

Development of the regulatory guidance documents within the Lapse Regulatory Project

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Summary

This report describes the output and discussion from the workshop held 26 – 27 April 2000 within the scope of the Lepse Regulatory Project. The main objectives were:

to develop understanding between operators and regulators of the regulatory requirements, and to discuss and comment on three draft guidance documents prepared by Gosatomnadzor

Presentations were made of the current situation regarding operational and regulatory development by representatives of Russian authorities and by relevant operator organisations. Presentations were also made on the licensing process by western participants.

After special presentations on each of the draft guidance documents, detailed discussion was held on each one and many comments raised and discussed. These are recorded in the report. 15 summary conclusions are provided for consideration by Gosatomnadzor. The workshop was a considerable success in bringing the relevant organisations together to discuss regulatory issues.

The workshop and report was jointly prepared by SIP, NRPA and Gosatomnadzor.

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1. Introduction

In order to assist the Federal Nuclear and Radiation Safety Authority of Russia (Gosatomnadzor of Russia (GAN)) in a more specific manner, the Norwegian Radiation Protection Authority (NRPA), the Swedish International Project Nuclear Safety (SIP), which is part of the Swedish Nuclear Power Inspectorate (SKI), and the Swedish Radiation Protection Institute (SSI) have agreed to offer their support in the licensing procedure of the Lepse project implementation [NRPA et al (1998)]. This co-operation agreement is called the Regulatory Lepse Project, and is designed to support activities for removal of spent fuel and radioactive wastes from Lepse. These are described in the draft Terms of Reference [EC (1997)], which briefly describes the Lepse situation and the safety analyses, which are proposed in relation to actual recovery of wastes etc. It is important to note that it refers to submission of materials to licensing authorities.

A workshop within the Regulatory Lepse project was held in Moscow 26-27 April 2000. The main objective of the seminar was to discuss the first draft of guidance documents developed by Gosatomnadzor. A further goal was to develop understanding between the operator and the regulator, and to involve other organisations than Gosatomnadzor in the discussions on the guidance documents.

The participants in the workshop represented different authorities in Russia; Gosatomnadzor, Goscomecology, Ministry of Health, and other organisations including the Scientific and Engineering Centre (SEC NRS) of GAN, VNIPIET, as well as the operator Murmansk Shipping Company (MSCo). The Western organisations involved included national authorities: SSI, SKI, and NRPA as well as experts from the International Atomic Energy Agency (IAEA) and other organisations, Babcock Rosyth Defence Ltd. (BRDL) and QuantiSci Ltd.

2. Background

NRPA and Gosatomnadzor have a co-operation agreement according to a protocol signed on 20 October 1997 [NRPA (1997)]. The Kingdom of Sweden has a related co-operation agreement with the Russian Federation including very similar themes to those in the Norwegian co-operation agreement [Swedish Ministry of Environment (1997)]. The implementation of this agreement is delegated to SSI and SKI for the Swedish side. This agreement allows for expanded cooperation within the following fields:

- ⇒ legislative and regulatory work, including licensing procedures on personnel, equipment and services;
- ⇒ methods for evaluating the risk of nuclear and radiation hazardous objects;
- ⇒ radiation monitoring on the territory of the supervised nuclear and radiation hazardous objects;
- ⇒ establishment of a technical support centre to co-ordinate regulatory measures in a case of emergency;
- ⇒ general issues on activities of the state regulatory authorities, including development and implementation of the inspection program;
- ⇒ exchange of information relevant to the activities of the organisations.

Within the above co-operation agreement the Regulatory Lapse Project has been started. The Regulatory Lapse Project is intended to help Gosatomnadzor to be in a better position to deal with the licensing process for removal of the spent fuel from Lapse. The main discussions in the project are related to the activities, like development of guidance documents, which can be started before the industry Lapse project starts. It was agreed to start a sub-project with the following objective:

To help Gosatomnadzor develop and justify a set of documents in the form of a procedure or sequence of activities to place before Lapse operators, such that the operators are aware of the practical steps they have to take and the information they have to supply to Gosatomnadzor in order to obtain a licence.

3. Issues of concern

3.1. Strategy

The licensing activities in different countries can be different depending of the legislation in these countries. Western support to Russia in solving specific problems can meet difficulties during the implementation phase because of the licensing process. Such problems can include delays in implementation of the industry project schedule because licences may not be granted on the anticipated time-frame. This in turn may arise because of misunderstanding of the requirements of the corresponding regulatory requirements.

In order to avoid these problems and build up the understanding between operator and regulator, the co-operation between Western and Russian regulators has been established. The main steps, illustrated in figure 1, for our co-operation have been identified as follows:

- Gathering and analyses of current legal and regulatory basis.
- Develop regulatory guidance documents that are needed for implementation of Lapse industry project.
- Review of the licence application from the operator, and analysis of the guidance documents on nuclear safety and radiation protection.
- After licence has been given, Gosatomnadzor must inspect that the work is done according to the licence.

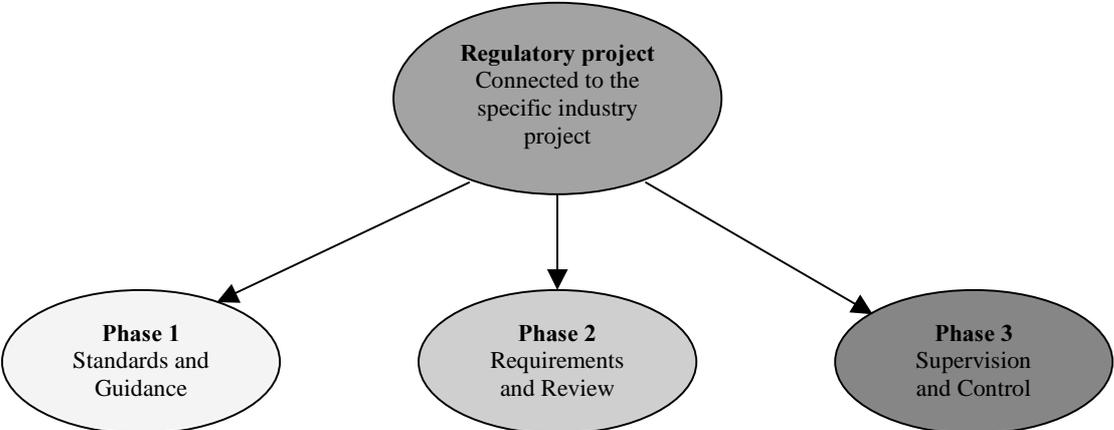


Figure 1. Overview of the different phases in the licensing process.

Documents that should be provided in a licence application are:

1. Technical project description
2. Safety Analysis Report
3. Environmental Impact Assessment (EIA)

The guidance documents that are needed for implementation of Lapse industry project:

1. *Requirements for the composition of a set and content of documents substantiating nuclear and radiation safety ensuring in the management of nuclear materials under the implementation of the industrial “Lapse” project* (Guidance on the set of documents)
2. *Quality Assurance Program (QAP) of activities for unloading of spent fuel assemblies in implementation of the industrial “Lapse” project* (Guidance on QA)
3. *Requirements for Nuclear and Radiation Safety Analysis Report (SAR) for management of spent fuel assemblies in the implementation of the industrial “Lapse” project* (Guidance on SAR)

The Technical project description and EIA is provided by the operator, in this case MSCo and Atomflot. It is an issue to be developed, which matters are covered by each operator. The 3 guidance documents should be produced in accordance to requirements from Gosatomnadzor and Goscomecology.

The EIA and SAR are interconnected. Aspects of these connections are discussed in Markarov, Smith and Stone [2000]. The EIA and SAR are needed for separate regulatory and other purposes, but should better be produced in coherence with each other, taking account of common terminology and common information. The QAP should encompass all activities within the scope of the plan of activities.

3.2. Responsibilities

Gosatomnadzor is responsible for implementing the licensing process. The Regulatory Lapse Project is intended to provide support for Gosatomnadzor in the following activities:

- To evaluate the submitted guidance documents with reference to laws, earlier provided guides and requirements.
- To co-operate within licensing process with other authorities and organisations as Goscomecology, Ministry of Health, VNIPIET, etc.
- To establish joint understanding and responsibilities with the operator, here Murmansk Shipping Company and Atomflot.
- To give the possibilities for independent experts (representatives from IAEA, BRDL, QuantiSci Ltd, SSI, SKI, and NRPA) to review, be involved and exchange knowledge.

3.3. Co-operation

In order to be able to develop the guidance documents, which will be helpful for the involved industry, it is necessary to have close co-operation between responsible parts and information exchange. As figure 3 illustrates there are contact between authorities in Russia (Gosatomnadzor) and Western countries (SSI, SKI, NRPA), and between industry in Russia (Minatom) and Western countries (Moss Maritime, Svensk kärnbränslehantering (SKB)). But the contact between authorities and industry are not satisfactory in Russia.

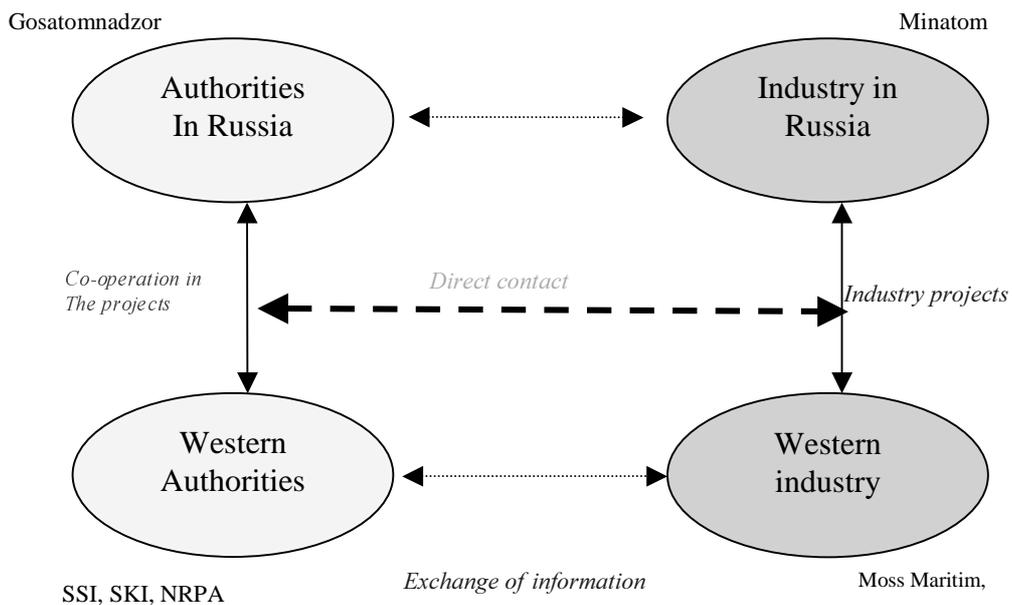


Figure 3. Working model for co-operation between authorities and industry

The radiation protection and nuclear safety authorities co-operate on developing legislative documents for the licensing procedure. The industry has the responsibilities for developing the technology for removal of damaged fuel from Lepse. Good contact between industry and authorities is necessary in order to make the licensing process go smoothly.

4. Presentations and Discussions in the workshop

The workshop was opened with a reminder of the main objectives:

to develop understanding between operators and regulators of the regulatory requirements, and to discuss and comment on three draft guidance documents prepared by Gosatomnadzor

The organisers of the workshop asked for constructive and open comments on the drafts, which include important technical input, and hoped that the workshop would contribute to improve the guidance documents.

Gosatomnadzor had in advance received comments on the first draft from some Western participants. There were some misunderstandings, which Gosatomnadzor will try to resolve with the help of Goscomecology and Ministry of Health.

Unfortunately, not all Russian participants had seen the guidance documents before the workshop.

The program for the workshop and the list of participants are attached in Annex A.

4.1. Presentation and discussion of the Guidance on the set of documents

4.1.1. The scope of works performed in the industry Lapse project (MSCo, Volkov)

For political reasons the industrial project has been delayed. The French and Russian agreement on liabilities has not been signed, until recently. The agreement between NERPA and MINATOM has been signed, but the Russian Federation Government was said to be not clear that such an agreement is appropriate; perhaps the Government itself should be directly involved.

Alternative solutions to unloading like the proposal to sink Lapse, or to put her into a big submarine for long-term storage have again been raised. This kind of solution will not be approved of authorities in Russia.

4.1.2. The Russian licensing procedure connected with nuclear and radioactive materials treatment (GAN, Markarov)

There was a proposal to dump Lapse in the Northern sea, but after signing of International conventions this would be breaking the law. According to governmental regulations Gosatomnadzor is responsible for licensing nuclear activities including the work at Lapse. In July 1997 a list of activities, which should be licensed, such as siting, design, construction, operation, and management (treatment-handling) of facilities for nuclear materials, was defined. All these activities have to be licensed by Gosatomnadzor. Supporting documents are required for the licence application.

Supervision of the regulatory body starts at the design stage. While giving consideration Gosatomnadzor take account of staff experience. Gosatomnadzors regional offices supervise the design stage, and the design stage can be reviewed independently. Designs for those at

Zvezdocha and another place are being reviewed. Gosatomnadzor takes account the independent review before approving design. After getting licence for *operation* the operator should apply for licence for *treatment* of nuclear material. At this stage, Gosatomnadzor looks at all sector relevant matters. The main document at this stage is the Safety Analysis Report. This involves approvals from Ministry of Health and from Goscomecology that they have no objections to the management of nuclear material. This will include an EIA and approvals from the Ministry of Health. The operator should hold sanitary passport to implement such activities. While applying, the applicant must have approval from Ministry of Health, otherwise there is nothing for Gosatomnadzor to review. Transport of spent fuel inside the operator site, should also be approved by Ministry of Health and Goscomecology. Gosatomnadzor supervises the operator from beginning to decommissioning.

Foreign colleagues sometimes suggest that licences for *operation* and for *treatment* are the same, but in Russian system they are different kind of activities.

Gosatomnadzor consider unloading as a dangerous type of activity. Gosatomnadzor has recognised tendencies in the operators to simplify safety assuring for such operation as unloading. Therefore Gosatomnadzor pay special attention to this type of activity. Ministry of Health and Goscomecology agree with Gosatomnadzor.

4.1.3. The storage facility characteristics and conditions of its surroundings (SEC NRS, Shempelev)

The overheads presented are attached in Annex B.

Lepse was built in 1936. In 1941 the ship sank. She was elevated in 1946. In 1962 Lepse was made a floating base for icebreakers, with special facility for storage of spent fuel and tanks for liquid radioactive waste and some works for reactor equipment. From 1963 to 1981 the ship was used for storage of spent and damaged fuel from the icebreakers Lenin, Arctica and Sibir. Lepse was taken out of operation in 1989. In 1999 her status was made as a short-term storage base. In 1999 Lespe was put in dock for checking as is required by Russian authorities. Afterwards Lepse was moved to where she is now.

Lepse now is being operated of Atomflot, 2 km from Murmansk. The main hazard at Lepse is the storage area for spent nuclear fuel.

Lepse was built with 12 mm sheet steel. Her weight is 5000 tons, length 87 m and width 14 m. The tanks are located in base compartment with waterproof bulkheads. The diameter of a tank is 3.6 m, and height 3.4 m. Each tank has 366 cylindrical channels with diameter 67 mm for spent fuel and 4 caissons 450 cm. Channels and caissons were covered by water. Now there are 639 spent fuel assemblies. The tanks for spent nuclear fuel are surrounded by biological shields. The wall of shield is 414 mm thick. The tanks volume is 115 m³.

In 1991, concrete mixture was put in spaces between tanks in the store, to test technology for additional engineered barriers. In 1992, there was an amount of water in the tank. The circuit is practically drained. It is 10 Curie per litre in the remaining water. Total activity today is 28 million Curie, where 70% of this is ¹³⁷Cs and ⁹⁰Sr. In circuit A, the water-cooling circuit for all the storage area, the heat generation is 3.6 kW, decreasing exponentially with half-life 30 year. The age of the stored fuel is between 12 to 28 years. The fuel is damaged by corrosion, and that results in modification of geometry. This makes it difficult to unload the fuel. The

inner surface of the tanks is corroded, and the upper plate is damaged too. There is a very high radiation level in the storage tanks.

4.1.4. The stage of regulatory documents development of “Lepse Industrial Project implementation” (SEC NRS, Shulgin)

The overheads presented are attached in Annex C.

In 1999 the development of the 3 regulatory guidance documents started. The Terms of reference (TOR), developed in phase 1 of the EC project, was the basis. Many organisations have been invited to review the guidance documents. It is difficult to finalise the guidance on SAR, because there are so many reviewers and comments.

By June 13. comments from Swedish and English participants have been taken in account. The Western participants should review the documents to November 30. By this date the final version should be finished.

4.1.5. Swedish background in licensing process of treatment of non-standard situations in spent nuclear fuel and radioactive waste materials (SSI, Malmquist)

The overheads presented are attached in Annex D.

4.1.6. Presentation to the draft of regulatory document “Requirements to a set and the content of the documents substantiating nuclear and radiation safety ensuring in the management of nuclear materials under implementation of the Lepse project” (GAN, Markarov)

The main principles in the licensing process are very similar to those presented by the Swedish participants (Annex D). While developing the 3 draft guidance documents, Gosatomnadzor has tried to take into account the condition of spent fuel on Lepse. Gosatomnadzor has procedures for regulating management of spent fuel, but the spent fuel on board Lepse is damaged and therefore needs special requirements for handling.

From previous discussions Gosatomnadzor understood that it is very helpful to have separate documents on requirements for the SAR. The utility value of the Guidance on the set of documents has been questioned. This guidance document covers all the operations up to when the waste is in the casks at a store. Neither MSCo nor Atomflot have a store. This necessitates a more complex approach, approved by Regulatory Project Working Group, where an overview of the whole system is given and where borderlines between different phases are defined. In the previous presentation by Gosatomnadzor it is said that operations, and management for treatment-handling are different. Gosatomnadzor tried to optimise these subjects: but there could be some overlap. Gosatomnadzor uses radioactive fuel legislation system including laws and regulations.

The next step will be to use comments from Western participants and put them into the second version. The guidance documents will then be sent to the operator and other regulatory bodies in Russia for comments. The following documents were used as basis for the Guidance on the set of documents:

- general rules for containment

- radiation norms
- general health regulation
- general rules for radwaste management
- nuclear safety rules for transport of spent fuel
- Safety Rules for Fissile materials transport
- and some others.

Item 11g of our licensing provisions requires a Guidance on the set of documents type document.

4.1.7. Discussion of the Guidance on the set of documents

Ministry of Health's opinion is that most technical matters are described in the Regulatory Guide, but added the following:

- According to the dynamic in development of laws concerning nuclear fuel, there are some new regulations in force, including Radiation Protection Norms. All MINATOM places are subject to these new Norms from 01.01.2000.
- These new Norms differ very much from the previous ones. Moreover, there is a new federal law on Sanitary Hygienic Well-being of Population, which describes some procedure for regulation development within the licensing system.
- Sub-commission of Ministry of Health deputy state doctor leader are to implement this law. Procedures for regulations of sanitary are well established. All the Gosatomnadzor documents will go through this procedure.

Gosatomnadzor said that it would be great if Ministry of Health will inform them what information should be submitted.

Goscomecology said that the Guidance on the set of documents is very detailed except for the unloading process itself. Gostaomnadzor answered that instead of the 2 guidance documents that are needed (QA and SAR), they have decided to have 3, where the 3rd is the Guidance on the set of documents. There is a special document for the loading process, the SAR.

Goscomecology said that it is necessary to include items to ensure that accidents/incidents that can occur during operation will not exceed prescribed limitations. But it is not necessary to say what the limits are. These issues should be described in the EIA and in SAR. If Goscomecology has documents requiring submission of this type of information, Gosatomnadzor is ready to include them in the set of requirements.

The Western participants asked what is the objective of the Guidance on the set of documents. The guidance document is so detailed that it is difficult to see the real important requirements. The Guidance on the set of documents does not list the different documents the operator needs. With a list it would be much easier for the operator to find the things he needs. It seems like Goscomecology also has troubles seeing this. All the 3 guidance documents contain a lot of technical information, way too much. It is difficult to get the content of them.

MSCo now have a licence to operate Lepse as a store. But they also need a new licence to move the fuel. MSCo have to submit additional documentation. 3 main documents are needed:

- Technical project description (from MSCo)

- SAR (from VNIPIET and Kurchatov institute. Requirements from Gosatomnadzor)
- EIA (from MSCo. Requirements from Goscomecology)

MSCO needs to know if the installed instruments will be safe enough for Lapse. The operator must answer this. For an operator it is necessary to have all the licences. According to contract WP4 between EC and AEAT, these 2 documents, SAR and EIA, will be developed. WP2 is the technical description. EIA have to be approved by Goscomecology, and SAR must go to Gosatomnadzor. There are no other conditions about submitting the contract to other regulatory bodies. Russian supporters to AEAT contract are Murmansk Biological Research Institute (EIA) and VNIPIET and Kurchatov Institute (SAR).

Gosatomnadzor requires the documents, not the contract. The operator bears responsibility during unloading operations. For the moment, Gosatomnadzor do not have a technical description for the unloading process, or an interim facility for storing. Therefore Gosatomnadzor requires these documents about these facilities. Gosatomnadzor needs to be assured of the safety for unloading etc.

Ministry of Health supports Gosatomnadzor. Lapse is not a standard ship, and in 10 years she will be very non-standard.

Some Western participants still do not agree. There are a lot of details, but not an overall picture. The document requests many bits and pieces, but not how they fit together. Will all these bits and pieces help Gosatomnadzor, or just make the licensing process more difficult? Gosatomnadzor should start from an overview, more generic, and then specify the bits that should be in the separate parts. Another point is the list of organisations rendering services that are requested. The list does not cover for example; how to prevent an accident, if the operator is competent, etc. Why would Gosatomnadzor need such a list? Is Gosatomnadzor interested to know if they are qualified? This question is not covered in the requirements. It is similar for other lists. The Western participants suggest that Gosatomnadzor should focus more on main items like:

- Design stage. A safety report including technical aspects of project.
- Preliminary decommissioning plan. Unloading is a planned activity. What will be done with the ship when the storage facility is empty? This is not covered in the document, and it should be included.
- Manufacturing and construction. At this stage Gosatomnadzor needs detailed information, and procedures to supervise that things are built as designed.
- Commissioning and operations. How to start and operate, operational manual as a tool for supervision.
- Decommissioning stage.

All these details fit well into the structure, except the decommissioning that is missing. These details should be placed into an overall structure. It would make Gosatomnadzors work easier. There is no need to include the details if they are included elsewhere, for example in the SAR.

Gosatomnadzor stated that the stages of designing, manufacturing, operation and decommissioning should be in the guidance documents. Gosatomnadzor will consider the comments from the Western experts. Gosatomnadzors opinion is that Lapse does not represent any danger once the spent fuel has been unloaded. The dangerous part is the unloading process.

Western participants were still not sure about the aim of the Guidance on the set of documents. Gosatomnadzor stated that the intention with the Guidance on the set of documents is to clarify the requirements for the operator. The guidance document is very helpful for the operator, when applying for a licence. The guidance document takes care of that the operators are aware of the practical steps they have to take and the information they have to supply to Gosatomnadzor in order to obtain a licence.

A Department of Gosatomnadzor decides how much must be submitted, to be taken into account to get a licence. The Guidance on the set of documents should be considered from this perspective. A list can change. A list of subcontractors are needed only at this stage. Gosatomnadzor needs the list to ensure that all subcontractors to be used, have a proper licence for the intended work. Qualification checking comes later. Gosatomnadzor also stated that all the points are included, for example design (a list is provided for what is required at the design stage). The Western participants expressed that perhaps it is more a matter of formatting? The current format does not demonstrate the stages and the sequences very clearly. Design includes design for decommissioning. There are some strong inter-connections, so it is hard to integrate.

The representative from BRDL compared the content with what they have for example in the UK. There are a lot of things, which meet UK requirements. But also some important things missing, as that the document would discuss things to do with company(s) doing the work, control operations, monitors performance. These are important for safe management of operations. The main point is to be able to monitor performance, and therefore this Guidance on the set of documents should complement the Technical requirements and not duplicate them. Can MSCo name documents important for operator?

The Western participants reminded that the objective with the workshop is to develop understanding between operators and regulators. There is no need to defend position. The discussion should be kept open and stay constructive. It is very important that at least the Russian operators understand Gosatomnadzors requirements well.

Gosatomnadzor suggested having a bilateral discussion with individuals on individual questions. Gosatomnadzor repeats basic reasons for the Guidance on the set of documents. Complications arise because there are two operators; one needing a licence for unloading and handling the waste, and one for the store operation. The Western participants wonder if scope goes as far as storage. This can give appearance of duplication. Gosatomnadzor wants to show that the operator cannot unload without a store available.

Goscomecology pointed out that the title is about substantiating safety, not about licensing. Gosatomnadzor said that licensing is said to be the issue in section 1.2 of the Guidance on the set of documents.

MSCo had no comments on the content of section 2.6, but consider the order of items. MSCo also suggested allocating each item to one of the three following areas: Technical description document, EIA or SAR. This is because AEAT have contract on work in these areas. The Western participants agreed with this.

4.2. Presentation and discussion of the Guidance on the Quality Assurance Program (QAP)

4.2.1. Presentation of the regulatory document “Requirements to the Quality Assurance Program of activities for unloading of spent fuel assemblies in implementation of the industrial Lepse project (Stroganov, SEC NRS)”

The comments from the Western participants were useful, and they can be included in the draft, without changing the sense of the Guidance on the QA. It will be useful to give more details in subsection 4.16. A list of equipment and services supplied have not been included in the document. It may be necessary to ask some organisations for existence of quality assurance arrangements.

4.2.2. Western approach in regulation of Quality Assurance in implementation of activities (IAEA, Warnecke,)

The overheads presented are attached in Annex E.

4.2.3. Discussion of Guidance on the QA

Gosatomnadzor and SEC NRS said that important items are:

- Quality Assurance Program
- Unloading processes
- Management of these processes

QAP should establish program for safe operations. The operator is responsible for the quality of his work. He must have adequate method for this. Control of the operator is done by testing and auditing.

MSCo stated that they know how to do unloading. If the work is done without any damage to public and environment, it is done with proper quality.

Transfer of the radioactive fuel to a store will involve transfer of responsibility from MSCo to Atomflot. It is very important to have monitoring of spent fuel. MSCo considers it necessary for 2 operators to have QAP:

- MSCo for unloading and casking
- Atomflot for transfer to store and handling in the store.

VNIPIET meant that the Guidance on QA could be applied to other ships too. VNIPIET organises its work for QAP at all stages and subcontractors must do the same. VNIPIET proposed to add an item: “Requirements for ensuring personnel to understand nature of unloading process”. There should also be more on safety culture.

Goscomecology and Ministry of Health commented that it is a good idea to add general items about QAP generally, under umbrella structure. Both organisations believe something is missing on how to control operators in section 4.

GAN/SEC NRS said that some general things (umbrella idea) could be added. Something for controlling non-compliance and corrective measures could also be added. The guidance

document will be written in such a way that all safety related activities that should be implemented in the Lepse project are included in the requirements. If some items are not included in these documents, it does not mean they should not be taken care of. It is the operator's responsibility to ensure proper quality assurance. In the development of the next draft GAN/SEC NRS will try to use the comments from Goscomecology and VNIPIET. The comments from VNIPIET were found very useful. Something about requirements for safety culture should also be included.

The Western participants agreed with Gosatomnadzor that the operator is responsible for the unloading process, and that the document should not contain more than necessary. By reviewing and auditing the QAP with the operator it can be assured that he meets the safety requirements. The QAP should avoid getting into technical details. That can tend to remove responsibility from the operator. QAP requirements must not be mixed with safety requirements.

The Ministry of Health considered the QAP to be important. It deals in many parts with human factors. Spent fuel unloading from Lepse is an abnormal situation. Maybe psychological testing of personnel should be taken into consideration. Gosatomnadzor meant that it is not necessary to carry out additionally tests, because there are already some requirements in the governmental decree for personnel working with nuclear material/facilities. The Ministry of Health said it is reasonable to use this governmental decree as a basis, but would like to hear the review of Western participants. Western participants have in principle the same view as Gosatomnadzor, and would use the same requirements as for normal work. There are inspections to check that the personnel have got the right training, requirements on operators plans for competence for categories of staff for training, occupational exposure, etc. The requirements are the same for all nuclear installations.

4.3. Presentation and discussion of the Guidance on the Safety Analysis Report (SAR)

4.3.1. Western perspective on a Safety Analysis Report (SSI, Malmquist, SKI, Westerlind)

The overheads presented are attached in Annex F.

4.3.2. Presentation of the regulatory document "Requirements for nuclear and radiation Safety Analysis Report for management of spent fuel assemblies in implementation of the industry Lepse project" (SEC NRS, Shulgin)

Activities that should be licensed:

- Cutting of top-lock from casing with spent fuel assemblies. This process has to be licensed because it is necessary to have special equipment. During operation of cutting equipment there may be some damages, changes in geometry, spent fuel could spill and collect on the bottom.
- Removal of casings, possibly damaged.
- Removal of spent fuel from caissons.
- Transfer process/-operations.

All these activities have high level of hazard. Because the designer did not account for these problems, Gosatomnadzor considers it necessary to develop a safety assessment just now for all these types of works. They are not standard operations, therefore additional requirements.

The draft developed belongs to second level of legislation in Russian Federal law. The Guidance on SAR is developed to help operators, regulators and organisations around the operator. Existing regulations, such as requirements for SAR for nuclear power plants, transfer and storage of nuclear material and nuclear facilities, and others are used as a basis in the development of the Guidance on SAR. It is important that the 3 guidance documents are in compliance with Russian legislation. The guidance documents are also being developed according to IAEA recommendations. SGN preliminary report from 1996 has also been taken into account. The Guidance on SAR is restructured to make it more logical with terms and definitions section. The document requirements for the Guidance on SAR for Lepse should be consistent with federal regulations being developed just now. They do not have draft federal regulations.

Comments have been received from VNIPIET, MSCo, and UK colleagues. Sometimes the comments are contradictory of one another. MSCo would like to see the Guidance on SAR very detailed. Gosatomnadzor is looking for compromises, in accordance with existing laws.

4.3.3. Discussion of the Guidance on SAR

In the beginning of the work with the guidance documents SEC NRS was not sure if the work would succeed or not. But now the work is beginning to look better. It is important that these guidance documents are in compliance with Russian Federal law. Building experience and modern technology have been taken into account. When comparing the Swedish (Malmquist and Westerlinds) and the Russian (Shulgins) presentations, SEC NRS found both differences and similarities; In Sweden the document is 2 pages, and in Russia it is huge. The document, “Main Provision for Safety Assuring Nuclear Power Plants”, in Russia is similar to the Swedish. SEC NRS is developing similar documents for Marine Nuclear Installations (for non standard fuel). Requirements of the regulatory bodies are included, but only briefly. According to the Russian system there is need for detailed regulations underneath. SEC NRS agreed with Western participants about developing mutual understanding between operators and regulators. These guidance documents are part of that. SEC NRS do not want to take the responsibility away from the operator.

Before 1973 there were no requirements on justifying safety. Before 1988 technical justification was part of the design documentation. This documentation had to be agreed by the regulators. Now a Safety Analysis Report has to be submitted by the operator before licence. After submission to regulatory body, dialog is established.

The Western participants said there are different styles of regulation. For example in Sweden the regulations are limited, they are used for steady standing facilities. If the regulations are to be used on a mobile facility they have to be changed. Babcock Rosyth Defence Ltd operates mobile facilities. The difference between a power station and mobile facilities is that the power station is a process industry where safety analysis can apply for lifetime. At Babcock a new safety case has to be written every time a submarine leaves the dock. This makes things different for the regulator, because the regulator does not know for example how to repair ships. The regulator requires Babcock to tell him how they will do the work and to justify to him how the work will be safe. If there are disagreements, there is a dialog until agreement is

reached. This means that Western regulators do not prepare such a detailed list of requirements as Gosatomnadzor has prepared. The requirements in Western countries are only specified at a high level, to control safety. One may argue that this leaves operator too much flexibility. The UK yard does not ask for more details, but MSCo has asked for more details. MSCo wants more details on the hazardous operations, as the cutting operation. The Western participants asked if MSCo have more confidence in the regulator than themselves? MSCo denied this. The regulator has qualified staff, but it is the operator who has, and should have, the best knowledge of the specified work to be done and the most qualified people to do it. The Guidance on SAR is required by Gosatomnadzor for the section 2.6 in the Guidance on the set of documents. The main purpose is to justify that unloading is carried out in a safe manner. Gosatomnadzor only wants to inform the operator what they have to submit to Gosatomnadzor for granting a licence. It is up to the operator to decide which method to use, as long as it is considered safe enough for the regulator. For MSCo it would be useful to have more details on the unloading mechanism.

The Western participants suggested that differences between mobile and steady facilities are not taken care of in the Guidance on SAR. That is, the unique problems of Lespe unloading are not sufficiently emphasized compared with more routine aspects of the planned operations. The SAR for Lepse is developed from the perspective of safety analysis for nuclear power plants (NPP). NPP's are very different in their hazards from Lepse. These differences have not been too well taken into account, for example "dose calculations for thyroid dose to children" when all the iodine has decayed. What about the geological situation of the ship? And what about tornadoes in the Arctic? The Guidance on SAR should be better adjusted to the situation at Lepse. Results of safety assessment are needed to do this. Only when that is done, there is an understanding of what is relevant, and causes of accidents, types of release, areas affected and data needed to justify that the safety requirements are met. The other way around, to specify the safety precautions to be taken, without proper understanding of the real risk is not considered an optimal solution. It is dangerous to have detailed inflexible requirements this early in the process. For NPPs' there is a different situation. NPP's have a long history with a lot of experience, which can be used.

The Western participants pointed out that section 9, which is thought to be the main part of the Guidance on SAR, seems rather short. There are a lot of iterations. The Guidance on the set of documents has a detailed list for documents to be presented. Several are also covered in the Guidance on SAR. Is it necessary to give it twice?

The Guidance on SAR takes care of radiation safety, but what about conventional safety? This issue should not be forgotten, but not over-done either. It must be co-ordinated so that conventional safety is consistently provided. Gosatomnadzor stated that conventional safety is the competence of the marine register. Gosatomnadzor will work to avoid duplications.

The Western participants asked how Gosatomnadzor will deal with the results from the safety assessment contradict the requirements. What is the process? SEC NRS answered as to numbers given for the stability of the ship. The figures were taken from the standards, and it could not be imagined that any operations should take ship beyond these standards. If safety analysis shows there is a need for deviation from values given in these standards, Gosatomnadzor will not give licence unless there is adequate safety. The first draft is for discussion. The draft will be sent to the operator for comments. Afterwards these matters can be discussed.

Western participants highlighted that there are a lot of details required on demography and emergency preparedness. Suppose the safety analysis shows that the worst-case accident does not result in any significant release! Are all these emergency requirements still needed? SEC NRS responded that an emergency plan must be prepared for all reactors wherever they are located. Western participants agreed, but why assume that this requires the entire zone plan? The safety analysis may show it is not enough, or too much. It is dangerous to put in so many unjustified detailed requirements.

Gosatomnadzor stated that if analysis shows it is not necessary, Gosatomnadzor will not insist on having such requirements. Gosatomnadzor can still refuse to give licence if they are not satisfied.

(The Western participants point was to warn Gosatomnadzor of the risks of implementing such emergency requirements. The risk is that Gosatomnadzor may approve a limited emergency plan and give a licence, sufficient to meet needs indicated by the SAR. But then Gosatomnadzor would have given a licence, which is not consistent with Gosatomnadzor's own requirements. Perhaps Gosatomnadzor could be taken to court, and maybe loose. To this Gosatomnadzor said that the requirements are guidelines, not laws.)

The Western participants concluded that item 1.5.2 in the Guidance on SAR invites presentation of options. The item is not prescriptive on what will be done. However later in the Guidance on SAR the text implies only a need to present information on one option, the chosen one. How will comparative analysis be done? How will the selection option be selected? This is a problem not only for Gosatomnadzor. Also item 8.1.3 requires presentation of analysis, but not what should be included. It would be useful if Gosatomnadzor gave their view of what the relevant measures for comparison are. Item 2.5 includes chemical contamination. Is that one of the measures of comparative performance? Gosatomnadzor agreed with Goscomecology to delete item 2.5.

Western participants stated that international standards require a safe and suitable option. The “best” option can’t always be obtained. Justification, optimisation and dose limitation have to be applied. It is still a problem to make a choice between options. IAEA has guidance on comparative assessment, for example “Tech Report Series 394”.

VNIPIET agreed with Western colleagues that there are too many requirements and that the requirements are more suitable for NPP's. It is impossible to put Lepse into status of a new facility. SEC NRS stated that all new equipment should be good enough. The Guidance on SAR asks for information on equipment presently on board, in order to see what might be used. According to the Western participants that should be up to the operator to propose. VNIPIET are trying to anticipate problems. There may be difficulties in making safety cases, because the fire system is old, etc. The Western participants suggested VNIPIET should explain their concerns to Gosatomnadzor.

The Western participants pointed out that section 1 in the Guidance on SAR refers to changes to SAR, loose-leaf binder, but the section does not say enough about who is authorised to change the report. It is not absolutely clear what is the scope of the safety assessment. From section 8, it seems like drying and loading into casks is the end of the safety assessment scope. Where does the safety assessment end? And what about closure of the container? There is a separate project on the dual-purpose cask. It should be clear what is in the separate projects and that there are no gaps and a smooth transitions from one project to another.

VNIPIET stated that for each stage, transport, reprocessing etc, it is necessary to develop a Guidance on SAR. We always have continuous operations and Gosatomnadzor supervises these situations. Perhaps it is necessary to define the final stage clearer.

MSCo stated that there is financial support for unloading, 8 million EURO. The final stage of the two segments is to put spent fuel into canisters, for further steps. However MSCo do not have financial resources for those further steps.

There is an international project for design and manufacture of casks (Murmansk 80 T Cask Project). It is important for MSCo to have information about the casks to be used before the unloading process starts. The Western participants informed that funding is available for design of the casks, but not for the serial production. So far MSCo only have Terms of Reference. The unloading process will take 18 months to 3 year. All the requirements for siting are not acceptable for MSCo because site already exists. MSCo considers data on geology, demography, etc within 30 km zone unnecessary and MSCo are not going to provide those. This would only increase the cost. What level of risks should be assessed? MSCo is interested in Western colleagues opinion. Divide in two categories:

- Initiating events for severe consequences
- Risks associated with abnormal operating conditions

The highest probability accident of concern is collision with another ship. The consequences are similar for, for example aircraft crash, etc. Gosatomnadzor stated there are no aircraft because of existing restrictions, but Tsunami type events can always occur. There is no sense to analyse these accidents, because in any case the consequences will be very bad. But currently MSCo would have to do all the analyses. To avoid probability of risks MSCo will try to do the analyses in shortest possible time.

In Western picture it is unacceptable for an operator to refuse to meet regulatory requirements. Therefore it is very important to analyse the consequences of the requirements. If the operator can demonstrate that requirements are not necessary, then the regulator should withdraw the requirement, but if the regulator still feels it is justified, the regulator should be prepared to take the necessary actions. Often it can be helpful to consider this as a “joint problem”. Even though roles of operator and regulator are different, the ultimate objective is the same; “to protect man and the environment” from radiation risks. The Western participants hoped MSCo have possibilities for further discussion of this subject, so that when the requirements are ready MSCo is prepared to meet the requirements.

There was a discussion between SEC NRS and Western participants on the joint responsibility. According to the Russian experts, it is the operator’s responsibility to protect “man and the environment”. The Western participants pointed out that also the authorities have responsibility within its scope of work, which is to regulate, licence and supervise, and “to protect man and the environment” from radiation risks.

Western participants concluded that there is an undesirable situation with Lapse. It is still not clear what is really needed in the Safety Guidance on SAR. The Guidance on SAR was developed with NPP’s as basis, but the situation at Lapse is different. The detailed content should be reconsidered, because only relevant things should be in the document. Why consider aircraft crash just when you start to unload? Why not from the beginning? Is that logical?

MSCo agreed with the Western participants. It is only necessary to assess accidents from internal events associated with the unloading process. The Western participants suggested there could be some external events, which would be more consequential during unloading, for example; a wave when fuel is in the ship may not be dangerous, but a wave while unloading the ship might be dangerous.

5. Conclusions

It is important that all 3 guidance documents are understandable and transparent for operators. There is no use for guidance documents that only regulators understand.

5.1. Summary points

Summary points on the 3 guidance documents (Guidance on the set of documents, Guidance on QA and Guidance on SAR) for consideration by Gosatomnadzor:

1. The objective has been to develop a common understanding of the regulatory requirements among all relevant parties, operators and regulators, based on the draft Safety Guides. The previous meeting concluded that the Guidance on the set of documents was necessary to let operators know what documents the operator has to develop for granting a licence.
2. There were a lot of questions about the Guidance on the set of documents. This suggests that the Guidance on the set of documents may create more problems than it helps. However, during the discussion it was confirmed that it is a necessary guidance document. The main problem for understanding is the structure and clarity of the document. Gosatomnadzor will look into this. As it is now, the Guidance on the set of documents is not clear enough for operators and others to understand what is needed for granting a licence. The technical details could be put in an annex, with main body of the Guide simply the list of relevant legal documents, preferably with some type of prioritisation.
3. It could also be convenient to include, in the Guidance on the set of documents, a schedule or sequence for submission of documents to Gosatomnadzor during the licensing process.
4. The Guidance on QA has similar intent and content as could be expected in other countries. It could be appropriate to prioritise the content. The QAP could also be better structured, and it should include the comments that were made at the workshop.
5. QAP should be focused on the most safety sensitive issues. This demonstrates the relationship between Quality Assurance and Safety Analysis.
6. All commentators have noticed the long list of requirements in the Guidance on SAR. Concern has been expressed about the amount of detailed requirements. There are so many details that it is difficult to see what is important. This is especially a problem given the iterative nature of Safety Analysis. The transparency should be improved and some duplications removed.
7. The scope of the Guidance on SAR should be clarified, and there should be interrelation between Safety Analysis and Quality Assurance.
8. There is a lack of balance in the formatting of the Guidance on SAR. The important parts should be highlighted.
9. Concern was noted that no allowance was made for the age and condition of the Lapse.

10. The requirements in the Guidance on SAR should be reasonable, relevant and balanced. The discussions between operators and regulators should occur before Gosatomnadzor finalises its requirements.
11. Some material is good for using as a checklist in reviewing the Guidance on SAR, instead of being included in the requirements.
12. It is easy to get the impression that the Guidance on SAR for Lapse is a once done thing. It should be considered as a “living document” requiring continuous updating.
13. Gosatomnadzor has received written comments on the Guidance on SAR from UK, and comments from Sweden and IAEA will be provided.
14. All further developments of the guidance documents should be done in co-operation/consultation with the operator.
15. Gosatomnadzor has in advance received comments on the first draft of the three guidance documents from Western participants. There were some misunderstandings, which Gosatomnadzor will try to resolve with the help of Goscomecology and Ministry of Health.

5.2. Closure

Gosatomnadzor thanked participants of the workshop for their active contributions to the discussions and noted especially the input from the international community. Gosatomnadzor will look forward for further co-operation with Western regulators and also with the UK experts because of their practical experience from real work at dockyards with nuclear ships. The Western participants suggestions will be taken into account in the further development of the guidance documents.

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Annex

- A. *Program for workshop with list of participants*
- B. *The storage facility characteristics and conditions of its surroundings (Shempelev, SEC NRS)*
 - English version*
 - Russian version*
- C. *The stage of regulatory documents development of “Lepse Industrial Project implementation” (Shulgin, SEC NRS)*
 - English version*
- D. *Swedish background in licensing of non-standard work with spent fuel and radwaste materials (Lars Malmquist, SSI, Magnus Westerlind, SKI)*
 - English version*
 - Russian version*
- E. *Western approach in regulation of quality assurance in implementation of activities (Ernst Warnecke, IAEA)*
 - English version*
- F. *Western requirements on a safety analysis report (Lars Malmquist, SSI, Magnus Westerlind, SKI)*
 - English version*
 - Russian version*