MINISTRY OF THE ENVIRONMENT

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Comments on the answer from Russia in accordance with the Convention on Environmental Impact Assessment in a Transboundary Context for the Nord Stream Gas Pipeline

Estonia has received from Russia the developer's comments concerning the Nord Stream environmental impact assessment (EIA) process. Hereby Estonia presents its opinion on the above mentioned material.

General provisions

(1) The status of the Russian EIA in the context of the transboundary EIA of Nord Stream, according to the Espoo Convention.

Estonia has not officially received the original Russian EIA and the status of the unofficial English translation is unclear. An unofficial translation has been made available in the Nord Stream web site not before July, 2009, i.e., after the previous round of the Espoo EIA consultations. The validation of this information by Russian Competent Authority and the responsibility for the contents of this translation remains unclear.

There are controversies between the Russian version (publicly exposed by Nord Stream on its web site in June, 2009), the unofficial English translation currently on the Nord Stream home page, the materials presented in „Transboundary answers" and the materials presented in the document "Answers to the Espoo Statements Espoo Consultation 2009 Responses to Russia to the letter from the Estonian Ministry of the Environment dated 08.06.2009".

Estonia indicates that for continuing the transboundary consultations, the Russian Competent Authority should take a stand on the official versions of the Russian EIA and to present them to the affected parties in the original version in Russian and as verified official English translation, and declare, which version applies in case of the controversies between the Russian and English version.

The Espoo EIA process of the transboundary environmental impact assessment of Estonia has not reached the stage of the presentation of the official report, and Estonia is waiting for it, as a pre-requisite of the official transboundary consultations.

Upon receipt of the official versions of the Russian EIAs, according to the Espoo Convention, reasonable time should be given for the assesment of its content.

In view of this situation, only preliminary comments to the developer's most recent statements can be given, in a hope that they can be used as guidelines for improvement of the documentation.

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(2) The format of the transboundary EIA according to the Espoo Convention

The purpose of the Espoo EIA process is transboundary environmental impact assessment, according to the Espoo Convention.

Therefore, the overall recommendation of Estonia that has been clearly expressed in several written documents and during the consultations, is, that **the developer is obliged to present a complete and coherent chapter of transboundary impacts to Estonia, that was missing in the Espoo EIA and in the Finnish EIA. This should include all transboundary impacts to Estonia, emerging from Finnish, Russian, Swedish, Danish and German EEZ-s and their possible cumulative effects.**

This chapter should comply with good standards of completeness and quality.

For example, the cumulative effects of the toxicants re-mobilized from the sea bed in the Russian EEZ, carried by currents to Finnish EEZ and affecting the Finnish and Estonian fisheries in the western Gulf of Finland. There are no physical borders in the Gulf of Finland and any impact to the eastern Gulf of Finland immediately affects the situation in the Finnish and Estonian waters. The joint responsibility of the HELCOM countries is to follow the
HELCOM Baltic Sea Action Plan signed in November 2007.

As only a small part of the relevant transboundary questions are answered in the previous documents and the document "Answers to the Espoo Statements Espoo Gonsultation 2009 Responses to Russia to the letter from the Estonian Ministry of the Environment dated 08.06.2009", all the questions that are not answered as yet in the letter and the expert report of June, 8, 2009, still apply. These documents are also appended and form a part of this statement and should be used as further guidelines in compiling this chapter on trans-boundary impacts to Estonia.

(3) Validation of the risk analyses by independent evaluators and responsibilities of the Parties of Origin for the compensations in case of accidents with human casualities or vast environmental impact

In public consultations, Nord Stream has announced that the overall risk analysis has been based on the seismicity data that has been confirmed by Det Norske Veritas. However, as the seismicity data uses are out of date, this overall risk analysis is no longer valid.

Nord Stream has stated the following:

Nord Stream conducted a comprehensive risk assessment of the pipelines, the results of which have been included in the technical design of the pipes. For the pipeiine operations phase, detailed analyses have focused on the causes and consequences of a subsea gas release:

- *Corrosion (internal and external)*
- *Material and mechanical defects*
- *Natural hazards, e.g. current and wave action, storm*
- *Other/unknown, e.g. sabotage, accidental transported mines*
- *External interference, e.g .fishing, navy and commercial ship traffic, etc.*

Risks to pipeline integrity deriving from these causes have been considered in the pipeline design. The resulting pipeline design is robust and the probability of damage through different scenarios very low.

Estonia, based on the experts' analyses, has found out that several risks are underestimated more than 100 times, mostly because of false premises. For example, the ship routes have been considered to cross the pipeline, but most of the ships travel along the pipeline. This increases the accident risk at least 100 times, that means the probability of a catastrophe in 50 years of operation is as high as 30%. Taking into account that not only a few crew members but thousands of passengers could lose his life

in the catastrophe, the zero risk is impossible and the F-N curve (Accident frequency vs. Number of fatalities) will be totally shifted into the unacceptable sector.

With this risk level, the construction any gas pipeline in the East-West direction along the Gulf of Finland is inadmissible.

If the authorities of some Parties of Origin nevertheless would permit the construction of the pipeline in his EEZ, they take the responsibility for eventual accidents, likewise they take the liability to compensate the human, environmental, and economical damages caused to Estonia and Estonian citizens and inhabitants by the accident.

Before any practical steps towards the construction, if it nevertheless will be permitted, the developer is requested to state who will take the responsibility for eventual accidents and to describe the mechanism and the calculation basis of the extent of the compensations paid to Estonia and other affected parties in case of accidents with human casualties or in case of the damage to the environment caused by the Nord Stream pipeline or any operations of Nord Stream or its subcontractors in any project-related activities.

Preliminary comments on the materials received in the document

"Answers to the Espoo Statements Espoo Consultation 2009 Responses to Russia to the letter from the Estonian Ministry of the Environment dated 08.06.2009"

2.1. Missing information on the Russian Exclusive Economic Zone IEEQ, in particular on release and dispersion of sediment and contaminants

In the context of international HELCOM studies with Russia, the lack of data of the substances or substance groups of specific concern to the Baltic Sea in the water column, biota and sediments, has been pointed out. Especially, there is a lack of the data of substances/substance groups of specific concern to the Baltic Sea, including dioxins, furans, dioxin-like polychlorinated bifenyls, short-chain and medium-chain chlorinated paraffins, endisulfan, nonylphenols, etc (HELCOM recommendations), from the water column, biota and sediments from the eastern part of the Gulf of Finland.
The questions on the risks related to high concentrations of toxicants due to the influx from the Neva River and other rivers have not been answered.

From Nord Stream answer:
"In addition to natural processes of land uplift and re-suspension, human activities such as bottom trawling for demersal fish also release sediments and nutrients and contaminants in it to the water column. A report from Coalition Clean Baltic estimates that 5,000-15,000 km2 of seafloor is trawled per year in the most intensively trawled 60×60 km rectangles of the Baltic Sea. This means that the seafloor in these regions is trawled 1-4 times per year. Floderus & Pihl (1990) estimate that the sweep and the bottom rope of a trawl penetrates 5-10 cm into the sediment which is thereby re-suspended. Nilsson & Rosenberg (2003) report penetration depths in the same range. Assuming a porosity of 30 % and a density of 2 650 kg/m3, between 200 and 1 200 million tonnes of sediment is re-suspended by bottom trawling in one intensely trawled 60×60 km rectangle. This means that much more sediment is annually resuspended by bottom trawling activities in the Baltic Sea than will be totally released from the activities associated with the construction of the pipeline."

Comment of Estonia:

Assuming that this statement is correct, we should expect re-location of the upper 5-10 cm of sediment 1-4 times of a year, and 200 and 1 200 million tonnes of sediment is re-suspended by bottom trawling in one intensely trawled 60×60 km rectangle.

It has three relevant implications: (1) the studies of Nord Stream and the data provided in the EIA atlases dealing with the upper 2-6 cm of the sediments are somewhat indicative of the polluted areas, but inconclusive, because these sediments are relocated due to currents and human impacts; (2) the most relevant data about the contamination in the depths of 10-50 cm are missing or insufficient and should be studied in course of the forthcoming environmental sea bed studies, including the coring and sampling of sediments; (3) the toxicants, once remobilized from the depths of more than 10 cm, remain movable in the suspension for longer periods being recycled by currents and human impact, and introducing the bioavailable components over a longer period of time, i.e. for several years.

The modeling results cannot be trusted, because (1) the models are not verified with the measurements of the current fields that are very complex due to the complicated bottom relief and (2) the input data used originate from the surface sediments, that are in continuous motion due to currents and human impact.

Due to the current system of the Gulf of Finland, the remobilized toxicants travel to long distances – along the coast of Finland towards the west, and due to the complicated bottom relief, the current fields bring a significant part of this contamination directly to the Estonian waters. Also, the contamination of fishes in the Gulf of Finland affects Russia, Finland and Estonia likewise.

As the baseline data of seabed geochemistry and results of the studies on the geographical distribution of contaminants, including the dioxins, from the depths of 10-50 cm in the Russian EEZ are still not available for the affected parties. According to the maps in the report of Perttilä et al (2006), the anomalies of most toxicants occur in the north-eastern part of the Gulf of Finland. These maps, based on the international publications summarizing the results of Finnish-Russian joint studies give more detailed and different results than the generalized "contamination level" maps in the Russian EIA (see Appendix 3).

It is recommended that the geological sections and corresponding maps of the occurrences of the toxicants should be presented.

Especially, there is a lack of the data of contaminants, including dioxins from the depths of 10-50 cm in the eastern part of the Gulf of Finland. In the context of international HELCOM studies with Russia, the lack of the dioxin data has been also pointed out. In case of the lack of these data, an environmental study in the Russian EEZ should be undertaken for drilling the bottom sediments for evaluation of the toxicants, including dioxins.

2.2 Incomplete and inaccurate information on the conventionaland chemical munitions in the EEZs of all parties of origin and mercury containers in the EEZs of Sweden and Denmark

From Nord Stream answer:

Subsequent to the finalization of the Espoo Report for public review the munitions survey n the Russian sector was completed. A.ccordingt o the latest survey results (as of August 2009) the current pipelines' route necessitates the clearance of 27 munitions in Finland, ne in Sweden and in the order of 20 in Russia in the 50 m wide security corridor.

Comment of Estonia:

The information on the transboundary impacts and the risk analysis of the eventual munitions clearance in the Russian EEZ was missing in the transboundary EIAs and has not been presented to Estonia. Estonia has not been sufficiently informed on the planned munitions clearance in the Russian EEZ and has not been given the opportunity to evaluate the quantitative assessment of the environmental impact. In this respect, Estonia considers that the developer has not followed the Espoo EIA rules on the transboundary environmental impact assessment.

2.3. Environmental impact assessment after design changes, missing environmental impact assessment and risks of using the dynamic lay barge, unclear risk analyses, incomplete evaluation of cumulative risks in the context of potential crossing of the pipelines with the planned Baltic Connector pipeline.

From Nord Stream answer:

„The Espoo Report assessed the project in terms of the current project design. The environmental impact assessments based on the current project design. The risk assessment was revised to take the new project plans into consideration."

Comment of Estonia:

Removal of the platform near Gotland:

In the explanation, it is claimed that the initial pressure of the current design (without the platform) is not higher than in case of the original design. However, usually, longer distances of transport require higher initial pressures. It can be understood that in the Espoo EIA, hundreds of pages were dedicated to the "old design". Now there is a brief statement, that the initial pressure is not higher in case of the "new design", but the readers and experts are left in the darkness about the details. Because the "old design" has been abandoned, Estonia recommends that the "new design" should be described as carefully as the "old design". The claim that the initial pressure will not be higher, needs more detailed explanation.

From Nord Stream answer:

„The Seismic Design Basis for the Nord Stream Pipeline is established based on a dedicated Probabilistic Seismic Hazard Assessment performed by D'Appolonia. These documents have been verified by Det Norske Veritas (DNV)"

„Note: the study includes the recent Kaliningrad earthquake which occurred on September 21, 2004 (Mw = 4.8). This earthquake is the strongest instrumentally recorded earthquake in the Baltic region (Husebye and Mäntyniemi, 2005). 05).The main shock was preceded by an earthquakeo of Mw = 4.7 two hours before and was followed by a smaller event (Mw = 4.1) four minutes later.

Comment of Estonia:

"This study of D'Appolonia dated November, 2007 and confirmed by Det Norske Veritas appears to be out of date with respect of the Kaliningrad earthquake. Gregersen et al. 2007, in a mainstream research paper published in *Physics of the Earth and Planetary Interiors, 164, 63-74*, provided the data for two earthquakes on Sept. 21, 2004, with an error of 0.15: Mw = 5.04 (11:05 UTC) and Mw = 5.22 (13:32 UTC).

Although this paper was available online from June, 26, 2007, it appears that the authors of the D'Appolonia report were not aware of it. However, it makes the most recent strong earthquake in the Baltic Region 0.4 magnitudes stronger.

Moreover, by the time of the public consultations in March, 2009, another relevant earthquake, in southern Sweden was well known, but it was neither reported not considered in the risk analysis.

On December, 16, 2008, an earthquake occured near the Sjöbö, 60 km east of Malmö, with the reported local ML values from 4.6 to 5.8 magnitudes (University of Bergen 4.7; Geological Survey of Denmark and Greenland and US Geol Survey 4.8; University of Helsinki 4.9; Helmholz-Zentrum Potsdam – Deutsches GeoForschungZentrum 5.4)
(Voss et al., 2009; *Geological Survey of Denmark and Greenland Bulletin 17, 9-12*;
http://www.geus.dk/publications/bull/nr17/nr17_p09-12.pdf)

In public consultations, Nord Stream has announced that the overall risk analysis has been based on these seismicity data that has been also confirmed by Det Norske Veritas. Accordingly, this overall risk analysis is no longer valid.

From Nord Stream answer:

Nord Stream conducted a comprehensive risk assessment of the pipelines, the results of which have been included in the technical design of the pipes. For the pipeiine operations phase, detailed analyses have focused on the causes and consequences of a subsea gas release:
- Corrosion (internal and external)
- Material and mechanical defects
- Natural hazards, e.g. current and wave action, storm
- Other/unknown, e.g.sabotage, accidental transported mines
- External interference, e.g .fishing, navy and commercial ship traffic, etc.
Risks to pipeline integrity deriving from these causes have been considered in the pipeline design. The resulting pipeline design is robust and the probability of damage through different scenarios very low.

Comment of Estonia:

Estonia, based on the experts' analyses, has found out that several risks are underestimated more than 100 times, mostly because of false premises. For example, the ship routes have been considered to cross the pipeline, but most of the ships travel along the pipeline. This increases the accident risk at least 100 times, that means the probability of a catastrophe in 50 years of operation is as high as 30%. Taking into account that not only a few crew members but thousands of passengers could lose his life in the catastrophe, the zero risk is impossible and the F-N curve (Accident frequency vs. Number of fatalities) will be totally shifted into the unacceptable sector.

With this risk level, the construction any gas pipeline in the East-West direction along the Gulf of Finland is inadmissible.

If the authorities of some Parties of Origin nevertheless would permit the construction of the pipeline in his EEZ, they take the responsibility for eventual accidents, likewise they take the liability to compensate the human, environmental, and economical damages caused to Estonia and Estonian citizen and inhabitants by the accident.

Before any practical steps towards the construction, if it nevertheless will be permitted, the developer is requested to state who will take the responsibility for eventual accidents and to describe the mechanism and the calculation basis of the extent of the compensations paid to Estonia and other affected parties in case of accidents with human casualties or in case of the damage to the environment caused by the Nord Stream pipeline or any operations of Nord Stream or its subcontractors in any project-related activities.

2.4. Cumulative risks in the context of the EU habitat and bird directives, cumulative effects of nutrient and toxic matter released to the food chain, impact of toxic contamination of fish to piscivorous birds and mammals, potential future Natura 2000 areas within the 20 km impact corridor.

From Nord Stream answer:

The total amount of the different organic contaminants modelled to be available for bioaccumulation during the construction phase of the Project has been assessed to be relatively low. In summary it is assessed that bioaccumulation and/or biomagnification of organic contaminants in fauna is not likely to happen from the pipe lay activities and that impacts from dispersion of toxic substances will have no measurable effects regarding accumulation or biomagnification of substances in the food chain. As a precautionary approach had already been taken in the assessment, the findings did not demand for additional assessments of further bioaccumulation and biomagnification.

In summary, no significant potential cumulative impacts were identified.

Comment of Estonia:

Concerning specifically the Russian EEZ, it has not been demonstrated what concentrations of toxicants will be released from the depths deeper than 10 cm. Thus, there is a great uncertainty concerning the input data.

Concerning the statement on "no measurable effects regarding accumulation or biomagnifications of substances in the food chain", it should be pointed out that according to HELCOM (2004), the average dioxin level of the Baltic herring population in the eastern part of the Gulf of Finland was already higher than 4 pg/g WHO-TEQ, exceeding the EU normative of the allowed concentration. This means, that any additional impact will increase the pressure to the fish populations and prolong the time when the population could reach lower toxicity.

Also, the quantitative data does not support the statements. **According to the Russian data (Shelepchikov, A.A., et al., 2008) "The special concern is caused by the high concentration of dioxin-like polychlorinated PCBs" and "all studied sea fish and its products are near or exceed levels established by the EC Council maximum levels for fish and fishery products in Russia (Kaliningrad Region)"**

The risk analysis was based on the false premise that the fish are contaminated with toxicants by diffusion only and did not take into account the concentration of dioxins in the breast milk for 50 times. It is a relevant information to the authorities of all countries that the Baltic herring population in the eastern part of the Gulf of Finland already has the toxicity level above the EU norm and that it is toxic to the breast-fed infants who will eventually suffer because of the impact to the development, mineral formation in teeth and carcinogenic effects. According to the norms of the Finnish food safety authority, EVIRA, consumption fish with this level of contamination should not be higher than 200 grams per month.

2.5. Missing environmental impact assessment of the route alternatives including the overland alternatives and of all subcontracted activities

From Nord Stream answer:

Nord Stream would like to emphasize that an onshore pipeline is considered to be a different type of project and not an alternative.

Comment of Estonia:

According to the EU EIA directive and related documents, on which the Espoo EIA process is based in the European Union, in the context of trans-boundary environmental impact assessment, any different solution is considered as an environmental alternative – including different ways of transport. In particular, any other routes of similar infrastructures, e.g., pipelines through Byelorussia and Poland, Ukraine or the Baltic States, are equally relevant alternatives from the environmental point of view and should be thoroughly assessed as alternatives from the environmental point of view.

In the process of the EIA according to the Espoo Convention, the developer should not be affected by any preferences related to economical or political perspectives.

This aspect has been emphasized by many EU Member States knowledgeable of the EU EIA recommendations and it is one of the main weaknesses of the Espoo EIA, that leaves it essentially to an unfinished status.

From Nord Stream answer:

„To lay the Nord Stream pipelines with maximum efficiency and in compliance with all healths, safety and environmental (HlSE) regulations customized logistics infrastructure the Baltic Sea region is required. The selected infrastructure comprises e.g. harbors, quarries, transportation and transshipment facilities. Nord Stream would like to explicitly state that the infrastructure used by the Project is not part of the Project as it has already been in place prior to Nord Stream. Nord Stream has ensured that our contractors have the relevant construction and operation permits in place.

The EU EIA Directive requires to assess direct and indirect environmental impacts caused by a project. This impact assessment has been carried out by Nord Stream throroghly. However, the Directive does not require to assess impacts by other projects or third parties, even if such infrastructure is uses by the project, but already permitted according to relevant national legislation. Therefore it is not requires under the EU EIA Directive to assess environmental impact of pipe production as part of the Nord Stream project."

Comment of Estonia:

This question addresses the literacy in understanding the EU EIA directive and the guidance for its implementation. By default, the environmentally conscious developer is expected to follow the standards recommended both in the strict rules and in the recommendations for their implementation.

The question on the overall environmental impact of the project is not concerning the pre-existing infrastructure, but particular activities and investments to new infrastructure by the project promoter and its subcontractors. For example, Nord Stream has publicly taken pride of providing the jobs in the pipe construction plant in Mukran, Island of Rügen and established installations and storage areas for technical operations in different countries. These and other operations of similar kind operated by Nord Stream within the general budget of the project are inseparable parts of the project in terms of environmental impact and, according to the recommendations of E.R.A. (see below) should be included to the environmental impact assessment.

The official web site of the EU EIA directive is supplied with a guidance for its implementation, including the report "EIA Review Check List", composed by one of the main consulting organization of Nord Stream in the questions of the Espoo EIA, E.R.A from Great Britain. E.R.A. has provided the standard instructions and check-list for the evaluation of the EIAs, including, e.g., the following relevant points:

1.7 Are the activities involved in construction of the project all described?
1.8 Are the activities involved in operation of the project all described?
1.9 Are the activities involved in decommissioning the project all described? (e.g. closure, dismantling, demolition, clearance, site restoration, site re-use etc)
1.10 Are any additional services required for the project all described? (e.g. transport access, water, waste disposal, electricity, telecoms) or developments (e.g. roads, harbours, powerlines, pipelines).

Estonia has received from Sweden the developer's comments on four issues concerning the Nord Stream environmental impact assessment (EIA) process. Unfortunately, the material presented is addressing some issues in rather general terms and does not cover the most critical key questions of the EIA. The materials submitted by Estonia for June 8 containing the relevant questions, most of which have remained unanswered, are appended to this letter. Estonia keeps waiting a well-substantiated and systemic answer to them in the format of a chapter of transboundary impacts (see below).

The Environment Committee of the Parliament of Estonia is discussing the subject concerning Nord Stream on 15th of October, so we are planning to send You the additional opinion after that.

1.11 Are any developments likely to occur as a consequence of the Project identified? (e.g. New housing, roads, water or sewerage infrastructure, aggregate extraction)
1.12 Are any existing activities which will alter or cease as a consequence of the Project identified?
1.13 Are any other existing or planned developments with which the Project could have cumulative effects identified?

1.22 Are all the processes involved in operating the Project described? (e.g. manufacturing or engineering processes, primary raw material production, agricultural or forestry production methods, extraction processes)
1,23 Are the types and quantities of outputs produced by the Project described? (these could be primary or manufactured products, goods such as power or water or services such as homes, transport, retailing, recreation, education, municipal services (water, waste, etc))
1.24 Are the types and quantities of raw materials and energy needed for construction and operation discussed?
1.25 Are the environmental implications of the sourcing of raw materials discussed?
1.26 Is efficiency in use of energy and raw materials discussed?
1.27 Are any hazardous materials used, stored, handled or produced by the Project identified and quantified?
- during construction
- during operation
- during decommissioning

1.28 Are the transport of raw materials to the Project and the number of traffic movements involved discussed? (including road, rail and sea transport)
- during construction
- during operation
- during decommissioning

1.29 Is employment created or lost as a result of the Project discussed?
- during construction
- during operation
- during decommissioning

1.30 Are the access arrangements and the number of traffic movements involved in bringing workers and visitors to the Project estimated?
- during construction
- during operation
- during decommissioning

1.32 Is the housing and provision of services for any temporary or permanent employees for the Project discussed? (relevant for Projects requiring migration of a substantial new workforce into the area for either construction or the long term)

Estonia points out that following of these guidelines outline the best practice in implementing the EU EIA directive, and environmentally conscious developers follow these guidelines.

2.6 Need for an adequate analysis of transboundary impacts on Estonia

From Nord Stream answer:

The Transboundary Impacts chapter (Chapter 11) of the Espoo Report and more particularly the transboundary impact summaries for each country are the culmination of a vast amount of work, research and investigation performed by various world renowned experts, consultancies and contractors. The short two page summary of the transboundary impacts affecting Estonia is based on the assessments... etc.

Comment of Estonia:

The consistence and clarity of the information on the transboundary environmental impact to is the main purpose of the Espoo EIA and all the related documents. Estonia emphasizes that the generalisation of the relevant results in consistent, clear and well-organised way is the responsibility of the developer.

Estonian experts have analysed not only the Espoo EIA, but also the national EIAs and several special reports and and separate comments. The formats used up to now do not satisfy the communication on the transboundary impacts for the following reasons.

First, as pointed out in the feedback of many countries, the version of EIA presented in March bears visible signs of incompleteness. Second, the data on impacts are scattered in several EIA reports, and explanation letters. Third, after the public hearing of the project, several aspects of the project have been changed. Fourth, more than twenty special reports have been produced after the public hearings, but many of them are unfinished. Fifth, different documents, and sometimes even parts of one document contain controversial information. Sixth, many results in the EIAs and special reports are biased, based on false premises or out of date.

Therefore, to fulfil the purpose of the transboundary environmental impact in the context of the Espoo Convention, the developer needs to provide a comprehensive, coherent, clear and quantitative special chapter on the transboundary environmental impact to Estonia, giving the final, updated view of the project and specific impacts with quantitative impact assessments and risk analyses. The answers given by Estonia so dar can be used for updating the report and improving the analyses.

Recommendation of Estonia:

As emphasized in the general provisions, **the developer is obliged to present a complete and coherent chapter of transboundary impacts to Estonia, that was missing in the Espoo EIA and in the Finnish EIA. This should include all transboundary impacts to Estonia, emerging from Finnish, Russian, Swedish, Danish and German EEZ-s and their possible cumulative effects.**

2.7 Availability of the Russian ElA, results of the EIA are not conclusive due to at the time of publication still ongoing surveys.

From Nord Stream answer:

„Russia has signed but not ratified the Espoo Convention Russia is, however, participating in the Nord Stream Project Espoo consultatiom process as a Party of Origin to the extent possible under its legislation. The Russian EIA was not released to the other Baltic States prior to mid of July 2009 as this is not required in terms of Russian Legislation. The Espoo Report has however made use of the Russian EIA and all other nationa ElAs and therefore contains all transboundary impacts identified."

Comment of Estonia:

It is the developer's responsibility to get necessary permissions for distributing the information. According to the stamps on the Russian EIA report, it was ready for distribution in November, 2008, at least in Russian version.

Up to now, Estonia has not officially received the Russian EIA neither in Russian nor in the official English translation. According to the latest information, even the parties of origin have not received it. An unofficial translation has been made available in the Nord Stream web site not before July, 2009, i.e., after the previous round of the Espoo EIA consultations. The validation of this information by Russian Competent Authority and the responsibility for the contents of this translation remains

unclear.

The developer has to be aware, that in the current situation, the environmental impact statements for the eastern part of the Gulf of Finland cannot be verified. Already almost a year has been lost in delivering the information, and, as this has delayed the evaluation of the environmental impact assessment, further delay will lead to the risks of a considerable delay of the project.

The summary of the Russian EIA within the Espoo EIA is a narrative that lacks the argumentation and quantitative evaluations and risk analyses; it is not of much use for evaluating the report.

Starting from the arrival of the authorized Russian EIAs, it is possible to go on with analysing the trans-boundary impacts to Estonia originating from the eastern part of the Gulf of Finland and the combined impacts from the Russian and Finnish EEZ-s.

Recommendation of Estonia:

The developer is encouraged to negotiate about the status of the Russian EIA and the ways how it will be made available in Russian and in English in the format that is verified by Russian authorities.

2.8 EIA methodology, the need for a worst-cases scenario assessment were gaps exist

From Nord Stream answer:

Nord Stream would like to ensure that the impact assessment methodology that was applied in the Espoo Report has been interpreted correctly.

In determining both the magnitude of the impact and the value/sensitivity of the resource/receptor, various methods were employed depending on the impact concerned.
These included:
(1) Baseline data
(2)The use of modeling techniques to determine the extent of interaction between a Project activity and the receiving environment
(3)The use of Geographical Information Systems (IS) to plot resources/receptors in relation to the pipelines' route and the sphere of influence of an impact (determined by modeling, previous studies and available literature)
(4)Statistical evaluation
(5) The results of desktop studies and field surveys into resource/receptor presence and sensitivity to specific impacts
(6) Prior experience of the EIA team in similar projects and environments
(7) External input from Project subcontractors and Baltic Sea experts in various fields

Comment of Estonia:

It appears that the major weaknesses of the Espoo EIA, other EIAs and related reports are related to the problems in applying the four first methods listed above.

(1) *Baseline data* – The data on inorganic and organic toxicants from the topmost 2 to 6 cm of the bottom sediments can be useful as proxies of a nearby active pollution source, but are useless for estimating the remobilisation of toxicants from the depths more than 10 cm during seabed interventions in connection with laying the pipeline and munition clearance. Moreover, it has been argued by Nord Stream with a reference to Coalition Clean Baltic, that the 5-10 cm of the bottom sediments are recycled by human impact 1-4 times a year. Consequently, most of the geochemical data and the corresponding sheets of the Espoo EIA colour atlases turned out to be a background information, but not the main signal in terms of environmental impact assessment.

(2) *The use of modelling techniques to determine the extent of interaction between a Project activity and the receiving environment* – It has been found out that in many cases, models have used irrelevant baseline data, false premises about the processes, or are unsuitable for the specific environment (see the details in the appendices).

(3) *The use of GeographicaI Information Systems (GIS)* – It appears, that the applications for plotting colour pictures have been more successful than the applications for the geographical data analysis. The presentation of, e.g., geochemical information, on maps is very poor. Partly, it is due to lack of data. Therefore the collection of sufficient data on seabed geochemistry in deeper layers and using GIS for plotting the isolines of the geochemical anomalies is encouraged.

(4) Statistical evaluation – The knowledge of the basics of statistics and some skills in handling spatial data would be helpful for using this approach. The lack of these skills is evident from the EIA report and its supplements (e.g., the report **"Offshore pipelines through the Baltic Sea. Environmental Field Survey Finland 2009. July, 2009. Nord Stream G-PE-PER-REP-100-03240000-A"**, used as a basis for argumentation in point 2.12 below).

(5) Instead of spatial analysis of geographical data points, overall averages are often used, or, averages of two values differing for more than two times, are calculated. The error limits and significance are not familiar for the team that carried out the statistical evaluation. Most of the argumentation based on averages, medians or other such values is statistically illiterate and its implication is that most of the related impact assessments and risk analyses are erroneous.

From Nord Stream answer:

lmpact mitigation

Nord Stream is in the process of compiling a detailed Environmental and Social Management Plan (Construction) which will also include monitoring techniques to determine the accuracy of the Espoo Report and the effectiveness of the mitigation measures.The ESMP will address issues of concern including munitions clearance, the impacts on Natura 2000 sites and MPAs, and seabed disturbance and the associated increase in turbidity and contaminants.

Comment of Estonia:

The monitoring programme of the Nord Stream project has been in the agenda of several expert meetings, including Hamburg, September, 2008. However, the affected parties were presented very premature versions of the monitoring programme that had failed to recognize the depth zones and ecological zonation of the Baltic Sea. There has been no signal that the monitoring programme is dropped from the agenda, and the finalizing of the Espoo EIA is so far incomplete. Any attempts of the developer to escape the finalizing and negotiating the monitoring programme with all affected parties should be interpreted as the failure to complete the Espoo EIA process.

So far, the contents and terms of reference of „Environmental and Social Management Plan" have not been discussed with all the affected parties. In some documents, it appears that this plan is selective in terms of the parties and is planning to discriminate the „only affected parties". It should be emphasized that monitoring is the obligatory component of the Espoo EIA and should be negotiated with all affected parties.

As the ESMP foresees also mitigation of the munition clearance, the developer should present these to Estonian authorities for discussion prior to any activities in the Gulf of Finland.

Also, as ESMP is dealing with the mitigation of all impacts, it is advisable to complement it with the budget for compensation mechanisms in case of eventual accidents with human casualties or environmental impact.

Recommendation of Estonia:

Before any practical steps towards the construction, if it will be permitted, the developer is requested to state who will take the responsibility for eventual accidents and to describe the mechanism and the calculation basis of the extent of the compensations paid to Estonia and other affected parties in case of accidents with human casualties or in case of the damage to the environment caused by the Nord Stream pipeline or any operations of Nord Stream or its subcontractors in any project-related activities, or residual impacts.

2.9 Consideration of the EU energy and climate package

From Nord Stream answer:

Gas demand figures used by Nord Stream are based on the DG Trend Study 'Trends to 2030. Update 2007 as of April 2008. This study was conducted by the University of Athens, and commissioned by the European Commission.

The question on the EU energy and climate package is not answered.

2.10 Foreseen procedures for new structure crossing the pipelines, restrictions

From Nord Stream answer:

If and when other pipeline connections gain approval, Nord Stream will work together with the new pipeline proponent to ensure that the Nord Stream pipelines are crossed safely with minimal environmental impact.

Comment of Estonia:

Evaluation of cumulative risks, including the risks with the planned future infrastructure, and their transboundary impacts is part of the EU EIA procedure.

The Baltic Connector is indicated in the Nord Stream EIA as future infrastructure.

This question was presented in the Espoo EIA context and concerns risk analysis of the two crossing pipelines prior to the planning of the construction of Nord Stream pipeline.

Recommendation of Estonia:

To provide the environmental impact assessment and risk analysis of the potential explosion of two Nord Stream pipelines in case they are crossed by a new pipeline in the Gulf of Finland.

2.11 Existance of a restriction zone in the Estonian EEZ during construction, involvement of cable owners, use of guard ships, inadequate consideration of the impact of the project on the economy and the environment of the parties of origin and the affected parties.

As shown by the analysis in the Estonian report of June, 8, 2009 carried out according to the guidelines for implementation of the EU directive, the "EIA Review Check List", the baseline assessment is incomplete and insufficient, and cannot be used as a basis of further conclusions.

The plan to establish a safety zone extending accross the Estonian border has been forwarded to the relevant authorities and not commented here.

2.12 Insufficient assessment of impact on the sea life from the oncological aspect, liability for environmental damage, impact of released chemicals

The information on bioaccumulation and bioconcentration is inaccurate, and therefore, incorrect. The dioxin accumulation in the foodweb varies among the fish species and even within different age groups of the same species; it accumulates differentially in different tissues. Also, it differs among the sea invertebrates. Thus, specific behavior of toxicants in case of each species is relevant and overall generalizations are misleading.

The effect of foodweb magnification is underestimated and is not in accordance with the modern knowledge. Also, when breast-feeding mothers consume even small amounts of fish, the rise of the concentration of dioxins in breast milk for 50 times affect the doses consumed by infants and represent serious health risks. Marine mammals, on the other hand, consume fatty tissues of fishes like the cod liver that is a trap of dioxins showing the values close to 100 pg/g in the Baltic Sea, while the muscle tissue of cod is well below 4 pg/g.

From Nord Stream answer:

„Dioxin concentration in the same sample 64 pg/g, normalized 43 pg/g exceeded the lower sediment criterion, but was less than 10% of the upper criterion"

Comment of Estonia:

According to the report **"Offshore pipelines through the Baltic Sea. Environmental Field Survey Finland 2009. July, 2009. Nord Stream G-PE-PER-REP-100-03240000-A"**, the WHO-TEQ dioxin concentration in the upper layer (0-12 cm) is 23 pg/g and in the middle sample below it 64 pg/g. The report is careless and does not provide the interval for the sample with the highest concentration. Apparently, the authors of the texts have thought that they will find the mean value of 64 and 23, to get 43 pg/g and have called the latter "normalized" value. At the end, they have used this "normalized" value to conclude that it was less than 10% of the 500 pg/g. This kind of manipulations with figures are not only statistically illiterate, but also dangerous to any decisions that may affect human lives, especially in case of maximum concentrations of toxins or, in evaluation of risks of explosion of the gas pipe.

Unfortunately, this kind of statistically illiterate approach and argumentation is typical of many papers in the Espoo EIA documentation and its supplements.

In spite of these unprofessional aspects of documentation and interpretation, this field study alerts that in a random sample on the pipeline route, near the impact area of the Kymijoki River, the WHO-TEQ concentration reached 64 pg/g, which is more than two times higher than Nord Stream suggested in the Espoo EIA by selective choice of the literature data. In fact, in the paper of Verta et al. (2007), values above 300 pg/g are documented at the sites closer to the mouth of the Kymijoki River. From the studies of Isosaari (2002, 2004), it is expected that the values decrease gradually from the mouth of the river towards the sea basin. It is expected that the concentrations above 60 pg/g or higher can be found in a longer part of the gas pipe route and it is urgently recommended that this area should be studied in more detail.

Also, the report of Perttilä et al. (2006) indicates that high concentrations of toxicants are expected to occur in the sediments deeper than 10 cm in the eastern part of the Gulf of Finland.

2.13 Impact on cultural heritage, sediment movements and their impact on the location of wrecks

Comment of Estonia:

Correct assessment of the currents and sediment transport are needed, with calibrated models supported by the field data. (See other comments on the modeling of currents and sediment transport).

2.14 Questioning of the impact assessment results as an uncalibrated model was deployed and missing assessment of sediments with destroyed cohesive structure

From Nord Stream answer:

Both calibration and annual evaluation are on a regional scale and no special emphasizes has been paid to the bottom currents in the Gulf of Finland. However since it is well known from the boundary theory that the velocity decreases towards a wall/ a bottom this has not been given a high priority, and the model is assumed to give reliable results in the Gulf of Finland.

Comment of Estonia:

The above statement is true if a wall or a bottom is even. In case of complicated topography the near-bottom current pattern is not as simple as stated. For instance, in a channel connecting two deeper sea areas/basins, the near-bottom current could be much stronger than that in the basins. This is our main concern that the model is not calibrated in the Gulf of Finland and just assuming that the model gives reliable results without calibration/validation is not appropriate in an environmental assessment. Using a locally non-calibrated model could cause major errors in sediment and substances spreading estimates and in estimates of changes in flow structure when the pipelines will be in place.

The partial success of the model used in the EIA procedure in terms of predicting the order of magnitude of salinity and temperature [Kai Myrberg, 2008, Recent results of the EUTROPHICATION-MAPS Project, Finnish Institute of Marine Research] cannot be extended to the accuracy of reproduction of velocity fields as is clearly visible from the cited source. As the bottom of the Gulf of Finland is extremely intermittent, with a number of steep slopes and localised non-uniformities, estimates for the magnitudes of near-bottom velocities valid for smooth bottom areas are usually completely worthless for areas with rugged bottom such as the Gulf of Finland.

Based on above arguments and the fact that the model in use cannot resolve mesoscale dynamics because of its low spatial resolution (grid size systematically larger than the Rossby radius), the match of the results with reality should be understood as a pure coincidence.

Recommendation of Estonia:

There is a need for using a locally calibrated model for diminishing errors in sediment and substances spreading estimates and in estimates of changes in flow structure when the pipelines will be in place. The local field measurements are necessarry for such a calibration.

2.15 Depth of sediment sampling

All identified potentially transboundary impacts were addressed in the relevant chapter 11 of the Espoo Report.

Comment of Estonia:

It appears that most potentially transboundary impacts have remained unidentified.
Therefore, the data presented up to now are not sufficient for evaluating the environmental and health risks.

The data on inorganic and organic toxicants from the topmost 2 to 6 cm of the bottom sediments can be useful as proxies of a nearby active pollution source, but are useless for estimating the remobilization of toxicants from the depths more than 10 cm during seabed interventions in connection with laying the pipeline and munition clearance. Moreover, it has been argued by Nord Stream with a reference to Coalition Clean Baltic, that the 5-10 cm of the bottom sediments are recycled by human impact 1-4 times a year. Consequently, most of the geochemical data and the corresponding sheets of the Espoo EIA colour atlases turned out to be a background information, but not the main signal in terms of environmental impact assessment.

The impacts from the Russian EEZ via the currents to Finland and Estonia have not been identified, because no spatial geochemical data from the depths of 10-50 cm are available. These data, with their interpretation, should be provided, or, in their absence, the field studies should be carried out.

Recommendation of Estonia:

To carry out the field studies, taking sediment cores from sediments deeper than 10 cm on the pipeline route expected to be under the influence of the Kymijoki that culminated in the past, until 1984. This area should be sampled in detail and further, the GIS and spatial data analysis software can be properly used for producing the concentration maps. Similar studies should be conducted in the Russian EEZ to map the contaminants in detail in the depths from 10 to 50 cm.

2.16 Remobilization of nutrients

From Nord Stream answer:

The total amount of N and P that will be dispersed inside the GoF has been calculated to be 31 tons for Total-P and 150 tons for Total-N...

Comment of Estonia:

In the Espoo EIA report the calculations of amounts of resuspension of nutrients from the sediment intervention works was estimated based on calculations made for Baltic Proper. In the answer document different figures are presented. It is not clear on what basis these calculations were made. If a new modelling study was performed the details of this study should be presented.

2.17 Potential accidents and special concerns related to chemical and conventional Munitions

The risks of the remobilisation of toxicants during the munitions clearance have been underestimated because of misunderstanding concentration of the toxicants in the foodweb.

The risks related to the chemical munitions are underestimated. Hydrodynamical and human impacts may carry continuously new munitions to the pipeline route.

2.18 Disturbance of traditional fishing patterns, compensation, missing information on the impact of chemical and conventional munitions on fish resources on the east side of the Finnish coast, damage to fishing gear

The impact of chemical and conventional munitions on fish resources is not discussed.

2.19 Frequency of potential pipeline accidents emergency response, crossing of shipping lanes, pipeline rupture under ice

The calculations of risk analysis of accidents in the Gulf of Finland, proceeding from the methodology in appendices /19/, /20/ and /21/ of the Nord Stream document "Transboundary answers"

The Baltic Sea belongs to the seas with the most intensive ship traffic in the world. Most ship routes are parallel to the planned pipeline.

In the Finnish EEZ, 27 accidents have occurred during 18 years, i.e. 1.5 accidents per year. In past 19 years, 50 accidents have happened on the Nord Stream route.

Calculating the probability of the accident:
1.5/370/1.8429 =2.2*10^{-3}events/year/nm

In the report:
1.55*10^{-7} occ/sh/nm

With 17000 ships per year and the length of the danger zone 285 km:

1.55*10^{-7}*17000*285/1.8429 =4*10^{-1} **occ/year (not 2*10^{-3}** event/year)

With the 0.015 probability of rupture and exploitation period 50 years, the probability of the breakdown of the gas pipe is 0,3 or 30%.

The only way to get the value **2*10^{-3}** event/year is by assuming that all ship routes would cross the pipeline corridor. However, this is not the case – most ship routes are parallel to the pipelines. In case of accidents Nord Stream has estimated the maximum number of casualities to 50 people. In reality, Estonia recalls an accident with over 800 victims.

Unanswered questions:

1. In case of breaking up of the gas pipe, how wide would be the zone of the accident.
2. Who will pay for the damage?
3. In case of the accident near Helsinki and Tallinn, the gas pipe explosion would endanger thousands of lives, Who will take the responsibility if this happens?
4. What scenarios will happen when the gas will leak under the ice cover?

The probability of the pipe explosion is too high.

About the Nord Stream Pipe Line (by Ants Erm, May 2009)

The potential extent of risk.
Diameter of the pipe – 1.153 m, length – 1220*10^3 m, pressure (mean) – 160 atm, special firing energy of the gas – 39 MJ/m^3 (at 1 atm pressure), explosion equivalent – 1 kg TNT = 4 MJ/kg TNT, power of the Hiroshima bomb (HB) – 15 000 000 kg of TNT, velocity of gas in the pipe – 4 m/s.
The total energy in the pipe is 8*10^9 MJ (133 HB). In the worst case (breakup of the pipeline) 80 000 m3 of gas flows out in a minute. That means it takes about 20 minutes to form an explosive cloud comparable to a nuclear bomb.

Is such a catastrophe possible?
Nord-Stream insists that the possibility of the pipeline breakup is very low (10^{-5} – 10^{-4} y^{-1}) and less as 10 people are dying in the accident. The origin of these assumptions and results is obscure.

2.20 Environmental monitoring

From Nord Stream answer:

Once conditions and monitoring requirements are agreed upon, Nord Stream will put together a detailed and integrated Environmental Monitoring Program prior to construction. This program will be

a direct response to the environmental issues that were addressed in the environmental impact assessment – specifically those requiring mitigation measures and monitoring, and the particular reporting requirements on national levels. The spatial and temporal frequency of monitoring will vary considerably from place to place along the pipeline route. Impact monitoring during construction ensures that critical environmental impacts are within or ideally below the predicted levels. Compliance monitoring in the post-construction phases ensures that the levels of specific environmental parameters are corresponding to normal levels, compliant with laws, regulations, standards or guidelines.

Comment of Estonia:

Our main concern is related to the monitoring of transboundary impacts. Since environmental impact assessment has many shortcomings (regarding for instance assessment of sediment and substances spreading, release of nutrients from the sediments etc) we are not sure that the program developed according to the above principles will satisfy the actual needs.

Recommendation of Estonia:

First of all, pre-construction monitoring of near bottom flow structure in the construction areas must be carried out. Both, impact monitoring during construction and compliance monitoring in the post-construction phases, shall be developed taking into account the results of the required pre-construction monitoring and reassessment of possible impacts during the construction and during the operation of pipelines.

2.21 lmpacts on Natura 2000 sites

From Nord Stream answer:

The Estonian Natura 2000 sites EE 0010173 and EE 0010127 are located withint he 20 kilometres corridor. The predicted maximum range of potential negative impacts of 20 kilometres is based on the observation that noise emissions during the construction phase could cause disturbance of seals in a distance of up to 20 kilometer from the pipeline route...

Comment of Estonia:

Impact from the pipeline project to marine environment is not restricted to the noise emission. Noise emission is only one of the possible impacts. As mentioned Natura 2000 areas have also other conservation targets than seals. It is not clear from the EIA report as well as from the answer to Estonian comments in what extent the e.g. dispersion of contaminants from the disturbed polluted sediments and remobilisation of nutrients wil affect other conservation targets in existing Natura areas.

Another topic totally missing from the EIA report and ignored by the answer document is the possible effect of pipeline project to planned MPAs (new marine Natura sites) in the Gulf of Finland.

2.22 Decommissioning

Environmental impact of different options of decommissioning has not been evaluated.
Decommissioning in case of various scenarios of the pipeline damage and its environmental impact assessment should be provided

2.23 Potential impacts of the presence of pipelines on the deep water circulation in the Baltic Sea scale as well as in smaller sub-basin scales in the Gulf of Finland. release of phosphorus from the sediments

From Nord Stream answer:

It is expected that the pipelines' presence will lead to local changes in current conditions and sedimentation that may result in areas with changes in oxygen condition, either with reduced or increased oxygen content, depending on effects from pipelines and rock berms. Changes in release of phosphor, with increase in anaerobic area, and reduced release in more oxygenated areas, may locally occur. The water depth where the pipelines are located is below the halocline and below the temporary thermocline and released phosphor will not enter the photic zone. Further if phosphor is released at anaerobic conditions it will precipitate when reaching oxygenated conditions. In general it is evaluated that the effects of the pipelines and the rock berms will have only an insignificant effect on phosphor release- so that the netto budget for phosphor near the seabed only will change marginally and on a local scale only.

Comment of Estonia:

We agree that the presence of the pipelines will lead to changes in current conditions and sedimentation that may result in additional phosphorus release from the sediments. Although the release of phosphorus is taken place mostly below the pycnocline(s), it is well known that the changes in sediment-water fluxes influence the content of nutrients in the euphotic layer, especially in the sea areas with strong horizontal salinity/density gradients, as the Gulf of Finland is. Therefore, without specific model exercises, it is not possible to assess whether this additional release is insignificant or not and whether the impact is local or regional.

Regarding the potential impact of the presence of the pipeline on the salt water inflow, I would like to note that the comments of the NordStream are controversial. For example, in the document „Transboundary answers" directed to Finnish and Estonian relevant authorities it is stated that "[SMHI – the Swedish Meteorological and Hydrological Institute] is currently updating the background memo" while this memo (SMHI report 2007-61) is characterised as „extensive and sufficiently detailed" in the answer to Swedish authorities.

As the inflow of salt water through Danish Straits into the Baltic Sea has an extremely important role in functioning of the entire Baltic Sea ecosystem, any deviations of this inflow properties from the natural course may have devastating consequences. In particular, the SMHI states that „The Institute does not agree with the conclusion presented to the effect that it has been found that the pipelines will not block the inflow of deep water through the Arkona and Bornholm Basins. The investigation shows that no effect can be identified, but it does not say that it has been established that the pipelines will not affect the inflow" (see Enclosure to Answer from Sweden, 2009-06-08, p. 3). Also, the SMHI has the opinion (which coincides with the opinion of Estonian experts) that increased turbulence around the pipeline may increase the mixing of inflowing saltwater, and this does not reduce the effects of eutrophication in the Baltic Sea.

Recommendation of Estonia:

To carry out the necessary field measurements and specific model exercises to assess the impact correctly.

2.24 Missing information on near-bottom flows that control spreading of sediments and released substances, missing information on the impact of the field of internal waves on the pipeline and the surrounding sediment

The dedicated note on internal waves in the Baltic Sea has been made available to Estonian experts as Appendix 17 of "Transboundary Answers." This note, however, describes the generic features of internal waves and correctly notes that such waves can occur in any location where a pycnocline exists, that is, almost in entire Baltic Sea basin. The major conclusion in this note (that internal internal

waves are too small to be of relevance for the EIA of Nord Stream) has been made based on typical flow velocities of **non-breaking** waves. It is well known that velocities in **breaking** waves (which cause most of sediment resuspension in micro-tidal marine environments and which are the major concern of Estonian experts) exceed those, at least, by one order of magnitude. Consequently, the near-bottom velocities in the zone of breaking waves are underestimated by at least one order of magnitude (that is about 10 times or more) and the information about the impact of the field of **internal waves** on the pipeline and the surrounding sediment is still missing. Moreover, even if internal waves mostly travel along a more or less fixed route, owing to large variations of the pycnocline depth in the Gulf of Finland they affect largey different areas of sea bottom in different seasons.

This gap means that the amount of potentially contaminated sediments released into water column both in installation and operational phases, with subsequent consequences to the concentrations of toxic substance in the food web, and contributions to the probability of mechanical damage to the pipeline in operational phase and its structural failure, with subsequent increase in the risks connected with gas leaks, explosions, and interactions of ship traffice with the pipeline, is severely underestimated as noted above.

2.25 Anisotropic pollution transport patterns in the Gulf of Finland

The answer to this issue raised by Estonia is irrelevant. The spatial resolution of the circulation models in use obviously is not fine enough to resolve mesoscale circulation in the Gulf of Finland and thus the match of many of the model results with reality is pure coincidence. This is specifically important for Estonia, the EEZ and coastal area of which may be under increased pressure created by anisotropic transport patterns in the Gulf of Finland. In terms of the amount of various toxic substances, the presence of these patterns may several times increase their actual transport rate from the area of the pipeline in the Gulf of Finland to the Estonian coastal zone.

2.26 Seismic risk analysis

From Nord Stream answer:

„The Seismic Design Basis for the Nord Stream Pipeline is established based on a dedicated Probabilistic Seismic Hazard Assessment performed by D'Appolonia. These documents have been verified by Det Norske Veritas (DNV)"

„Note: the study includes the recent Kaliningrad earthquake which occurred on September 21, 2004 (Mw = 4.8). This earthquake is the strongest instrumentally recorded earthquake in the Baltic region (Husebye and Mäntyniemi, 2005). 05).The main shock was preceded by an earthquakeo of Mw = 4.7 two hours before and was followed by a smaller event (Mw = 4.1) four minutes later.

Comment of Estonia:

"This study of D'Appolonia dated November, 2007 and confirmed by Det Norske Veritas appears to be out of date with respect of the Kaliningrad earthquake. Gregersen et al. 2007, in a mainstream research paper published in *Physics of the Earth and Planetary Interiors, 164, 63-74*, provided the data for two earthquakes on Sept. 21, 2004, with an error of 0.15: Mw = 5.04 (11:05 UTC) and Mw = 5.22 (13:32 UTC).

Although this paper was available online from June, 26, 2007, it appears that the authors of the D'Appolonia report were not aware of it. However, it makes the most recent strong earthquake in the Baltic Region 0.4 magnitudes stronger.

Moreover, by the time of the public consultations in March, 2009, another relevant earthquake, in southern Sweden was well known, but it was neither reported not considered in the risk analysis.

On December, 16, 2008, an earthquake occured near the Sjöbö, 60 km east of Malmö, with the reported local ML values from 4.6 to 5.8 magnitudes (University of Bergen 4.7; Geological Survey of Denmark and Greenland and US Geol Survey 4.8; University of Helsinki 4.9; Helmholz-Zentrum Potsdam – Deutsches GeoForschungZentrum 5.4)
(Voss et al., 2009; *Geological Survey of Denmark and Greenland Bulletin 17, 9-12*; http://www.geus.dk/publications/bull/nr17/nr17_p09-12.pdf)

In public consultations, Nord Stream has announced that the overall risk analysis has been based on these seismicity data that has been also confirmed by Det Norske Veritas. Accordingly, this overall risk analysis is no longer valid.

2.27 Risk from the potential crossing of the Nord Stream with the Baltic connector gas pipe in the Gulf of Finland

From Nord Stream answer:

If and when other pipeline connections gain approval, Nord Stream will work together with the new pipeline proponent to ensure that the Nord Stream pipelines are crossed safely with minimal environmental impact.

Comment of Estonia:

Evaluation of cumulative risks, including the risks with the planned future infrastructure, and their transboundary impacts is part of the EU EIA procedure.

The Baltic Connector is indicated in the Nord Stream EIA as future infrastructure.

This question was presented in the Espoo EIA context and concerns risk analysis of the two crossing pipelines prior to the planning of the construction of Nord Stream pipeline.

Recommendation of Estonia:

To provide the environmental impact assessment and risk analysis of the potential explosion of two Nord Stream pipelines in case they are crossed by a new pipeline in the Gulf of Finland.

2.28 Completion of the environmental impact assessment

From Nord Stream answer:

Nord Stream would like to emphasize that after publication of the Espoo Report Nord Stream has continued their work in many aspects, such as finding agreements on compensation the relevant fishery organizations, detailing the monitoring program on a national basis and elaborating a variety of action plans.

Conclusive commendations of Estonia:

(1) **The overall recommendation of Estonia that has been clearly expressed in several written documents and during the consultations, is, that the developer is obliged to present a complete and coherent chapter of transboundary impacts to Estonia, that was missing in the Espoo EIA and in the Finnish EIA. This should include all transboundary impacts to Estonia, emerging from Finnish, Russian, Swedish, Danish and German EEZ-s and their possible cumulative effects.**

(2) **According to the quantitative evaluation of the experts based on the methodology of Nord Stream, the risk of the accidents reaches 30% during the 50 years of exploitation, when the ship routes are considered parallel to the pipelines, as they actually are. Estonia finds that with this risk level, the construction any gas pipeline in the East-West direction along the Gulf of Finland is inadmissible.**

If the authorities of some Parties of Origin nevertheless would permit the construction of the pipeline in his EEZ, they take the responsibility for eventual accidents, likewise they take the liability to compensate the human, environmental, and economical damages caused to Estonia and Estonian citizens and inhabitants by the accidents.

Before any practical steps towards the construction, if it nevertheless will be permitted, the developer is requested to state who will take the responsibility for eventual accidents and to describe the mechanism and the calculation basis of the extent of the compensations paid to Estonia and other affected parties in case of accidents with human casualties or in case of the damage to the environment caused by the Nord Stream pipeline or any operations of Nord Stream or its subcontractors in any project-related activities.

(3) **Before implementation of the project the development of the monitoring programme of the Espoo EIA should be completed in cooperation with all the affected parties.**

(4) **A satisfactory geographical study of geochemical data, including dioxins, methyl mercury and other relevant contaminants should be carried out in places where the pipeline crosses the area affected by the Kymijoki River and along the pipeline route in the Russian EEZ, with sampling from the depths of 10-50 cm. This is one of the most relevant missing parts of the Russian EIA.**

(5) **The risk analyses of possible gas pipe explosion, accumulation of toxicants in the food web should be carried out by competent independent experts; risk analyses (e.g. seismic risks) should be based on updated data.**

(6) **Quantitative analyses should be statistically literate.**

(7) **The modeling of the processes in the water environment should be verified with hydrological field measurements of the current fields, especially in the Gulf of Finland, where the bottom relief creates complicated current patterns.**

Yours sincerely,

Harry Liiv
Deputy Secretary General
Point of Contact of the Espoo Convention in Estonia

Enclosures: Annex 1. Comments on hydrodynamic issues
Annex 2. Estonian position 08 June 2009
Annex 3. Review of the transboundary EIA of the Nord Stream gas pipeline (report by the expert group sent on 08 June 2009)

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