

# DIALOGUE

A JOURNAL FROM THE PETROLEUM SAFETY AUTHORITY NORWAY

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**FIRMER AND CLEARER**





## ABOUT TRUST AND ICT

Trust is an important value in Norwegian society – and part of the foundation for the country's safety regime in the petroleum industry.

The companies are responsible for taking care of HSE. We *must* be able to trust that they accept this responsibility, and that they do what they can to comply with the regulations and operate safely. That is the way the regime is structured.

Norway's Auditor General has recently taken a closer look at the PSA's supervisory practice, and concluded that we have been too trusting of the companies in certain cases.

It also found that the companies, for their part, have not shown the degree of responsibility required. In its report, the Auditor General emphasises the importance of a firmer and more vigorous supervision.

This issue of *Dialogue* explains how we are following up these criticisms. You can read about a firmer and clearer PSA, and find that a lot of what we are now saying and doing is closely related to the HSE White Paper approved last summer.

A closer look is also taken in these pages at ICT security, an issue now attracting much greater attention. What challenges do we see, and what does our commitment in this area involve? Read on to find out.

Enjoy!  
Øyvind Midttun  
Editor

Front cover photo: Marie von Krogh.

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### ABBREVIATIONS USED IN THIS ISSUE

HSE: Health, safety and the environment

ICT: Information and communication technology

NCS: Norwegian continental shelf

PSA: Petroleum Safety Authority Norway

RNNP: Trends in risk level in the petroleum activity

# Stronger spotlight on ICT security

New technological solutions, data sharing and interconnecting systems are meant to benefit the oil industry – but also help to increase vulnerability. The PSA is responding to this challenge by learning more and extending its supervisory activities.



ICT covers computers, software, systems and networks, and is essential for safe and efficient operations both offshore and on land.

“Industrial ICT systems manage processes, monitor possible gas emissions or fires, and handle safe shutdown of facilities and platforms,” observes Espen Seljemo at the PSA.

“That means they represent safety-critical equipment and solutions, which need good and robust protection – including against ICT security incidents.”

The PSA has been following up the industry’s work on ICT systems for many years. Attention has been directed at the industrial solutions and company efforts to safeguard these.

“ICT security is a matter of protecting software and critical systems against both intentional and unintentional harm,” says Seljemo, who heads many of the PSA’s projects in this area.

**Priority** While current advances offer many opportunities and benefits, security must take priority. Understanding the consequences of introducing new solutions for the risk picture is important.

Different systems and programmes which were previously isolated have been integrated – not only locally, but also between industrial ICT solutions offshore and office systems on land.

Sharing data from these systems with equipment manufacturers and suppliers as well as other partners is a growing trend. Work that previously had to be done on a facility can now be conducted from land.

But increasing digitalisation makes the petroleum sector more exposed to advanced digital threats and vulnerabilities. Solutions which improve efficiency, competitiveness and safety can also reduce safeguards and create new angles of attack.

Systems, processes and equipment can be taken over remotely, for example. Both human error and system faults may disrupt operational regularity and cause financial loss.

With society seeing a growing number of cyber-attacks, players must stay constantly aware of the need to upgrade their ICT security in order to deal with undesirable incidents.

**Nothing new** “It’s important to emphasise that ICT security is nothing new, either for us or for the rest of the industry,” says Seljemo. “The industry drew up guidelines on this issue as early as 2006.

“And we conducted our first audit with this as a specific subject already the following year. ICT security has since been followed up in a number of our audits.”

The issue has also been incorporated by the PSA

in its tripartite collaboration with the companies and unions in the petroleum sector, he explains.

“Developments are happening fast and the pace of change is rapid. ICT security is one of the areas affected by increased digitalisation.

“New solutions and technologies are being speedily adopted, while the risk picture constantly changes. We’re more vulnerable than before, so we must take precautions to safeguard HSE and stay updated.”

**Strengthened** The PSA’s work on ICT security has now been greatly strengthened, Seljemo reports. “This subject will receive great attention in coming years.”

The PSA is recruiting more specialists in the area, and has also received additional funds from the Ministry of Labour and Social Affairs.

Seljemo says that a number of activities directed at the industry’s follow-up in this area will be pursued in the 2018-21 period.

“An important part of this commitment involves learning more, so that we maintain an overall picture of ICT challenges and risks in the sector.

“We’ll look in depth at a number of important areas, and increase what we know about the technology developments now under way and how they affect the risk picture.”

The PSA will describe the changes and drivers which influence the threat and risk picture, and identify areas where more work may be needed to prevent planned and unplanned incidents.

“Our goal is to help the industry to maintain an acceptable level of safety, acquire adequate expertise and methods and establish robust and reliable processes here,” says Seljemo.

He emphasises that the knowledge acquired will be made available to and shared with the whole petroleum sector.

**Audits** The PSA will also continue to follow up the industry’s work on ICT security through its audits. Attention will be concentrated on areas thought to present the biggest risk, Seljemo explains.

“We’ve planned a number of audits in this area in 2019. These will address selected companies and how they implement and operate industrial ICT system offshore and on land.

“We’ll also check that procedures and routines are being followed up on the individual facility, as well as the robustness of these systems.”

# Specific targets needed

The PSA requires that the industry's commitment to digitalisation must help improve security. Clear and binding goals must also be set here when companies assess and adopt new solutions.

Innovative technology, concepts and modes of operation are being adopted at a rapid pace by companies in the petroleum sector. The aim is to secure more effective work processes, replace manual work, improve analyses and contribute to better decisions.

"Digitalisation concerns both technology and organisation," explains Linn Iren Vestly Bergh, who leads the PSA's follow-up of these advances by the industry.

"Examples include robotisation, artificial intelligence, machine learning, use of Big Data, real-time sharing and closer integration of systems.

"Digitalisation isn't only about changes to work processes in your own organisation, but also involves the implementation of new forms of collaboration and business models."

**Attention** Close attention is being paid by the PSA to the digitalisation wave in the industry, and to ensuring that these innovations contribute to improved safety, says Bergh.

"The companies have ambitious plans to increase the use of digital technology across the whole value chain, and digitalisation offers clear positive benefits."

"But these can only be reaped if we can rely on the technology being secure and the risk being manageable within the regulatory framework."

New solutions create more complex and integrated infrastructures and systems – and will mean changes to the way the petroleum industry works.

"Solid expertise combined with good understanding and thorough assessment of risk are essential here," Bergh notes, and says that digi-

talisation is not only about money, rationalisation and making operations more efficient.

The companies are duty-bound to ensure that work in this area also yields a safety gain both for the working environment and for major accident risk, she says.

"They must ensure continuous development of and improvement to safety in all phases of their operations, and we expect them to set specific and binding goals for how new technology and solutions will help to increase safety.

"General formulations aren't enough. Safety isn't a benefit, a side effect or something thrown in for good measure. It's an outcome you achieve through purposeful commitment."

**Development** The PSA is paying special attention in 2019 to activities related to the development and implementation of digital technology and changes to work processes and forms of collaboration.

Audits are planned on the adoption and conduct of automated drilling operations, portable technology and the use of digital solutions in maintenance.

"We'll be looking particularly at the interface between decision support tools and human and organisational conditions," says Bergh.

"We will also follow up company plans for ensuring prudent change processes, and the way workers are involved and looked after.

"Digitalisation increases requirements for data quality, base data, information-sharing across organisations, new collaboration models, education and training, and mutual adaptation of work processes and technology."



# Honestly speaking

The report from the Office of the Auditor General on the PSA's follow-up of HSE contained a hefty dose of criticism. Director general Anne Myhrvold responds to key issues raised in its wake.

## **Which points in the report do you consider the most serious?**

It's tough to read that the Auditor General, in the cases it has looked at, feels our supervisory practice has a limited impact on safety work by the companies.

From individual episodes it's looked at, it also concludes that our supervisory methodology doesn't help to uncover serious safety challenges.

We've spent time seeking to understand the grounds for these assertions.

We'll be working purposefully to demonstrate that this picture isn't representative for us as a government agency. It's now up to us to change this perception.

At the same time, it's important that we make it even clearer what independent responsibility the companies have for safety work, and what our supervisory responsibility comprises.

## **Do you find the criticism to be unjustified?**

It's valuable to be audited. That goes for us as well. And it's instructive. We see that the Auditor General has selected some cases which aren't necessarily representative either of the industry or of our work, but which nevertheless form part of the overall picture.

So I think it's important that we carefully assess the views in the report and work to correct things which aren't working well enough.

We won't waste energy arguing over the Auditor General's choice of cases, or the conclusions it has drawn. We'll be looking ahead.

## **How does this report affect the PSA's room for manoeuvre?**

In many ways, it helps to strengthen this. We can, for instance, be even more conscious of the way we use the powers delegated to us by the ministry.



## Auditor General's conclusions

- In the cases investigated, the PSA's supervisory practice has had limited effect on follow-up of HSE by the companies.
- Individual episodes show that the PSA's supervisory methodology fails to help uncover serious safety challenges.
- The companies do not always close regulatory nonconformities after an audit, and the PSA is not always good enough at checking that this is done.
- The PSA is too slow to take firm enforcement action when necessary, and does not investigate well enough to determine whether the companies are obeying its orders.
- The PSA generally follows up incidents and whistleblowing reports well.
- The PSA gave consent for using the Goliat platform without this being acceptable in safety terms.
- The Ministry of Labour and Social Affairs does not secure relevant management information on the PSA's effectiveness, or check that the PSA is discharging its responsibility for ICT security well enough.

The report from the Office of the Auditor General was published on 15 January 2019.

Combined with the signals in the latest HSE White Paper, we see Norwegian society now has a clear expectation that we'll use our enforcement powers in a clearer way and enforce the regulations more firmly than before.

However, it's important for us to use the *right* enforcement powers. Dialogue can often get the companies to correct nonconformities more quickly than formal orders and reactions.

Our goal is that the petroleum industry operates prudently at all times. This represents the most important consideration for us as a regulator, rather than how many orders we've imposed.

### What specific changes have the criticism led to?

Many of the conclusions in the report coincide with the signals in last year's HSE White Paper. We've therefore worked for a good while on firming up and clarifying the way we work.

We're now demanding better documentation from the companies about how they're closing nonconformities, and we'll conduct our own verification where necessary.

We've also become more conscious about the use of our enforcement powers, such as orders, and are starting to see results from that.

Work is also being done to measure the effect of our supervision, including a user survey to secure further information about the way we can act more firmly here.

### How will the companies notice the changes?

They'll see a stronger PSA over time, and find we're setting stricter requirements, demanding better documentation and checking that nonconformities have been closed.

We'll emphasise clearly what responsibility rests with the companies themselves at all times. And we'll require the industry and the companies to take responsibility for continuous safety improvements.

### The unions were among those who demanded an administrative audit of the PSA. Why so, and how do you rate your relationship with them today?

When the slump hit the industry with full force, it

contributed to pressure on, discussions with and frustration among unions – particularly in their bipartite relations with the employers.

Part of this irritation was also directed at us. A number of employees were dissatisfied with the support they received from us on thorny issues, and the climate was difficult for a time.

The position is different today. I feel we largely have a very good dialogue with the organisations, and that the unions feel they are included and heard.

That doesn't mean we always agree, but we respect each other's views and positions. That's also how it should be.

### Has the PSA been naive and trusted too much in the companies' own safety efforts?

If the government doesn't trust the companies, we'll find ourselves in a very difficult position. So I wouldn't say it's naive to rely on the companies – we should and must do so.

The companies *have* the overall responsibility because they *own* the risk and manage all safety work in their activities. Our supervision only supplements their internal control.

This is a basic principle in the petroleum industry. That said, the companies must demonstrate that they're worthy of the trust placed in them – every day, and over time.

### Can we still base our safety regime on trust?

Norway's safety regime relies heavily on trust – and on responsibility. Unless we as the regulator can rely on the companies, the model will collapse. Many other areas of Norwegian society apply the same logic, too.

We have good reason to trust the companies in our industry. The big picture shows that they're responsible and competent, and comply with the regulatory requirements.

However, we've seen some exceptions recently, and that's a serious matter. I think particularly of the position with Goliat.

Ultimately, the whole industry can be hit by a

company failing to respect and understand the Norwegian model and the values it builds on.

These exceptions are so rare and special that I see no reason for general concern. But it's very important to learn from the cases which have challenged the regime so that the industry can make a collective effort to avoid such conditions in future.

### The Storting (parliament) backed the Norwegian model in the HSE White Paper. But has the time come to start a process for revising today's safety regime?

Our present system was created in the mid-1980s, drawing on incidents, developments and experience in the early years of the petroleum sector. It's been reinforced over the years, and has shown an ability to cope with many upheavals and major changes.

The model has been analysed and attacked a number of times, but has always survived. The Auditor General also supports the model, even if it criticises Equinor among others for failing to fulfil its responsibilities in all circumstances.

Taken together, I *don't* believe the time is ripe for a reassessment. The regime functions well, providing all the parties and players understand, use and respect it. But it must be continuously maintained and developed to function as intended.



Anne Myhrvold, director general of the PSA.  
(Photo: Marie von Krogh)

BY INGER ANDA PHOTO NTB SCANPIX

# Ready to learn

Equinor was also criticised fairly sharply by the Auditor General, and CEO Eldar Sætre makes it clear that he takes these comments very seriously. He has launched a far-reaching internal drive to assess what must be done in response.



# equinor



Eldar Sætre, CEO of Equinor.



The criticism of Norway's biggest operator company concentrated primarily on two aspects – an alleged inability to learn from near misses and a failure to take adequate steps to correct regulatory breaches identified by the PSA.

Eldar Sætre has given the following responses to some of the key issues raised by the Auditor General's report.

#### **How do you assess the criticism from the Auditor General?**

I take the criticism levelled at us seriously. The report says we sometimes haven't been good enough at learning from incidents, and that corresponds with findings from our own investigations.

It also says we haven't always closed gaps or followed up adequately. My basis here is that we'll be good at reporting and following up identified conditions. Nonconformities must be closed – and we need to get even better at that.

#### **How serious is this for Equinor?**

We depend on close follow-up by the regulatory authorities in our work on safety, and we take the feedback we receive very seriously. It's used systematically for learning and improvement.

I welcome good and constructive evaluation of our HSE-related efforts, because safety is and will remain the most important basis for our business.

The goal is to reduce risk as far as possible, learn from errors and improve safety. We see our results are steadily improving, but think we can always learn more and get even better.

#### **How are you working on the issues identified by the Auditor General?**

We're conducting a large-scale survey to check our follow-up of audits going back a number of years, and to see whether possible gaps exist or actions remain to follow up.

We are also working a lot on HSE learning packages directed at operations on the NCS to ensure that lessons from actual investigated incidents are learnt.

I want to ensure that we involve the organisation in this way – with work teams and platform managements working on specific cases and issues to ensure we learn from them.

We're never fully qualified, and I'm convinced we can become even better by working continuously and systematically with learning.

#### **Will the Auditor General's report lead to any changes in the way Equinor operates?**

We'll use its findings to ensure that more lessons are learnt. We will comply with existing management systems and allow good safety routines to saturate everything we do.

A key consideration for us is that we manage to work efficiently while reducing risk to a minimum, closing measures and documenting this satisfactorily.

We'll work every day to improve our present safety results even further. Although it's no excuse for inaction, we have reduced the incident trend both in the industry and in-house.

Our safety results have never been better than they are today. So my attitude is that we must be in a learning mode when safety work on the NCS is reviewed.

#### **The safety regime on the NCS is based on trust between the parties. Is that good enough for meeting today's and tomorrow's challenges, or should we reassess the model?**

As a responsible operator of oil and gas installations in Norway, we run our facilities safely and securely in line with official requirements. In our

view, this is best done in close collaboration with the government and the rest of the industry.

We support the working group report and White Paper which found that the HSE regime for Norway's petroleum sector functioned well on the whole and should be maintained.

However, making good use of the room for manoeuvre in the regime depends on the parties having mutual trust and respect for each other's roles and responsibilities.

Collaboration between companies, unions and government is an important cornerstone in that context, which can be further strengthened and developed. The annual RNNP surveys carried out through this tripartite cooperation are a case in point.

A key consideration for us is that we collaborate well with the players and that we conform with the requirements set for our operations.

“ The goal is to reduce risk as far as possible, learn from errors and improve safety. ”

Eldar Sætre, CEO of Equinor



BY INGER ANDA PHOTO NTB SCANPIX

# Tightening up from the top

Clear expectations for the PSA have been expressed by Anniken Hauglie, minister for labour and social affairs. She wants further development of the supervision strategy and more concise reactions towards the companies.

*Anniken Hauglie is minister of labour and social affairs, the PSA's parent ministry.*

As the responsible minister, Anniken Hauglie was the formal recipient of the report from the Office of the Auditor General on 15 January 2019 concerning the PSA's follow-up of HSE in the petroleum sector.

She agrees with the report's emphasis on the importance of a firmer and more vigorous supervision: "The PSA must be a clear authority which constantly adapts to oil industry trends.

"Among other things, that means systematically applying the instruments and enforcement powers available to it – when necessary."

Hauglie stresses that the PSA must be able to reflect developments in the very advanced oil and gas industry, a sector characterised by change and constant new solutions.

"Petroleum is a resource-intensive and high-tech sector in rapid change," she notes. "New concepts and modes of operation are regularly adopted and the player picture is continuously altering.

"The industry embraces a wide range of different activities, both on land and offshore. Many players are involved, with varying roles and expertise. And the companies have a big responsibility.

"This complex picture means that the PSA's follow-up of petroleum operations must primarily be pursued at an overall system level."

**Extensive** Hauglie notes that the PSA's follow-up of the industry is wide-ranging: "Its activities involve far more than verifications and audits, which are probably the most visible part.

"They also cover consideration of applications and consents, various types of meetings with the companies, compiling incident data and analysing risk, investigating incidents and dealing with individual cases in all phases of the industry.

"In addition, the PSA pursues a number of activities directed at challenges characterising the whole or large parts of the business – known as the sector duties.

"All in all, the PSA makes a broad commitment which is important for safety work in the industry."

**Clear** She emphasises the importance of clear supervision with the necessary authority: "The PSA's supervisory strategy is based on dialogue and trust.

"This approach promotes learning and emphasises the industry's responsibility, but can also be perceived as more guidance and advice than government regulation."

In her view, the choice of instruments must be based on what yields the best effect. She emphasises that the PSA itself, on the basis of its expertise, must assess reactions in each case.

Hauglie says that developments could mean that the PSA needs to be clearer in the use of its enforcement powers. "My clear expectation is that it acts more forcefully when necessary."

She notes that this view also found clear expression in Report no 12 to the Storting (2017-2018) on HSE in the petroleum sector, which was considered by the Storting (parliament) last June.

In other words, the ministry, the Storting and now the Office of the Auditor General have all called for the PSA to respond more firmly.

**Support** "Today's HSE regime in the petroleum sector has broad support," Hauglie says. "Great agreement prevails that this model has been

important for the positive safety trend of recent years and the high level of safety in the industry."

At the beginning of the 1980s, the system was characterised by detailed regulation, inspection-oriented supervision and companies which rested on these government checks and partly disclaimed responsibility for safety.

This approach was replaced in 1985 with the present regime, where the aim is clear allocation of responsibility and stronger collaboration between companies, unions and government.

"It's important to emphasise that today's regime has proved to function well, and that all sides now agree this is the case," says Hauglie.

"But the PSA must continue to work on the challenges which have been outlined, so that it can fulfil its role in a firm and clear manner."

“The PSA must be a clear authority which constantly adapts to oil industry trends.”

Anniken Hauglie, minister of labour and social affairs

BY ØYVIND MIDTTUN PHOTO MARIE VON KROGH

# Balancing trust and authority

The relationship between freedom and control as well as the intelligent use of authority are key issues for professor Ole Andreas Engen. He is one of Norway's leading experts on the Norwegian safety regime. →



“ If a company breaks the rules of the game and shows it’s not worthy of trust, the regulator must take action. It may take no more than one incident before trust is undermined. ”

Ole Andreas Engen, University of Stavanger

Trust between government, companies and unions is crucial for today’s system, says Ole Andreas Engen, who belongs to the department of safety, economics and planning at the University of Stavanger.

“The government sets the parameters and shows trust in the companies, and that gives them the room to choose for themselves how to conduct their activities.

“For this system to work, the companies must intend to comply as far as possible with the regulations. We’re entirely dependent on people playing by the rules.”

Trust rests on expectations, he points out – that those you collaborate with will behave as expected. It is easy to demolish but hard to rebuild.

“Striking a good balance between trust and distrust – between freedom and control – is also important. The government must ensure that it exerts its authority in an appropriate way.”

**Studies** This trust-based system has been assessed several times in recent years, and Engen himself chaired two of the key studies which

identified strengths and weaknesses with the model.

He led a government-appointed committee of experts in 2013 which conducted a broad review of HSE regulation in the petroleum sector.

And he chaired a tripartite working group in 2017 to assess and discuss HSE conditions in the same industry, which formed the bases for the White Paper approved last year.

Both these bodies proposed improvements within the regime, but their main conclusion was that the existing system is robust and well-functioning and should be retained.

“We occasionally hear criticism of the trust-based safety model, but the critics seldom propose an alternative or address the consequences of abandoning today’s approach,” Engen observes.

**Comparisons** He points to comparisons with other countries, which reveal big differences in the way regulations are formulated, the regulator’s role and the relationship between the various sides.

“The US model, for example, is not trust-based,

and provides a clear contrast with ours. There, the regulator fines companies, conducts unannounced inspections on platforms and takes court action over legal breaches.

“Prescriptive – in other words, detailed – legal requirements form the basis for the regime, with less emphasis on performance-based regulation.”

Engen points out that prescriptive requirements make it easier to present concrete evidence in court, but says the question is whether this regime functions better and provides greater safety.

“First, it takes much greater government resources to enforce the regulations when you’ve literally got to check each valve on every platform.

“Second, responsibility for safety moves from the companies to the government. If anything goes wrong, the blame lies with the latter – because it’s checked and approved the equipment.

“And when they have no responsibility, the companies lack the same incentives for devoting their full attention to safety they get here in Norway.”

**Challenged** Engen regards the Goliat oil development in the Barents Sea as an example of a project

where trust between company and regulator came under challenge.

“In this case, operator Eni apparently applied pressure and overstepped the boundaries set by the government. Trust was undoubtedly stretched a little too far.”

A number of commentators have suggested that the PSA could have underestimated the importance of intervening early and clearly enough in important phases of the Goliat project.

“If a company breaks the rules of the game and shows it’s not worthy of trust, the regulator must take action,” says Engen. “It may take no more than one incident before trust is undermined.

“The question is when and how firmly you should intervene. And that’s a difficult decision. You can act often, be tougher and use stronger reactions. But what would that mean in the long run?

“It’s not automatically the case that the companies will thereby get better at thinking safety. Punishing somebody doesn’t necessarily mean they’ll then do what you want.”

He points out that the companies could instead





## Rooting for the regime

begin to *reckon* with orders, and thereby stretch the limits as far as before. In that case, more use of reactions would have little effect.

“I believe the PSA could have been a bit firmer. It’s necessary to show the companies some muscle, make it clear that enforcement powers exist and will be used if necessary.

“That’s basically what we said in our expert report in 2013 and in the tripartite working group in 2017.”

**Collaboration** In his view, tripartite collaboration between companies, unions and government is very important for building trust. He points to such permanent meeting places as the Safety and Regulatory Fora.

“Working together in this way is perhaps the most distinctively Norwegian part of our safety regime. You don’t find it done in the same way elsewhere.

“This ensures communication and openness, and thereby helps to build confidence. At the same time, it’s very important that the discussions occur within these fora rather than outside them.

“All the companies have a responsibility to contribute to this. Shifting the debate out of the tripartite arenas would weaken the overall level of trust.”

**Responsibility** “Our safety regime assumes that operating safely is in the companies’ own interest, and that they accept their social responsibility,” Engen explains.

“Anything else would be hopeless. That’s the fundamental logic of a trust-based system. The companies also know that good safety makes sense in financial and quality terms.”

In Norway, he notes, the companies have the sole responsibility for operating prudently and for the safety of their operations and technology.

“The government is responsible for doing system audits, checking that the companies comply with the regulations and that they close nonconformities which have been identified.

“If the authorities are to be responsible for checking activities by the companies, we’ll no longer have a trust-based system but a control regime.”

Norway’s trust-based system of supervision has been subject to several detailed assessments in recent years. The various reviews have revealed broad support for the model among experts, politicians, the government, the companies and the unions.

**The following major analyses have been conducted.**

- 2013:** A committee of experts appointed by the Ministry of Labour carried out a broad review of HSE regulation in the petroleum sector. It concluded that the regime functioned well and should be maintained.
- 2017:** A broad-based working group drawn from companies, unions and government assessed and discussed HSE conditions in the petroleum sector. In a report which formed the basis for the 2018 White Paper on HSE, it concluded that the regime was on the whole well-functioning and should continue.
- 2018:** Report no 12 to the Storting (2017-2018) on HSE in the petroleum industry was approved by the Storting (parliament). It concluded that the present regime is robust, functions well and should be retained.
- 2019:** The Office of the Auditor General presented an investigation of the PSA’s supervisory practice in January. While recommending no changes in the actual safety regime, it maintained that the PSA’s supervision has had a limited effect on safety work by the companies in specific cases.

# Unions react to audit

The Auditor General's report on the PSA's follow-up of HSE attracted much comment when it was published in January. Some reactions from union websites are presented below.



**AUDUN INGVARSEN, president, Norwegian Organisation of Managers and Executives**

The Auditor General's criticism primarily involves the far too frequent failure of the PSA to make sufficiently firm use of its enforcement powers when necessary. It is also accused of relying too much on the oil companies to comply with its orders.

Trusting the companies is fine, but there is every reason to sound the alarm when important improvements repeatedly fail to be made.



**LISE LYNGSNES RANDEBERG, president, Norwegian Society of Graduate Technical and Scientific Professionals**

It's good that the PSA is taking seriously the critical comments from the Auditor General concerning supervisory practice in the NCS, and we look forward to greater clarity and responsibility in this context.

We have participated in the Auditor General's work, and have called attention to the unclear division of supervisory responsibility between government agencies over ICT safety. Collaboration between employers and employees has been another important issue.

**JORUNN BIRKELAND, deputy chair, petroleum committee, Norwegian Society of Engineers and Technologists, and member of the Safety Forum**

What emerges is entirely in line with the points we have also made. The report shows that the PSA has committed serious errors, and its supervisory role has also undoubtedly weakened over time.

When a critical report of this kind emerges, we must remind ourselves that a lot of positive things can also be said about the PSA's organisation.

We have a technically competent and hands-on regulator which collaborates closely with unions, safety delegates and employers in the industry, in part through the Safety Forum.



**HILDE-MARIT RYSST, president, Norwegian Union of Energy Workers**

The PSA experienced in practice what many people have been telling it – that the companies are happy to speak fine words to the regulator which are by no means always followed up in practice.

Giving Eni consent to come on stream although it didn't actually have the [Goliat] installation under control was very serious and should never have happened.

This shows that the PSA can never take it for granted that a company accepts the regulator's authority. Promises and follow-up points must be monitored in practice.

Now is when the job begins. The PSA has been given a work order, and we now expect director general Anne Myhrvold to follow it up. We are confident that she will.



**FRODE ALFHEIM, president, Norwegian Union of Industry and Energy Workers**

This criticism must be treated with the utmost seriousness. At the same time, we see today an obviously firmer and clearer regulator than when the actual audit was conducted.

After pressure from the PSA and [us], for example, big improvements have been made in the operation of Goliat and in employer-union collaboration in Eni/Vår Energy.

Following the Engen report and the White Paper on HSE in the petroleum sector, a proper grip has also been established on cooperation between government, companies and unions. And we see clearly improved collaboration and trust between these parties.



# Safety in steel and

Why were the Ekofisk platforms built with steel jackets, while Statfjord's facilities rest on concrete gravity base structures (GBSs)? When did subsea developments begin to dominate, and what role have safety regulations played in platform design on the NCS? Read on to find out.

Facilities of many different types, sizes and materials have been installed on the NCS over 50 years of Norwegian oil and gas production.

They have all been constructed to handle demanding drilling, production and processing jobs – and to ensure these activities cause no harm to people, the environment and material assets.

Their designs result from an interaction between industry responses to technological challenges and government requirements for managing risk and shaping offshore workplaces.

**Jackets** The technology for offshore facilities resting on steel jackets was first developed in the Gulf of Mexico after 1945. Since water depths at the southern end of Norway's North Sea sector were

# concrete

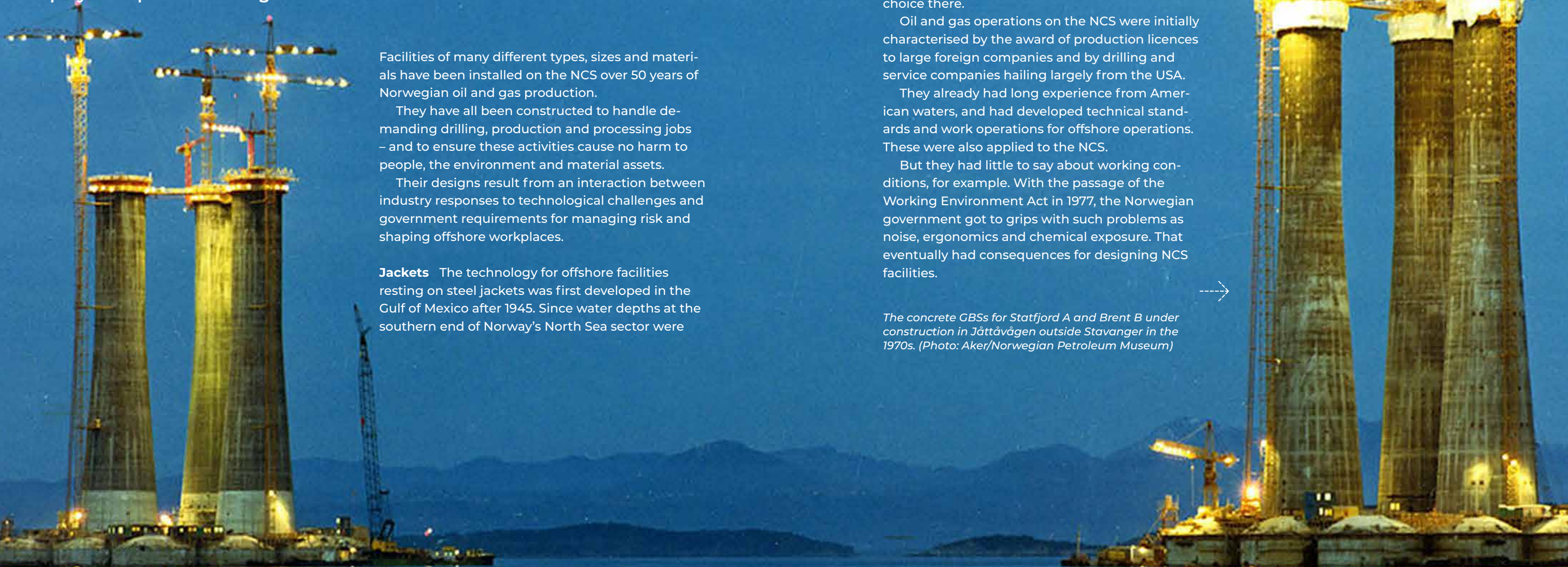
fairly similar, such structures were a natural choice there.

Oil and gas operations on the NCS were initially characterised by the award of production licences to large foreign companies and by drilling and service companies hailing largely from the USA.

They already had long experience from American waters, and had developed technical standards and work operations for offshore operations. These were also applied to the NCS.

But they had little to say about working conditions, for example. With the passage of the Working Environment Act in 1977, the Norwegian government got to grips with such problems as noise, ergonomics and chemical exposure. That eventually had consequences for designing NCS facilities.

*The concrete GBSs for Statfjord A and Brent B under construction in Jättavågen outside Stavanger in the 1970s. (Photo: Aker/Norwegian Petroleum Museum)*







*Brage in the North Sea is one of many Norwegian fields developed with a platform supported on a steel jacket. (Photo: Wintershall)*

The government and the scientists therefore had to accept that no necessary relationship existed between these two kinds of risk.

**Deeper** Several big discoveries were made during the 1970s in the northern North Sea, where water depths were greater than the roughly 70 metres found on Ekofisk.

These included Statfjord and Troll, in 150 and 300 metres respectively. Norway's Condeep platform technology was a response to the challenges presented by depth and storage requirements.

The concrete GBSs supporting these structures offered particular benefits of robustness in relation to weather, waves and currents.

Their drawback was high construction costs as well as the difficulty – in practice, virtual impossibility – of removing them after production ceased.

**First** Statfjord A was among the first concrete giants approved for the NCS in 1976.

After a series of modifications, the Norwegian Petroleum Directorate (NPD), which then embraced the PSA, found that the necessary safety standards were met. It came on stream in 1979.

When operator Mobil submitted plans to build Statfjord B as a copy of the A structure, however, the NPD put its foot down and sent the company what has often been called “Norway's most expensive letter”.

This required the living quarters to be placed on a separate structure. After many meetings and

**Rough** Norway's offshore industry was characterised for its first couple of decades by rough working conditions and much manual labour with heavy and dangerous equipment.

The American approach to personal safety was often to send people who made mistakes home on the first helicopter. That could also happen if they reported dangerous or unhealthy working conditions. The result was a relatively large number of injuries.

A widespread view within risk research at the time was that cutting the number of personal injuries would also reduce the risk of major accidents.

As the personal injuries declined, however, no corresponding decrease was observed in the number of incidents with a major accident potential.

long discussions, however, Mobil won acceptance for a single platform with a longer topsides.

That made it possible to separate the accommodation from those areas where fires and explosions – and a consequent major accident – might occur.

This concept later formed the basis for the Statfjord C facility and the three Condeep platforms installed on the Gullfaks field.

Adopting prudent solutions during planning was later extended to other types of risk. It became more usual, for example, to take account of employee experience when designing workplaces.

That improved the physical working environment and reduced the risk of personal injury. In turn, sickness absence declined and efficiency increased.

**Subsea** Technological advances led to a new shift from the 1980s, when big integrated concrete and steel facilities began to be replaced by subsea solutions tied back to existing installations.

As early as the initial phase of Norway's oil history, small discoveries had been made which were not considered commercial on their own.

But it became clear in the 1980s

that developing such marginal fields could be made profitable as well as acceptable in safety terms with the aid of seabed installations.

Specially built remotely operated vehicles (ROVs) capable of performing complex jobs on subsea Xmas trees and other equipment were also introduced at this time.

Ultimately, this made it possible under certain conditions for big fields – such as Ormen Lange in the Norwegian Sea – to produce entirely without surface installations.



*Installation work on Åsgard in the Norwegian Sea. Such subsea developments shot ahead in the 1990s. (Photo: Equinor/Øyvind Hagen)*

**Biggest** A lot of facilities are still being constructed for the NCS. The world's largest Spar platform was installed last year on Aasta Hansteen in the Norwegian Sea, for example.

Best described as resting on a big vertical steel cylinder, this installation is tailored for deep water and demanding offshore conditions.

At the same time, the Oseberg west flank 2 project marks a move in a different direction.

This development includes a completely unmanned wellhead platform.

Remotely operated from the Oseberg field centre, the H facility will only have people on board for one or two annual maintenance visits.

It thereby has no quarters, helideck or lifeboats – not even a toilet. Personnel will go on board from a vessel fitted with a walkway.



*Aasta Hansteen is one of the newest fields to come on stream off Norway. It has been developed with a Spar platform, seen here being transported from the yard in South Korea to Norway. (Photo: Boskalis/Equinor)*

# Safety depends on knowledge

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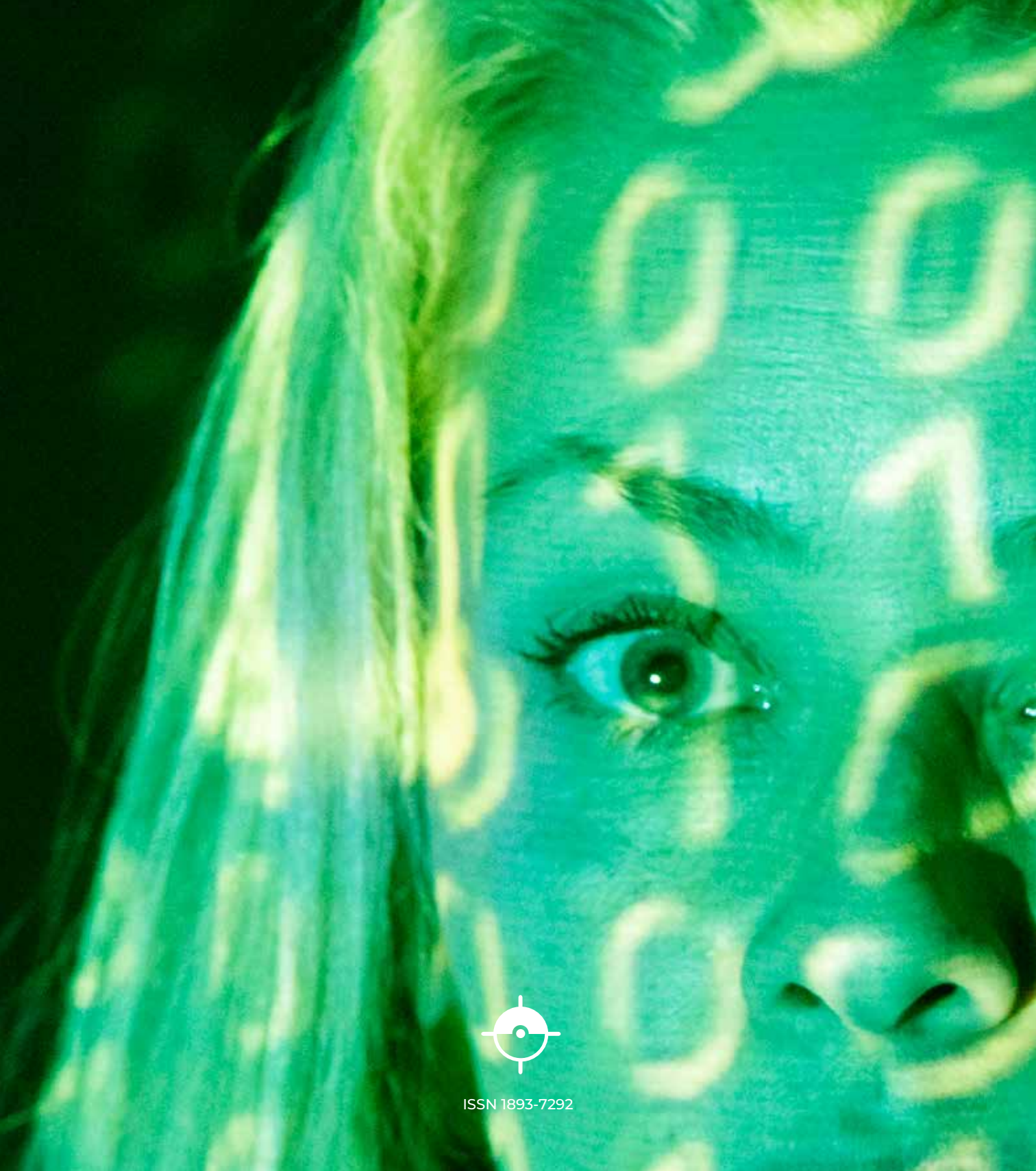
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