arctic University of Norway. An exciting programme has been put together to illustrate a number of aspects of and challenges for the petroleum industry in the far north of the NCS. Status reports will also be provided on the most important safety-related projects currently under way.

Among a number of speakers will be **Mark Fesmire**, Alaska region director, Bureau of Safety and Environmental Enforcement (BSSE), USA, **Mike Tipton**, professor, University of Portsmouth, UK, **Torkjel Tveita**, professor, UiT–Arctic University of Norway, **Anne Myhrvold**, PSA director general and **Aud Nistov**, manager HSE, Norwegian Oil and Gas Association.

For registration and more information about the programme, go to

psa.no/summit

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