MINISTRY OF THE ENVIRONMENT

Ms Seija Rantakallio
Counsellor
Ministry of the Environment
PO Box 35
FI-00023 Government
FINLAND

12.October 2009 No.13-3-1/18601

Comments on the supplementary information in accordance with the Convention on Environmental Impact Assessment in a Transboundary Context for the Nord Stream Gas Pipeline

From September 15 to September 17 2009, Estonia has received a considerable amount of new documents concerning the Nord Stream environmental impact assessment (EIA) process. The developer presented a paper with environmental statements in 96 pages, and 23 separate reports dealing with particular issues.

Upon receipt of the material, expert consultations in the national level were started. As the first priorities, the experts were asked (1) to provide a technical control on the completeness, consistency, and quality of the presented reports, in the context of the Estonian requests of June, 8 and consultations in Helsinki; (2) to estimate the time required for giving the expert statement upon completion of the information by the developer.

According to the Article 4 of the Espoo Convention and the Finnish-Estonian agreement on the transboundary environmental impact assessment, Finland and Estonia are entitled to negotiate about the reasonable time needed for completion of the statement on the EIA.

Taking into account the amount of the materials You sent, it takes more time to evaluate the information. The Environment Committee of the Parliament of Estonia is planning to discuss the subject concerning Nord Stream and the above mentioned material, so we are not able to give You the complete answer before the 20th of October 2009.

The required format of presenting the information on the transboundary environmental impacts, the most relevant missing parts of the information and the notes on the quality of the EIA information provided so far are presented as follows.

7a Narva mnt
Tallinn 15172, Estonia
Reg nr 70001231

phone +372 626 2802, fax +372 626 2801
Keskkonnaministeerium@envir.ee
www.envir.ee

General provisions
(to the competent authorities of Finland, Sweden, Poland, Latvia and Lithuania only).

The decision-making in the EU Member States concerning the issues of environment and health is a high responsibility. Erroneous decisions may cost human lives and cause extensive health problems. The health risks of young people related to accumulation of dioxins and methyl mercury closely associated with dioxins in sediments, even in case of moderate doses, have been demonstrated worldwide. In the context of Nord Stream, the Finnish state institution with the highest competence in the field of food safety, EVIRA, has pointed out that the due to the health risks, munition clearance by exploding the mines in their present places should be avoided (cited by the statement of Uusimaa Environmental Centre):

„The Finnish Food Safety Authority (Evira) considers the current environmental state of the Baltic Sea poor. The most significant and persistent contaminants affecting the Baltic Sea are dioxins and PCB compounds. The high concentrations of dioxins, PCBs, and organotin compounds show beyond doubt the Baltic Sea's extraordinary level of pollution in comparison with other parts of the world. Evira states that the construction of the natural gas pipeline may increase the environmental load of the Baltic Sea from its current level. As the pipelines corrode, the compounds and materials used in manufacturing the pipeline may be released into the sea. Moreover, the detonations of wartime munitions will increase the toxic substance load of the environment, most likely in the form of higher lead and arsenic concentrations."
„Evira proposes a number of procedures intended to ensure that no harmful substances are taken up by fish during the construction of the natural gas pipeline. They include avoiding munitions detonations, avoiding the use of the areas with the highest contaminant concentrations for construction activities, ensuring that the excavated soil is uncontaminated, and ensuring that the compounds and materials used in manufacturing the pipeline are suitable for a brackish water environment. ***Moreover, questions that must be resolved are related to compensation to be paid in case of accidents and for the project's negative impacts on fishing and recreational use of the area, and to the future responsibilities for the decommissioning of the pipelines."***

As this is the common concern of the Finnish and Estonian scientists and state authorities with relevant know-how, Estonia asked the experts to have a closer look to this issue. For the 15th September, Estonia presented the preliminary quantitative re-assessment of the risk analysis. It was based on the comparison with the arguments used in the Nord Stream EIAs and water permission applications with those in the publications in the interdisciplinary international scientific community. It shows that Nord Stream has based its calculations on incorrect premises and may have underestimated the risks of contamination by 100 or 1000 times. If this error will remain unnoticed, it may lead to potential risks to the most vulnerable target groups of potential toxification are pregnant women, breast-fed children and young people.

As the same errors would affect conclusions on the seabed intervention, with an impact several magnitudes higher than the munitions clearance, the mutual understanding of the communication of scientific terminology and quantitative analyses should be ensured.

Estonian statements presented on 15 September 2009 that mostly agree with the statements of the Finnish EVIRA, and also the Finnish state environmental institute, SYKE, and provided additional quantitative arguments, have been partly misunderstood and misinterpreted in the

extent that may have affected the decision making on the permission on the munition clearance in the Gulf of Finland. In similar fashion, the critical comments of the Finnish Authority of Maritime Safety have received very little attention.

Estonian experts have high regard of Finnish experts at the state institutions and in academic and applied research centres, successfully applying for the EU funds targeted for the protection of the Baltic Sea, health care etc. At the same time, the Estonian experts have expressed their concern that apparently the potential of the best Finnish experts is often either ignored or their input has been overlooked in making decisions on the project with enormous impact to the ecosystem of the Baltic Sea.

STATEMENT ON THE REPORT "Transboundary answers"

General provisions

The time for answering was shorter than „reasonable time" and the statements provided are provisional, but they may guide through the major current problems.

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

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. Therefore, the responsibility of Finland and Estonia, as the EU Member States, is to prepare for taking the joint steps according to the environmental priorities of the EU Baltic Sea strategy, which are in a good accordance with the HELCOM Baltic Sea Action Plan signed in November 2007.

As only a small part of the relevant transboundary questions concerning the Espoo EIA is included to the „Transboundary answers", all the questions that are not answered as yet in the letter and the expert report of 08 June 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.

Integrating the information of the Russian EEZ to all relevant discussions on the Gulf of Finland

In point 6.1. (p. 59) of the „Transboundary answers" it has been stated that „The Espoo Report has been compiled based upon the assessments in the National EIAs and identifies and assesses impacts along the full length of the pipelines.", and in point 4.4.2. „National environmental and social monitoring programmes of Russia, Finland, Sweden, Denmark and Germany are an integral part of the Nord Stream Environmental and Social Management System and are currently being developed."

From the above two statements, it can be understood that Estonia and all affected parties are entitled to claim full-scale environmental assessments along the full length of the pipelines, including the Russian EEZ and that the baseline aspects for the monitoring system should be in place.

As the baseline data of seabed geochemistry and results of the studies of contaminants from the depths of 10-50 cm in the Russian EEZ are still not available for the affected parties, Estonia calls the parties of origin, in this case, Finland and Sweden, to ask the necessary data, and in case of refusal, to postpone the project activities until the data will become available.

Because the Gulf of Finland is a united system, it is necessary to include the data from the Russian EEZ to all the matters discussed so far only in the limits of the Finnish EEZ. From the environmental perspective, discussing the part of the gulf in the Finnish EEZ separately leads to distorted results.

Preliminary comments on the materials received in "Transboundary answers"

Given the incompleteness of the presented issues and materials and a very short time, the following answers to selected topics should be considered as preliminary. Estonia calls the developer to fill the gaps by reading carefully the report from May and especially the expert report where the issues are explained in greater detail (Annexes 3 and 4).

2.4. Pre-Commissioning Operations

The procedure of intake and discharge of water and its impact at K300 and its environmental impact should be explained in further detail. How this solution with pH=10 is operated at the sea and what are the risks to the sea life and humans.

3.1. Deep water circulation

It has been pointed out both in writing and during the consultations. From several relevant questions, only two are addressed and the explanations given are not scientifically acceptable (see separate analysis by Prof. Tarmo Soomere, Academician of the Estonian Academy of Sciences – Annex 1). As pointed out earlier, **the models used have not been compared to the field data and remain speculative, and therefore, are not usable for making the predictions on sediment transport.**

3.2.1. Studies on sediment release

p. 13. (also copied to answers to Latvia, Lithuania and Poland):
"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."

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 is also known that the sediments uppermost layers are also continuously re-located by currents. In this context, most of the Nord Stream geochemical studies of upper 2 cm and upper 6 cm have been addressing the moving sediments, that sometimes still reflect nearby anomalies in deeper sediments, but are irrelevant for any calculations of long-term re-suspension risks.

As emphasized before, and especially in the light of this statement, the relevant geochemical data on the contents of toxicants in the parts of the seabed that are presently immobile, but shall be affected by munitions clearance, and, in the greater extent, by the seabed interventions during the pipe-laying, should be obtained from the depths of 10-50 m, and in case of crater-forming munition clearance, the depths corresponding to the radius of the crater, i.e. up to 2.5 m in case of the 5 m crater, and to 1.25 m in case of the 2.5 m crater – of course in case there is a willingness to find out about environmental safety.

Moreover, when the dioxins and other sediment-bound contaminants that have been cemented together in clays or silts are released to the water due to seabed interventions in the depths over 10 cm, where the sediments most contaminated with dioxins and MeHg are located, they will stay in the circulation of the suspension for several years, first by currents, and then by trawling recycling the upper 5-10 cm 1-4 times a year, as discussed above. Most of the released particles will be in movement most of the time and will be put out of circulation either via food web or when carried to quiet regions where clay-particle size sediments can accumulate.

As of October, 2, 2009, the developer was granted the water permit by a Western Finland Permitting Authority, but Estonia has notified the Finnish authorities that the materials presented for this purpose were incomplete and that the used methodology of risk analysis and statistical approach were not appropriate, that resulted in the 100 to 1000 times lower risk estimates than the realistic ones.

It is likely that the developer will use the privilege already granted, but all the parties need to know that it has been applied by presenting incomplete and incorrect documentation and that it has not been shown convincingly that the munition clearance will not be environmentally hazardous.

3.2.2. Supplementary studies

"*Dioxins were assessed in the Finnish EIA using concentrations measured in two samples taken close to the pipeline route by the Finnish Environment Institute. To strengthen the existing baseline a supplementary environmental survey was performed in June/July 2009 in the Gulf of Finland. Sediment samples were taken from the main rock placement areas and in the vicinity of selected munitions clearance sites. The sediment samples were analyzed for nutrients, organic contaminants and heavy metals according to the same programme as in the baseline investigations in 2007 and 2008. Additional parameters included into the analysis were dioxins and furans. Some further sediment samples (down to approximately 0.5 meter, depending on penetration depth of the core sampler and sediment quality) were taken along*

the pipeline route for only dioxin analysis, making the total number of sampled locations to 33. The analysed dioxin concentrations were found to be lower than the values used in the EIA, except for one rock placement site, where the effects from River Kymijoki explain the higher concentrations. The dioxin concentrations were also compared to the threshold values in the Finnish dredging manual and all concentrations were under the threshold values for polluted sediment. These new results were in line with earlier survey results and therefore support the assessments made in the Finnish EIA. For more detailed information see Environmental field survey Finland 2009 –report /3/.

"A further clarification of the impact assessments of sediment nutrients and contaminants released during the pipeline construction activities within the Finnish project area is provided in the "Qualitative assessment of the impact of released nutrients and contaminants on plankton production and on the food chain" /5/."

Indeed, River Kymijoki, known from the EU reports already in 1999 as the most relevant point source of dioxin contamination in the Europe, was the main concern why the distribution of dioxins and mercury in the depths of 10-50 cm should be mapped geographically in greater detail, especially in the areas where its high concentrations are expected by interpolation of the distribution gradient. Initial EIA report tried to hide the Kymijoki dioxin and mercury problem.

The scarce data and the data analysis methodology used in the documents /3/ and /5/ does not support the strong statements provided above. All the arguments in the report /3/ are based on the attempts of statistical treatment of data that fail to meet even the standards of a high school text-book.

It is suggested that before granting any permissions, the permitting authority with the assistance of the Ministry of Environment should investigate this issue by letting to evaluate these aspects by an independent expert with necessary qualifications. As similar answer is given to Sweden, Estonia would welcome an input from independent Swedish experts of foodweb and ecotoxicology.

In conclusion, the document /5/ makes assumptions that are not supported by current knowledge on the behaviour of the toxins in foodweb. Some scarce statements about potential effects of dioxins are made in the literature review of the EIA report, but most of them are ignored in the risk analysis section. In case the data interpretation has been modified to accommodate the pre-set goal to show minimum risks, it fails to support the environmental statement.

A more detailed treatment of these issues is provided in Annex 2.

3.3 Risks in regard of seismic activities

„The Seismic Design Basis /13/ 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) /14/."

„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)."

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.

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 the point of view of the EIA procedure, it is curious that the Swedish and Danish EIAs and the Finnish EIA and the Espoo EIA were not supplied with the information of the D'Appolonia report and presented stories from some old text-books printed in 1994. It remains obscure, why this report from 2007, if it is adequate, was not presented during the official EIA process and its public hearings.

3.5 Maritime safety

The calculations of risk analysis of accidents in the Gulf of Finland, proceeding from the methodology in appendices /19/, /20/ and /21/.

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 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 exposion 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.

3.6 Impacts on fisheries

Statements on the quality of the report presented in May, 2009:

1. The spawning and feeding distribution as well, as the dynamics of fish stocks and fish catches statistics, in particular of commercially important marine fish species (cod, sprat, flounder and herring), are assessed at the inadequate level, because too short time period assessed in question, coincided in fact maximum two last decades, what means that the deeper stagnation period in the Baltic Sea during last 100 years were assessed only. Actually, during last 60 years there have been 16 years with high abundances of cod in the Northern Baltic Proper and Gulf of Finland with maximum annual landings of this species much above 10 000 ton's. As the Nord Stream pipe line exploitation time planned to be at least 50 years, the findings of Espoo Report that the cod is non-common in Gulf of Finland and that the bottom trawling is marginal in this area are incorrect.

2. Estonian fishermen are remarkably and efficiently fished for herring and sprat in day-time towing the pelagic trawls in near-bottom position, occurred that the trawl doors and clamps touched the bottom. The free-span pipeline sections over-trawling safety for pelagic trawl in near-bottom position (day-time fishing for herring and sprat) is not estimated and should be addressed.

Both of these statements of Estonia concerning fisheries are still unanswered because the text in the "Transboundary Answers" (14.09.2009) subchapter 3.6. is almost the same, as in the Espoo Report.
The bottom trawling is continuously claimed to be marginal in the Gulf of Finland. The adding the fishery statistics of years 2006 and 2007 is obviously not enough for this

statement. As it was settled by Estonia in June 2009, the period of equal to operation time of Nord Stream is necessary to be concerned.
The planning of special studies of free-span pipeline sections over-trawling safety for pelagic trawl, fishing in near-bottom position, is still not clear in this document. However, the differences between the possible damages on bottom trawling and pelagic trawling may exist and it should be investigated.

Conclusions

The developer should focus on the main issue of the Espoo EIA process and to provide the chapter on the transboundary impacts to Estonia that has been missing so far from the Espoo EIA and from the Finnish EIA.

Because the Gulf of Finland is a united system, this chapter should synthesize the impacts to the Gulf of Finland caused by seabed interventions and other processes in Russian and Finnish EEZs, with particular focus on the transboundary impact to Estonia. This has been and is the expectation of Estonia on the outcome of the Espoo EIA process from the very beginning, and this has been repeatedly communicated to the parties of origin.

In the new report "Transboundary answers" the developer presents a new relevant information from the Coalition Clean Baltic that in the Baltic Sea, the upper 5-10 cm of sediment is re-suspended by bottom trawling at least 1-4 times a year. Together with the evidence from the previous geochemical studies showing that the most toxic layers near the mouth of the Kymi River and several rivers in the eastern part of the Gulf of Finland lay mostly in the depths from 10 to 50 cm, it indicates that extensive geochemical studies of toxicants in the sediments in the Finnish and Russian EEZs from the depths to 50 cm are needed, especially near the point sources where the contamination of surface and subsurface sediments is known from the previous studies (e.g., Perttilä et al. 2006, MERI58 report, http://www.fimr.fi/fi/julkaisut/fi_FI/mtl_julkaisut/_files/12076504320070012/default/meri58.pdf).

Alongside the urgent aspect of dioxins that needs growing attention, the recommendations of recommendations for the EIA studies are continuously relevant and the EIA should make available or collect the relevant geochemical data on toxic substances and to provide maps on the distribution of toxicants in layers deeper than 10 cm, especially from the area near the mouth of Kymijoki River and from the eastern part of the Gulf of Finland where the maps of surface sediments from 1999 and 2003 have shown the highest contamination.

The developer should also pay particular attention to the annexes 3 and 4 submitted by Estonia already in June, 2009, where the detailed analysis of the main problems of the trans-boundary EIA have been presented.

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. Comments on documents received in 15 August, 2009
Annex 3. Estonian position 08 June 2009
Annex 4. Review of the transboundary EIA of the Nord Stream gas pipeline (report by the expert group sent on 08 June 2009)

Copy: The Western Finland Environmental Permit Authority
PO Box 115
FI-000231 Helsinki
FINLAND

Mr Egon Enocksson
Implementation & Enforcement Department
Swedish Environmental Protection Agency
SE-106 48 Stockholm
SWEDEN

Mr Ryszard Zakrzewski
Director, Department of Investment and Technological Development
Ministry of Environment
52/54 Wawelska Str.
00-922 Warsaw
POLAND

Ms Sandija Snikere
Ministry of the Environment
25 Peldu street
LV-1494 Riga
LATVIA

Mr Vitalijus Auglys
Head of EIA Division
Ministry of Environment
Jaksto 4 /9, LT-01105 VILNIUS
LITHUANIA

Maris Malva; phone +372 6260 742;e-mail: maris.malva@envir.ee