

Paper No. 3029

## Lessons Learned from a transport security exercise conducted off the coast of Sweden

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### Abstract

In May 2015, a full-scale exercise on security while transporting spent nuclear fuel was conducted off the coast of Sweden when Sweden's national nuclear transport system was put to test. Named "Pilot 2015", the exercise was part of a joint project with the IAEA to test and evaluate a new IAEA guide on planning, conducting and evaluating transport security exercises, but the field test also gave a perfect opportunity for the Swedish Radiation Safety Authority, SSM, the coast guard, the police counterterrorist unit and the Swedish Nuclear Fuel and Waste Management Company, SKB, to practice together in a realistic situation.

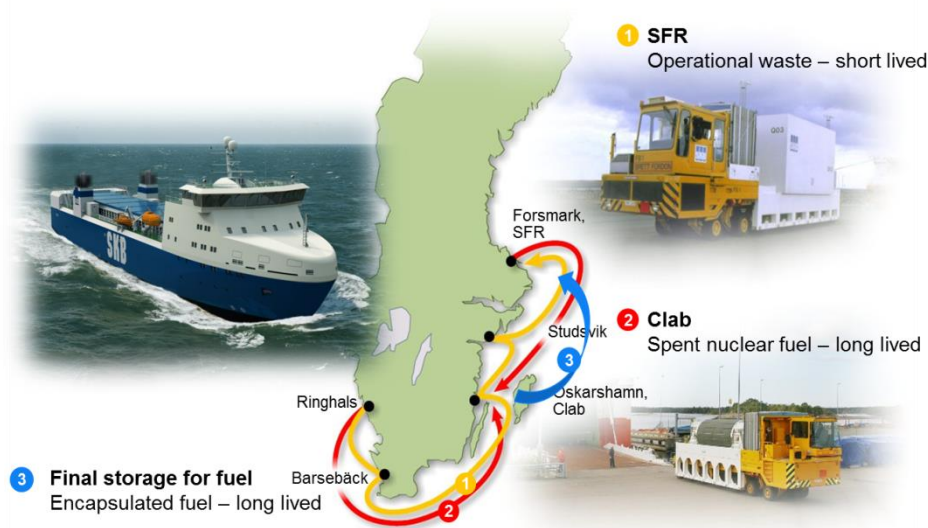
Sweden's nuclear transport security system is designed on the basis of national regulations and IAEA nuclear transport security guidelines and preparatory exercises. Training is an important part of a successful system and this full-scale exercise with both a tabletop exercise and a field exercise under realistic conditions has served as a most valuable source for further development of the security.

For SKB, "Pilot 2015", involving the company owned INF-3 vessel, purpose built for transporting nuclear fuel, and the company's emergency response centre, has provided a considerable amount of input to the company's work with continuous improvements. The "Pilot 2015" has contributed to both administrative and technical improvements of various kinds.

This paper outlines lessons learned from a ship owner and operators perspective.

## Introduction

The Swedish Nuclear Fuel and Waste Management Company, SKB, is owned by the nuclear power companies. They have a statutory duty to deal with the disposal of Swedish nuclear waste and to pay for these operations. SKB is responsible for taking care of the Swedish nuclear waste and for planning of this work funding. SKB has a fully implemented system for dealing with nuclear waste. Since the mid-1980s both the Final Repository for Short-Lived Radioactive Waste (SFR) and Central Interim Storage Facility for Spent Nuclear Fuel (Clab) have been in operation. Safe transport of radioactive waste from the nuclear power plants takes place using the SKB owned INF-3 vessel, M/S Sigrid.



**Figure 1 SKB Transport System**

Since the IAEA reviewed Sweden's nuclear transport security system in 2011, Sweden has been closely involved with the IAEA in the development of a transport security exercise guide and SKB has had a representative in a consultancy group working with the IAEA guide during 2013-2014.

In 2014, Sweden got a request from IAEA to conduct a full-scale exercise in order to test and evaluate the guide on planning, conducting and evaluating transport security exercises. The exercise, named "Pilot 2015" also gave a perfect opportunity for the Swedish Radiation Safety Authority (SSM), the coast guard, the police counterterrorist unit and SKB to practice together in a realistic situation.

Lessons learned from the exercise have been valuable to improve the vessel security on both a technical and administrative level but also the company's emergency organisation.

## **M/S Sigrid**

The SKB owned vessel M/S Sigrid is designed to carry radioactive material and irradiated nuclear fuel and is classified INF 3 according to the International Maritime Organisation regulations. The vessel was built in 2011-2013 by Damen Shipyard in Galati, Romania. SKB has a Ship Management Agreement with Furetank Rederi AB for the crew and technical operation of the vessel.

M/S Sigrid is a Ro/Ro and Lo/Lo vessel, designed to carry cargo that are driven on and off the ship as well as cargo which require a crane to load and unload. The radiological and physical protection abilities were important factors for the vessel design and the emergency preparedness of the management company was an important evaluation factor for the supplier selection.

## **SKB Emergency Response Centre**

SKB has emergency preparedness 24 hours a day, every day of the year by a duty officer at the head quarter. In the event of an accident or incident the duty officer will start staffing the company emergency response centre. The individuals designated to staff the SKB emergency response centre are trained and have the authority to carry out actions that are necessary to respond to the accident or incident. The emergency response centre is working according to a preparedness plan but must be creative to identify “what if” scenarios and be capable of thinking outside the box. Since one important function during an emergency is to support the authorities with information and knowledge a well working communication system is critical.

The SKB emergency response centre is regularly put to test by different kind of exercises, but a full scale, realistic security exercise together with the authorities, like the Pilot 2015 are rare.

## **Purpose and preparations**

The IAEA desire to conduct a full-scale exercise in order to test and evaluate the guide on planning, conducting and evaluating transport security exercises led to an invitation to Sweden to serve as the test subject. Sweden took the opportunity to control, evaluate and further improve the national preparedness on security against a malicious act while transporting spent nuclear fuel. The Swedish authorities SSM, the national police and the coast guard could with the exercise put the cooperation between the authorities to a test and Pilot 2015 gave SKB a perfect set-up to practice in a realistic situation together with the Swedish authorities.

### **Table top exercise**

As a part of the preparations a tabletop exercise was held in February 2015. At the tabletop, a one day discussion-based exercise, 19 different authorities and representatives from the industry participated with around 100 participants and observers. The first half of the day walked through six different scenarios and the participants should evaluate how and if affected stakeholders got the needed/required information to fulfil their responsibilities. In the afternoon the police played up a

notionally attack against the Swedish nuclear vessel M/S Sigrid and presented what kind of information they needed to successfully arrange and perform the countermeasures. The purpose of the tabletop exercise was to strengthen the Swedish national transport security system by identifying gaps in the flow of information between involved authorities and to find areas of improvement.

### Rehearsal

The purpose of conducting an exercise is to exercise specific tasks and scenarios. However, if you arrange a realistic scenario with actors given a mission to act realistic, the play might not take the turns the exercise leader has planned. A month before the field exercise, a rehearsal with the involved authorities was held. As a result the sequence of events was adjusted somewhat to assure that some critical moments would not get lost in the field exercise.

### **Field exercise**

The field exercise took place in May 2015. It was a full-scale scenario involving authorities and SKB. It started with M/S Sigrid departing the port of Forsmark imagined to carry two loaded spent fuel cask with the destination Clab, the Swedish central intermediate storage facility for spent fuel. It was kept a secret to the crew, the police counterterrorist unit and the observers when and how an attack should take place. Already in the beginning of the planning for the exercise, the national police dedicated a group to play the attacking armed group and held that group separated from the rest of the planning and rehearsal in order to get the scenario as realistic as possible. The armed group was set up to come in a small, fast boat and enter the vessel, with the goal to intrude the cargo hold and get access to the spent fuel packages. At the time when the grope managed to take control over the bridge, the crew had already triggered the alarm and the authorities as well as the SKB emergency organisation were set into action. All stakeholders followed their emergency procedures and prepared plans, designed around regulations and guidelines and continuous improvements from previous exercises. The national police planned the countermeasure with support from expertise from SSM, the coast guard and SKB, and the operation to regain control of the vessel was successful.



**Figure 2 Field exercise (photo: Swedish Police)**

## **Lessons learned**

Since almost all detailed information about a transport security system is confidential, it is a delicate task to share experience and identified needs of improvement. The lessons learned given in this section will therefore only be briefly described.

Training is the base for knowledge and exercise is necessary for the performance. SKB has a trained emergency response centre and conducts exercises on a regular basis. In a company based exercise, interactions with other stakeholders in an event are simulated. In Pilot 2015 all the sequences of the routines and instructions with authority interactions could be tested. The discussion-based exercise also provided the opportunity to study the paths of communication, if the information given was sufficient for the other party and if someone in the need of information was left out in the information chain. Another critical issue that was put to a test was the roles and responsibility. Being the expert and having the responsibility for a technical area does not necessary imply that the same organisation is in charge of the strategic decision in a field operation and it is valuable for all involves parties to get a clear picture of how this works in reality.

### **Insights gained**

- SKB can, within its own organisation, even further position the importance of awareness of deviations from normalities and to forward this kind of information to the security office. Since the SKB security office are in close contact with the national police regarding the security level and threats against the nuclear industry, they are most probably in the best position to put the puzzle and early on alert the authorities of abnormalities.
- A lot of information about the vessel and the SKB organisation is to be found in public media both in SKB published material but also from other sources. The bits and pieces of information are maybe harmless in its own context, but Pilot 2015 identified the risk for an antagonist to gain a larger knowledge than desirable, gathering all this pieces of information.
- Cooperation between stakeholders is the key to success
- If an armed group manage to board the vessel, keeping the vessel crew out of the equation is the major key for delaying the sequence of events
- Endurance: If there is a real-life situation that goes on for several days , there is a substantial risk that SKB will run out of trained and exercised staff in all functions for the emergency response centre



**Figure 3 SKB Emergency Response Centre during Pilot 2015 (photo: SKB)**

### What was successful?

- It was very valuable for SKB to exercise with other stakeholders and the authorities.
- The set-up with different kind of exercises such as discussion-based, rehearsal and field exercise
- The SKB emergency response centre managed to follow their methodology in a successful way and solved their task. The work was well structured and, with enough secretary resource, they managed to keep the documentation all the time up to date.
- The Pilot 2015-participants who had also taken part in the rehearsal felt that they could use a lot of the experience made.
- In advance prepared answers to likely questions within the different areas of expertise were valuable
- It was useful for the SKB emergency response centre to have experts sent to the national police head quarter

### Areas of improvement

- Responsibility is not obvious/given/evident/clear
- The information flow and information sharing must be regulated by instructions otherwise it gets stuck.
- Media was not a part of Pilot 2015. SKB has the experience that when an incident happens, the attention from media is almost instant and the pressure massive. It is important to also allow the involved parties media organisations to exercise together since they will also face the situation with roles and responsibilities and information share. For Pilot 2015 SKB exercised its media organisation together with the SKB emergency response centre but with simulated events and they held a simulated press conference for the IAEA guests.
- The in advance prepared answers to likely questions could be improved if developed in collaboration between SKB and SSM.
- Improvement opportunities in the SKB alarm chain identified

## **Conclusions**

Train an organisation and challenge it with exercises. Vary the exercises to make sure all aspects of the system are put to a test. Make sure to evaluate and discuss the lessons learned with all participants after each exercise and update routines, instructions and templates accordingly. Train and exercise again, to keep the loop of continuous improvements going. Make sure to include the media aspect ever now and then. A working system and carefully planned operation will slow down or, in worst case, collapse when the media pressure is not taken care of.

It is important for both the transporter and the operator's emergency organisation to exercise in a larger scale with several stakeholders, including the authorities, at a frequency of about every 5th year. The years in between preferably consist of a varied kind of exercises, combined with training if necessary, focusing on parts of the emergency organisation. The SKB experience of table top exercises with the possibility to discuss sequences of events and the outcome of different decisions is very positive.