



EUROPEAN COMMISSION
DIRECTORATE-GENERAL
JOINT RESEARCH CENTRE
Directorate F - Institute for Energy and Transport
Nuclear Reactor Safety Assessment

Petten, 08/06/2016

Mission report

Name: [REDACTED]

Date(s): 26 May 2016

Place: DG ENER, Brussels (DM-28-00/S36)

Subject: Meeting between Lithuanian delegation and Commission experts from ENER/DEVCO/JRC on NPP construction in Belarus

Participants: See Annex 1, [REDACTED] (JRC F.5)

Objectives: To support DG ENER in the technical discussions on the Ostrovets NPP project in Belarus with a delegation of the Lithuanian government

1. SUMMARY:

The meeting followed the general outline provided in the Room Document in Annex 2. For each topic, a presentation was made by the Lithuanian side (with or without accompanying presentation slides) which was followed up by discussions between all participants.

A short background document was also provided (see Annex 3).

For those presentations supported by slides, the slides are provided in Annexes 4 to 8.

Lithuania has been involved in the trans-boundary Environmental Impact Assessment procedure with Belarus according to the Espoo convention since 2009. Lithuanian review of the preliminary EIA led to 39 comments on site-specific issues from the Lithuanian experts. After more than 50 exchanges of letters, the Belarusian side has not adequately responded to the issues. Lithuania complained to the Espoo committee, which agreed to launch infringement procedures and issued 12 recommendations to the Belarusian authorities. Lithuania claims that these recommendations have not been implemented. The Espoo committee proposed a technical expert meeting between the two parties with Espoo committee mediation, but Belarus rejected the proposal in favour of continued bilateral discussions which are clearly not progressing. The next bilateral meeting will take place on 21/22 June.

A representative of the Lithuanian regulatory authority provided some information on the main concerns regarding the Ostrovets NPP:

Site selection issues

- There is no evidence of a proper site selection process, with analysis of alternative sites and robust process for selecting the preferred site.

- Site evaluation has not been performed according to IAEA NS-R-3. Evaluations of the suitability of the site have not taken into consideration possible effects on the Lithuanian population and territory (the plant is located only 50 km from the Lithuanian capital city, Vilnius, with more than half a million residents and there are almost one million Lithuanian residents within 100 km radius of the plant).
- Belarus has agreed to an IAEA SEED (Site and External Events Design) Review mission, but has requested only partial scope, skipping some of the first steps, including the site selection process review and integrated site evaluation review.
- There are concerns about cross-border cooperation in case of an emergency.

Design and construction issues



- It was noted that a number of questions were raised by STUK in during the pre-licensing process for Hanhikivi. These included [redacted] inadequate physical separation and primary circuit pressure reduction.
- Delays and lack of information regarding the performance of stress tests that Belarus agreed to implement according to the ENSREG methodology.
- Concerns over the capabilities of both regulator and operator. Lack of independence of regulator.
- No strategy for spent fuel and radioactive waste management.
- There are also concerns regarding the conditions for workers on the construction site, theft of materials, poor construction quality, blame culture and non-reporting of errors, violations of on-site regulations.

The Commission provided some clarification on the issue of the stress tests: Performance of the stress tests is agreed by resolution. The national report should be ready end of 2016/ start of 2017. The peer review of the stress test report is in the ENER work programme.

Lithuanian experts presented more details on the concerns regarding geological and seismic aspects of Ostrovets and alternative sites and on radiation protection of the Lithuanian population (see Annexes 5 and 6 for more details).

There followed a presentation, and discussion with ENER experts in the field, on the need for a level playing field with regard to electricity trade in the region.

The Commission side (ENER, DEVCO, JRC) then provided some feedback on the related cooperation with Belarus. Cooperation under the INSC programme has been ongoing for some years with support provided for capacity building of the nuclear regulatory authority. The previous and

currently ongoing projects have included transfer of expertise and knowledge for reviewing safety analysis reports, joint review of selected safety issues as part of the PSAR review in the framework of the issuing of the construction licence for Ostrovets NPP, development of a strategy for radioactive waste management for Belarus, support for the review of the NPP commissioning licence application and support for the review of the updated PSAR and PSA in the frame of the NPP operating licence application.

2. CONCLUSION

Lithuania would like to continue working with the European Commission on this issue and wishes to have EC support for the resolution of its concerns and complaints by:

- bringing attention to nuclear safety issues in high level dialogues with Belarus
- exerting all possible influence to ensure stress tests are carried out
- encouraging Belarus to invite a full scope IAEA SEED review mission
- ensuring a level playing field for electricity trade in the region in the frame of the regular dialogue in the energy sector
- bringing attention to the issues in the frame of EC participation in relevant international conventions, and exerting pressure for Belarussian compliance.

It was also suggested that the IAEA Convention on Nuclear Safety (CNS) review meeting, which is to be held in the first half of 2017, could also be a suitable forum to highlight the Lithuanian concerns. In this context, it was agreed that both Lithuanian and EC experts would jointly review the Belarusian national report submitted for the next CNS review meeting (the reports are due to be issued in August 2016). Both sides agreed to organise a follow-up meeting after the next Lithuania-Belarus bi-lateral meeting scheduled for 21/22 June.

Signature:

Approval HoU:

Signature:

Date: 9/6/16

Copy:

Annex 1

1. [REDACTED], Ministry of Energy	Email address: [REDACTED] Postal address: Gedimino ave. 38, LT-01104, Vilnius
2. [REDACTED], Electricity sector division, Ministry of Energy	Email address: [REDACTED] Postal address: Gedimino ave. 38, LT-01104, Vilnius
3. [REDACTED] Energy Security Policy Division, Ministry of Foreign Affairs	Email address: [REDACTED] Postal address: J. Tumo-Vaižganto st. 2, LT-01511, Vilnius
4. [REDACTED], Energy Security Policy Division, Ministry of Foreign Affairs	Email address: [REDACTED] Postal address: J. Tumo-Vaižganto st. 2, LT-01511, Vilnius
5. [REDACTED] Environmental Impact Assessment Division, Ministry of Environment	Email address: [REDACTED] Postal address: A. Jakšto st. 4, LT-01105, Vilnius
6. [REDACTED] State Nuclear Power Safety Inspectorate	Email address: [REDACTED] Postal address: A. Goštauto st. 12, LT-01108, Vilnius
7. [REDACTED] Bedrock Geology Division, Lithuanian Geological Survey under the Ministry of Environment	Email address: [REDACTED] Postal address: S. Konarskio st. 35, LT-03123 Vilnius
8. [REDACTED] Licensing and State Register division, Radiation Protection Centre under the Ministry of Health	Email address: [REDACTED] Postal address: Kalvarijų st. 153, LT-08221, Vilnius
9. [REDACTED] market development division, Transmission system operator LITGRID	Email address: [REDACTED] Postal address: A. Juozapavičiaus st. 13, LT-09311, Vilnius
10. [REDACTED] Permanent Representation of Lithuania to the EU	Email address: [REDACTED] Postal address: Rue Belliard 41-43, 1040 Brussels

DG ENER		
[REDACTED]	DG ENER.D1	EURATOM co-ordination, legal matters and international relations
[REDACTED]	DG ENER.D1	EURATOM co-ordination, legal matters and international relations
[REDACTED]	DG ENER.A1	Energy policy co-ordination
[REDACTED]	DG ENER.A3.	International relations & Enlargement
[REDACTED]	DG ENER.A.3.	International relations & Enlargement
[REDACTED]	DG.ENER.B.1	Networks & Regional initiatives
[REDACTED]	DG.ENER.B.2	Wholesale markets; electricity & gas
[REDACTED]	DG.ENER.B.4	Security of supply
DG DEVCO		
[REDACTED]	DG DEVCO.B5	Stability, Security, Development and Nuclear Safety
JRC		
[REDACTED]	JRC.F.5	Nuclear Reactor Safety Assessment
[REDACTED]	JRC.A.4	Nuclear Safety and Security

Annex 2

Expert meeting with the representatives of European Commission on Belarusian Nuclear Power Plant (NPP)

Thursday, May 26, 2016
DG Move, 24, rue De Mot, Brussels
DM24 07/50A
10:00 – 13:00

ROOM DOCUMENT

Introduction of issues by Lithuanian delegation and the EC

I. Foreword

- Welcome address by the EC
- Vice-Minister of Energy of the Republic of Lithuania

II. Presentation by Lithuania of nuclear safety and environmental protection issues regarding the Belarusian NPP

1. Introduction

Nuclear safety and environmental protection issues regarding the Belarusian NPP; issues related to international conventions in the field of nuclear safety and intergovernmental environmental impact assessment.

- [REDACTED] Ministry of Foreign Affairs

2. Site selection for the Belarussian NPP; lack of safety measures.

- [REDACTED] State Nuclear Power Safety Inspectorate

3. The geological and seismic aspects of Ostrovets and alternative sites: major issues.

- [REDACTED] Lithuanian Geological Survey under the Ministry of Environment

4. Belarusian NPP impact on the radiation safety state in Lithuania

- [REDACTED] Radiation Protection Centre under the Ministry of Health

III. Issues of electricity trade with third countries taking into account the ongoing or planned nuclear power plant constructions in Belarus and Kaliningrad Region

1. Considerations of measures for electricity import from non-EEA area Countries limitations.

- [REDACTED] Ministry of Energy

2. Measures for Introducing Level Playing Field vis a vis non-EEA Countries in Electricity Trade.

- [REDACTED] Transmission system operator LITGRID

IV. Quick overview of the EC's tools and planned actions to address the matter

V. General discussion

Annex 3

BELARUS NPP: SAFETY CONCERNS MAY 2016

Belarus is building its first nuclear power plant (NPP), designed by Russian state corporation Rosatom (design concept AES-2006), in the North-Western part of Belarus, Grodno oblast, near Ostrovets (coordinates 54°45'19.6"N 26°05'28.9"E). The distance from construction site to the Lithuanian capital Vilnius ~ 50 km.

The NPP will have two units with VVER-1200 reactors (output capacity up to 2x1200 MW, operating lifetime – 60 years). The first unit of the NPP is scheduled for launch in 2018, the second – in 2020. Contractor General of the NPP construction project is Rosatom's subsidiary company – Atomstroyexport (Russian Federation).

Despite violation of international standards and requirements on nuclear safety, lack of experience in nuclear energy and technologies, Belarus is quickly progressing with the construction of its first NPP. Currently, works on site include construction of the major buildings and structures for reactor Units No 1 and No 2. It is estimated that by the end of 2015, around 40% of the 1st Unit of the NPP was built and the reactor vessel was delivered to the construction site on 24 December 2015. The reactor vessel for Unit No 2 will be delivered in 2017.

The safety culture of the Contractor General and future operator is rather low. In November 2014, integrated inspection mission performed by Belarus authorities in the Belarus NPP have identified violations in the fields of hydro isolation, entry control installation, construction and armature works, load lifting installation, etc. Inspectors noted that violations were found during every inspection. Belarus press constantly reports thefts of concrete, armature and other construction materials from the NPP construction site. Belarus declares that the NPP in Ostrovets will be the cheapest NPP in the world and it will be built in the shortest period of time.

Since 2009, Lithuania has been involved in the *Transboundary Environmental Impact Assessment* (EIA) procedure with Belarus according to the Espoo Convention¹ and has been raising its concerns bilaterally and through other multilateral instruments. Belarus not only failed to answer Lithuanian questions regarding the nuclear and environmental safety aspects of the NPP, but also violated the main principle of the Espoo Convention – final decisions can be taken and construction works can only be started, when the concerns of the Affected Party (here – Lithuania) are duly considered and the *Transboundary Environmental Impact Assessment* (EIA) is completed². Neither the sequence of procedures of Espoo Convention were fulfilled (first Belarus made decisions, then attempted to legitimize them formally in reverse order), nor the content of requested actions (e.g. necessary research were not made), main issues to be answered in the process of Espoo procedures were not resolved.

Distances from Belarus NPP site to:

Capital of Lithuania Vilnius ~50 km;
River Neris (Vilija) (cooling source)-11-13 km
Capital of Belarus Minsk ~ 140 km;
Capitals within the range of 1000 km:
Vilnius (~50 km);
Minsk (~140 km);
Riga (~300 km);
Warsaw (~430 km);
Tallinn (~550 km);
Kiev (~560 km);
Stockholm (~710 km);
Copenhagen (~860 km);
Berlin (~870 km).

¹ Espoo Convention – UNECE Convention on Environmental Impact Assessment in a Transboundary Context

² The Espoo Convention foresees a chronological order of procedures: (1) notification about the planned activity – (2) preparation of EIA Report – (3) answers to questions and comments from the Affected Party – (4) proper consideration of comments and questions, reflected in the EIA report – (5) public hearings in the Affected Party – (6) experts' consultations – (7) final decision regarding the planned activity.

Belarus is implementing the project in violation to international nuclear safety and environmental standards and requirements, and without respect to the principles of openness, transparency and good neighbourhood. This was confirmed by the international organizations. In 2014, the Ministers' meetings of the Espoo Convention and the Aarhus Convention³ concluded that Belarus has developing the NPP project in violation to these Conventions. It was acknowledged that Belarus had violated four articles of the Espoo Convention and recommended to take certain steps in order to comply with the Convention. Lithuanian submission against Belarus, presented to the Espoo Convention in June 2011, served as the basis for investigation. Openness and transparency is of utmost importance when developing a NPP project especially for states newcomers in nuclear power programs. However, Lithuania still has not received the answers regarding nuclear, radiological and environmental safety issues of Belarus NPP.

Lithuania considers that Belarus has infringed the rights of Lithuanian society in the development of Ostrovets NPP project and throughout the *Transboundary Environmental Impact Assessment* process. After continuous fruitless requests to Belarus to provide answers to the key questions of concern to Lithuanian authorities and the public and to arrange public hearings for Lithuanian residents in Lithuania, on 27 March 2015, Lithuania placed a submission to the Aarhus Convention Compliance Committee regarding Belarus actions. The submission is now being considered by the Compliance Committee of the Aarhus Convention.

The main issues related to the nuclear and environmental safety of Belarus NPP project:

- ❖ **Site selection and safety of site.** The Espoo Convention requires to assess locational alternatives in the EIA Report and to choose the project site as an outcome of the EIA procedure. Belarus *de facto* selected the site for the NPP construction in Ostrovets district in 2008, i.e. before the commencement of the transboundary EIA in 2009. Site selection criteria were not disclosed for Lithuania in spite of official requests, alternative sites were not evaluated in EIA.
- ❖ **Seismological observations.** Territories around the Ostrovets site experienced earthquakes measuring 5-7 on Richter magnitude scale in 1887, 1893, 1896, 1908 and in 1987. Although Belarus declares that the seismological survey of the territory around Ostrovets has been performed, Lithuanian authorities have identified substantial shortcomings of the observations (scope, duration of seismological monitoring, methodology, etc.). Belarus' experts have also admitted that previous seismological researches were based on invalid conditions. Therefore, the results cannot be considered as reliable for seismic hazard assessment.
- ❖ **IAEA SEED mission.** The International Atomic Energy Agency (IAEA) encourages its Member States to request a Site & External Events Design (SEED) Review mission at an early site survey stage (an action that precedes site selection and site assessment). In June 2014, during the Review Meeting of the Convention on Nuclear Safety and the Meeting of Parties of the Espoo Convention, Belarus was recommended to accomplish the SEED mission but it has not been done up until now. Moreover, in April 2016 Belarus declared that it will accomplish only 5th and 6th modules of the SEED mission that are related to construction and design evaluation, and is about to skip the first four modules of the Mission that are scheduled for the evaluation of the selected site suitability for NPP project development. To this end, Belarus is planning to start the SEED Mission only from module 5 that deals with the evaluation of project design. This is absolutely unacceptable for Lithuania. The SEED mission should be performed as soon as possible and in its full scope.
- ❖ **"Stress-test" exercise.** In response to the 2011 Fukushima nuclear accident, risk and safety assessments ("stress tests") have been carried out on all EU NPPs – those in operation and under construction. On 23 June 2011, Belarus signed a declaration with the European

³ Aarhus Convention – UNECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters.

Art. 4(1)(a) first indent

Commission regarding the performance of the stress-test. Although 5 years have passed, but Belarus still has not fulfilled its commitment. Belarus has announced that the "stress-tests" will be performed by Rosatom subsidiary companies. Lithuania applied to the European Commission with a request to ensure that the stress-tests are performed according to the EU methodology, in a fair manner and with the participation of EU experts.

- ❖ **Impact to transboundary waters.** The transboundary river Neris is envisaged as a cooling source for the Belarus NPP. Neris forms a large part of Nemunas river basin, covering 72 percent of Lithuanian territory. Operation of the NPP can cause thermal and radiological pollution of the river that will eventually negatively affect natural ecosystems and Lithuanian population. Lithuanian scientists made a study, which demonstrates that in case of a severe accident in Ostrovets NPP, 57-95 percent of drinking water in Vilnius, Kaunas and Jonava cities might be contaminated.
- ❖ **Reliability of NPP cooling system.** The transboundary river Neris (Vilija in Belarus) is envisaged for cooling purposes for the Ostrovets NPP project. The river Neris is ~7-10 km away from the NPP site and ~55-65 meters lower than the NPP, i.e. the conditions for water supply to the cooling system of the NPP are complicated as it will be absolutely dependent on the continuous electricity supply to the water pumps. It is worth to remember that the Fukushima NPP accident has occurred due to the lost of electricity supply to the cooling system of the NPP that, consequently, resulted in reactor-core melt. Belarus has not provided information how they will ensure continuous electricity supply to water pumps, i.e. for cooling of the NPP.
- ❖ **Other issues that require close attention:** potential negative impact to the territory and population of Lithuania and the EU; emergency preparedness and response plans, which are extremely important having such a distance from Lithuanian capital Vilnius and potentially covering 1/3 of Lithuanian population; reliability and independence of nuclear safety *Regulatory Authority* in Belarus; quality (safety culture) of ongoing NPP construction works; management of spent nuclear fuel and radioactive waste; adequate financing for the whole NPP *life cycle*, especially for the implementation of the nuclear safety measures.

Belarus ignores the recommendations of international conventions and Lithuanian requests, however publicly provides misleading statements that international organizations and other countries approve the NPP project and have no major comments, which is a mere misinterpretation of the actual situation. Belarus is actively looking for political support while disregarding evident technical and legal issues concerning the development of the NPP project and instead of looking for solutions and taking appropriate measures (international experts, researches, etc.) to compensate or minimize effects.

Seeking to avoid devastating transboundary effects (such as Chernobyl), nuclear energy has to be developed in the most responsible way, ensuring strict implementation of international requirements. In this respect active involvement of international community in Belarus case is necessary.

POSSIBLE RADIOLOGICAL IMPACT OF THE BELARUS NPP FOR LITHUANIA AND EUROPE

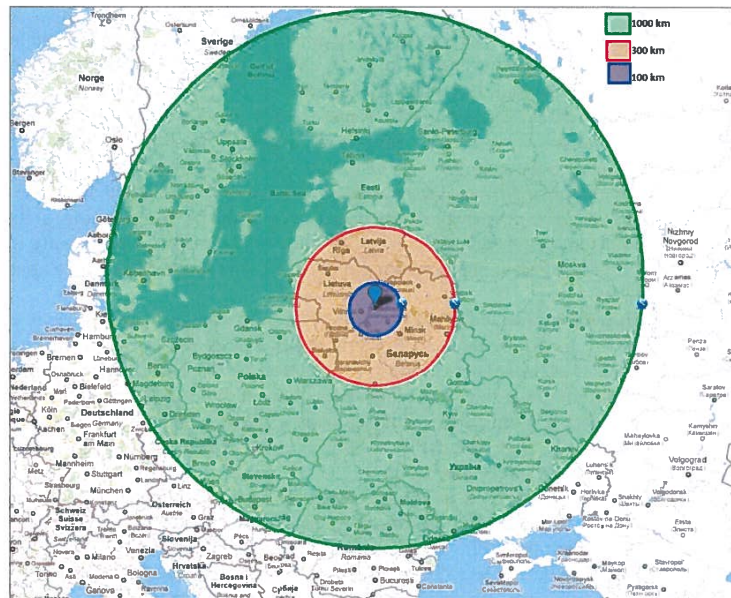
FOR EUROPE

Belarus authorities agree that there is a possibility for the radiological impact to the environment and people⁴:

1000 km – possible short-term restriction for consumption of locally produced food;

300 km – possible long-term restriction for consumption of certain types of food;

100 km – possible need for iodine therapy.



FOR LITHUANIA

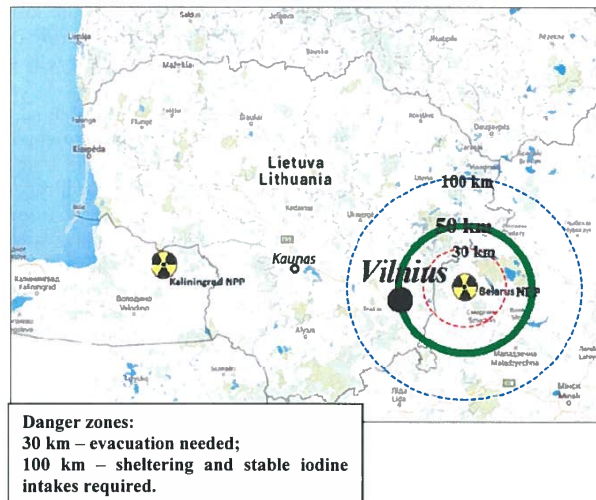
Distance from Belarus NPP:

Lithuanian Capital Vilnius – 50 km;
Lithuanian border – 20 km;
Belarus Capital Minsk – 140 km;
River Neris (Vilija) (cooling source) – 11-13 km.

In Lithuania within the radius of 100 km:

Capital city Vilnius (542 664 residents, major business and governmental institutions);
14 administrative districts (276 516 residents);
A total of ~900 thous residents.

1/3 of Lithuanian population might be affected by Belarus.



⁴ Based on A.N. Rykov, Director of Belinipenergoatom, presentation, 16-06-2010.

Follow-up on Decision VI/2 of the Meeting of the Parties (EIA/IC/S/4 Ostrovets NPP)

35th session of the Implementation Committee of the Espoo Convention

15 March 2016
Geneva

Object of Lithuanian submission – Belarus NPP project

Belarus NPP:

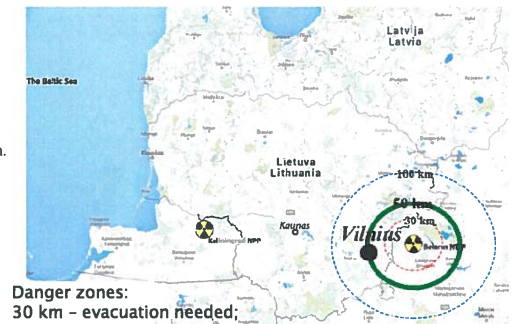
Distance from:

- Lithuanian Capital Vilnius – 50 km;
- Lithuanian border – 20 km;
- Belarus Capital Minsk – 140 km;
- River Neris (Vilija) (cooling source) – 11-13 km.

In Lithuania within the radius of 100 km:

- Capital city Vilnius (542 664 residents, major business and governmental institutions);
- 14 administrative districts (276 516 residents);
- A total of 919 180 residents.

1/3 of Lithuanian population might be affected by Belarus NPP.



Danger zones:
30 km – evacuation needed;
100 km – sheltering and stable iodine intakes

Lithuanian position

In June 2011 Lithuania submitted a complaint regarding the transboundary EIA for Belarus NPP project.

Transboundary EIA is in non-compliance with Espoo Convention:

- EIA of 2010 was recognized as non-compliant;
- Further communication was not adequate; Belarus was repeatedly sending the same EIA of 2010;
- Final Decisions on Ostrovets site have been taken against Espoo Convention:
 - Final Decision No. 1 - Presidential Decree No 418 of 15 September 2011;
 - Final Decision No. 2 - Presidential Decree No. 499 of 2 November 2013;
- Lithuanian public rights were infringed.

3

«Наша станция и российская станция в Калининграде – это **кость в горле** Евросоюзу и прибалтийским государствам»

*“Our nuclear power plant and the Russian nuclear power plant in Kaliningrad is **a fishbone in the throat** of the European Union and the Baltic States”*

A. Lukashenko
2013 04 30 Belarusian State Agrarian Technical University,
(БГАТУ)

«Станция <...> должна быть **самой дешевой** из всех тех, которые россияне и другие построили в мире»

*„ The NPP must be **the cheapest one** – from all those Russians or the others have ever built in the world“*

A. Lukashenko,
www.belta.by, 9 August 2012

5

Construction works on Ostrovets site - started on May 2009

Ostrovets

Construction of nuclear power plant

Beginning of construction – May 2009



Belarus NPP construction site. Source: Naviny.by, 26 May 2010
http://naviny.by/rubrics/society/2010-05-26-ic_articles_116_167965/

4



THE PHOTO CHRONICLE OF THE BELARUSIAN NPP



The reinforcement of the foundation slab. October, 2013

Source: Brochure of Republican Unitary Enterprise „Belarusian Nuclear Power Plant”

Final Decision No.2 on construction of Belarus NPP was adopted on 2 November 2013

6

Construction works on Ostrovets site – December 2013

As Final Decision No. 2 – in November 2013



Reactor building. Source: baltic-course.com, 17 December 2013

7

Reactor vessel delivered to Ostrovets site

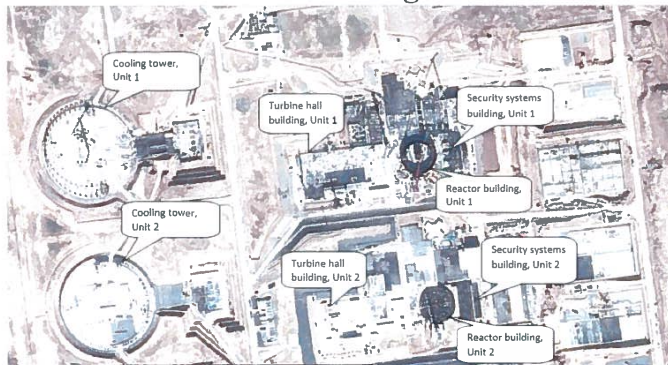
on 24 December 2015



Source: MK.ru <http://www.mk.ru/economics/2015/10/20/iz-volgodonska-v-ekhal-atomnyy-reaktor-dlya-belorusskov-ges.html>

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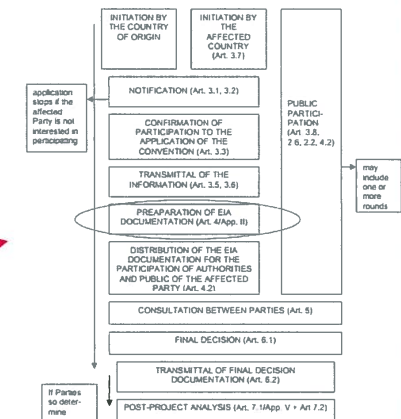
Construction works in full swing



Belarus NPP construction site in details (satellite view).
Source: GoogleMaps, 2014

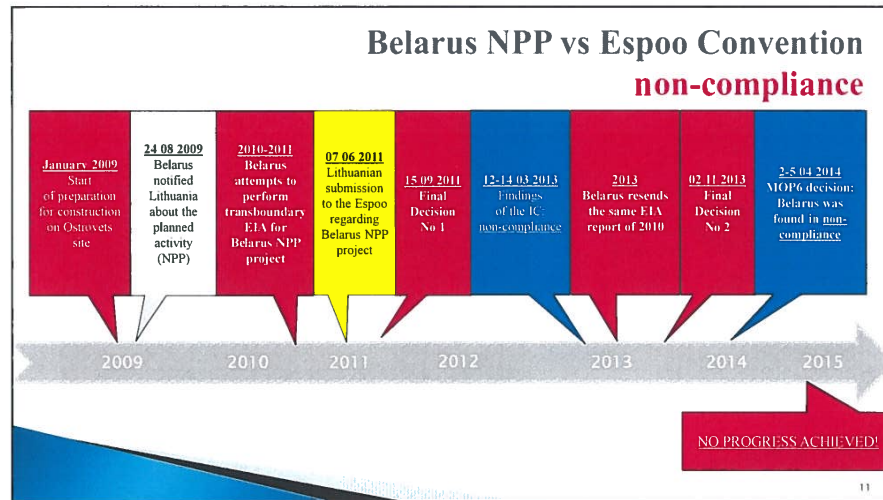
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Where do we stand with transboundary EIA for the Belarus NPP?



Procedural stages of EIA according to the Espoo Convention

10



Provisions of non-compliance – MOP6 Decision VI/2, para 50

In June 2014, Espoo MOP6 endorsed **Belarus non-compliance with:**

- article 2, paragraph 6;
- article 4, paragraph 2;
- article 5, paragraph (a);
- article 6, paragraphs 1 and 2 of the Espoo Convention.

For the purpose of compliance with the Espoo Convention – specific MOP6 recommendations.

MOP6 para 50

12

Final Decision No. 1 – Decree of 2011

On 15 September 2011 Belarus adopted Presidential Decree No. 418 *On the location and project development of the nuclear power plant in the Republic of Belarus* – determined the **Ostrovets site for the location of the NPP** and required to carry out the design of the NPP taking into account its location.

Lithuania has not received neither the Decision itself, nor the reasons and considerations on which it was based.

On 7 June 2011 Lithuania made a submission to the Espoo Convention regarding transboundary EIA for the Belarus NPP project. Three months later Belarus adopted a Final Decision.

Национальный реестр правовых актов Республики Беларусь, 2011 г., № 106, 1/12939-1/12940

УКАЗ ПРЕЗИДЕНТА РЕСПУБЛИКИ БЕЛАРУСЬ
15 сентября 2011 г. № 418

1/12939-1/12940 О размещении и проектировании атомной электростанции в Республике Беларусь

В соответствии с абзацем четвертым статьи 1 Закона Республики Беларусь от 30 июля 2008 года «Об энергообеспечении атомной электростанции с использованием ядерного топлива»:

1. Определить место размещения сооружения атомной электростанции на земельном участке в Островском районе Гродненской области общей площадью 449,94 га, расположенный в 1,3 км на северо-востоке от дер. Бобрювка и южнее дер. Алены, ограниченный на северо-западе автомобильной дорогой дер. Шуляники-дер. Алены, на западе – автомобильной дорогой Года-АЭС-Островец от автомобильной дороги Р-45, на северо-востоке – автомобильной дорогой Н-6223 (Масляны-Шуляники-Алены-Ветейкуны), на юге, юго-западе, западе – автомобильной дорогой от автомобильной дороги Н-6223 дер. Рудники-курьер Бобрювки и земель сельскохозяйственного назначения производственного кооператива «Ворняны».
2. Осуществить в соответствии с законодательством Республики Беларусь и международными договорами Республики Беларусь проектирование атомной электростанции с учетом определенного в пункте 1 настоящего Указа места размещения земельного участка для ее сооружения.
3. Совету Министров Республики Беларусь, Гродненскому облисполкому в двухмесячный срок принять меры по реализации настоящего Указа.
4. Настоящий Указ вступает в силу после его официального опубликования.

Президент Республики Беларусь А.Лукашенко

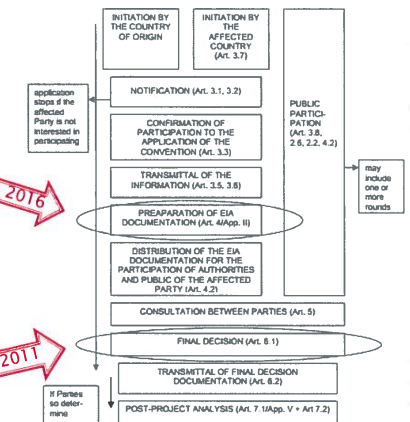
The Decree of the President of the Republic of Belarus No 418 of 15 September 2011

MOP6 para 51

Where do we stand with transboundary EIA for the Belarus NPP?

In March 2016

Belarus decision in 2011



Procedural stages of EIA according to the Espoo Convention

14

Licence to build nuclear facility for Unit 1

On 13 September 2013 Belarus issued a license No. 02300/239-4 for building the first NPP Unit in Ostrovets site.



15

Final Decision No. 2 – Decree of 2013

Национальный правовой Интернет портал Республики Беларусь 05.11.2013 1/14609
УКАЗ ПРЕЗИДЕНТА РЕСПУБЛИКИ БЕЛАРУСЬ
2 ноября 2013 г. № 499

О сооружении Белорусской атомной электростанции

В целях повышения экономической и энергетической безопасности Республики Беларусь и с учетом обязательств, предусмотренных международными договорами Республики Беларусь, постановляю:

1. Осуществить в 2013-2020 годах сооружение Белорусской атомной электростанции (далее – АЭС) на земельном участке в Островском районе Гродненской области, расположенном в 1,5 км на северо-востоке от дер Бобровицки и южнее дер Авены, ограниченном на северо-западе автомобильной дорогой Гоза – АЭС – Островец от автомобильной дороги Р-45, на северо-востоке – автомобильной дорогой Н-6223 (Мисляны – Шульники – Авены – Вайкуны), на юге, юго-западе, западе – автомобильной дорогой от автомобильной дороги Н-6223 дер Рудинки – хут Бобровицки и землями сельскохозяйственного производственного кооператива «Ворыцаны».

The Decree of the President of the Republic of Belarus
No. 499 of 2 November 2013

16

On 2 November 2013 Belarus adopted Presidential Decree No. 499 „On construction of the Belarussian nuclear power plant” in Ostrovets site.

Question: what's the meaning of this Decision, if everything is done BEFORE:

1. Final Decision No. 1 already taken in 2011;
2. Construction license issued in September 2013;
3. Construction works on site started in May 2009.

Site Selection made in 2008 – before any procedures started

Ostrovets site for the construction of the Belarus NPP was chosen:

- *de facto* – in 2008 or even earlier*;
- *in practice* – January 2009;
- *de jure* – in 2011 (Final Decision No. 1, September 2011).

*Source:

Original (Russian)

20 декабря 2008 года государственная комиссия по выбору места размещения земельного участка для строительства АЭС в Беларуси приняла решение о строительстве атомной электростанции на Островской площадке в Гродненской области.
http://atom.belta.by/ru/dosie_ru/view/stroitelstvo-belorusskoj-atomologija-sovtyti-41/

Translation

On 20 December 2008 State Commission for the selection of the location for the construction of the NPP in Belarus, adopted a decision to construct an NPP on the Ostrovets site in Grodno district.

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EIA report – lost in translation

Formal submission of the EIA documentation does not mean documentation compliance with the Espoo Convention.

The EIA report presented to Lithuania in 2013:

- was dated as of July 2010 (old report);
- did not contain substance;
- was google-translated into Lithuanian-like language.

EIA report - lost in translation:

- “nuclear power plant” = “nuclear herb” – as the word “plant” translated into Lithuanian as “herb” rather than “factory” or “enterprise”;
- “reactor plant” = “Republic of Uzbekistan” – as the Russian abbreviation «РУ» translated into Lithuanian as Republic of Uzbekistan instead of “reactor plant” (in Russian is «реакторная установка»);
- “Lithuania” = “Uzbekistan” – as the description of the transboundary EIA named Uzbekistan instead of Lithuania;
- meaningless sentences.



Would you trust such a document?

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EIA report – lost in translation

Meaningless sentences

Example 1:

Belarus submitted text like this in Lithuanian (google translation):

„The project is based on **national greenhouse gas experience** in the design, manufacture and operation of horizontal **emission**. The service life of **greenhouse gas emissions** equal to the **Uzbek** service period is 60 years.“

In comparison, it should be like (EIA report English version part I page 96):

„SG project is based on our own experience in development, manufacturing and operating of horizontal SG. Service life of a SG is equal to service life of RP and is 60 years.“

(RP – reactor plant, SG – Steam generator)

Example 2:

Belarus submitted text like this in Lithuanian (google translation):

„Research all options power **herbs** accident, including **tea** and worst shows that there is no serious danger to the order of the **herbs** location of the area of the population there. All accident scenarios provide a clear sequence of actions presented **neo b Sary** preventive and protective measures making consequences. It is important that all accident scenarios **RA ssmatrivalis real world deployment area station**.“

In comparison, it should be like (EIA report English version part I page 171):

„Researches on all types of accidents at NPP including the heaviest shows that there is no serious danger for population in the station region. Scenarios of all accidents consider sequence of protective activities.“

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MOP6, para 64: Confidence building

- o **IAEA SEED mission** (International Atomic Energy Agency, Site and External Events Design mission) **is an independent review** for site selection on:

- o adherence to the IAEA guidance and appropriateness of the selection and site selection criteria;
- o adherence to the IAEA safety requirements - whether site is safe and appropriate for installing design;
- o adherence to the IAEA environmental assessment requirement;
- o development and operation of the NPP: site hazard evaluation against natural and human induced external and internal hazards, design safety margin assessment against external hazards, etc.

Belarus has not provided dates or schedules, when the SEED mission would take place. No request to the IAEA on the SEED mission.

- o „**Stress-test**“ - on 23 June 2011 Belarus committed to perform the „stress-tests“ according to EU methodology, however, up until now it has not been done.

MOP6 para 64

21

MOP6, para 53 – nothing clear about:

- | | |
|---|--|
| 1. Site selection criteria; | 9. Measures planned to avoid cooling malfunctioning; |
| 2. Assessment of locational alternatives; | 10. Measures planned to avoid potential contamination of the river Neris (Vilija); |
| 3. Seismic safety assessments of Ostrovets site; | 11. Emergency preparedness plans; |
| 4. Commencement of construction works on Ostrovets site; | 12. Strengthening of nuclear safety regulatory authority in Belarus; |
| 5. NPP resistance in case of a heavy airplane crash; | 13. Financing issues of the NPP project; |
| 6. Belarus plans and schedules for the IAEA SEED peer review mission; | 14. Control of quality of construction works and operation of NPP; |
| 7. Belarus plans and schedules for the stress tests activity; | 15. Management of spent nuclear fuel and radioactive waste. |
| 8. Minimisation of potential NPP impact to Lithuanian territory and population; | |

MOP6 para 53

20

Lithuania's public rights infringed

Not every public event is considered to be a public hearing.

- o Adequate EIA Report, required by the Espoo Convention, is a key for public hearings.
- o On 2 March 2010 public event failed.
- o Event of 17 August 2013 in Ostrovets (Belarus) – totally unacceptable as public hearing:
 - Lithuania was not allocated with reasonable time to examine EIA report, presented in June 2013;
 - The EIA report was *google-translated* into incomprehensible Lithuanian-like language;
 - The event was organized unilaterally by Belarus;
 - There were serious restrictions for Lithuanian public to participate (transportation, visas, passports, people were allowed to the event only if they agreed not to ask questions).
- o Lithuania continuously suggesting Belarus to co-arrange public hearings for Lithuanian public in Lithuania.

MOP6 para 55

22

Non-compliance with Art.5 – experts' consultations

Meeting on 18 June 2010 – a failed attempt to organize experts' consultations as:

- LT learnt during the meeting – a subject for consultation is unknown for LT experts: EIA report suddenly appeared significantly amended (4 times as bigger as the previous version, received and analysed by Lithuania);
- No time provided to examine the EIA report;
- LT received amended EIA report **AFTER** the meeting in **8 months time** – in February 2011;
- LT sent **official letter 9 July 2010** on status of this meeting regarding its non-compliance as experts' consultation according Espoo Art. 5.

Espoo: Experts' consultations – **after** the completion of the EIA documentation, **before** the adoption of Final Decision.

IC of the Espoo Convention on 12-14 March 2013 noted (para.52):

„<...> In order to allow for meaningful consultations under article 5, the information provided should be as complete and precise as possible and, in particular, should meet any reasonable request as to its scope made by the affected Party.“

MOP6 para 56

23

Bilateral Agreement on the Implementation of the Espoo Convention

On 5 November 2015 Lithuania presented the draft Bilateral Agreement and invited Belarus to discuss it on 17 December 2015 in Vilnius.

Lithuania's objectives in the Agreement:

- ensure the proper implementation of the Espoo Convention;
- increase clarity of legal norms (clear guidance in performing transboundary impact assessment procedures);
- describe order, forms and timeframes of procedural steps;
- define requirements to the content for the EIA documentation and other relevant documents;
- settle language requirement issues.

MOP6 para 54, 58

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Post-project analysis-premature, but Lithuania is in

Post-project analysis program (Art. 7), shall be carried out for activities for which an EIA **has been finished**.

Transboundary EIA procedure for Belarus NPP with Lithuania **is still non-compliant**.

Without EIA completion, objectives of the post-project analysis (listed in the Appendix V) cannot be achieved.

In spite of this, Lithuanian authorities analyzed the post-project analysis and presented to Belarus detailed findings.

As the post-project analysis is a document for the next 60 years, the post-project analysis programme should remain open for revision.

MOP6 para 57

24

MOP6, para 62: Permanent joint body

Lithuania proposed to use **already existing bilateral legal instruments** which provide possibilities to discuss in joint bodies:

- Bilateral Agreement between Ministries of Environment of Lithuania and Belarus (signed in Minsk, 14 April 1995);
- Bilateral Technical Protocol on Cooperation in Monitoring and Information Exchange on Status of Transboundary Surface Waters (Minsk, 10 April 2008).

Lithuania also proposed to include a joint body provision into the Bilateral Agreement on Implementation of the Espoo Convention.

MOP6 para 62

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Conclusions

- Lithuania is **seriously concerned on potential transboundary impact** of Belarus NPP for LT environment and population.
- Lithuanian **concerns are not addressed properly** - Lithuanian key questions still remain without answers.
- Lithuanian **public rights are being infringed**.
- **No progress from Belarus** side in implementation of the recommendations of MOP6.
- **On the contrary**, Belarus quickly advances with construction works on Ostrovets site.
- That is an **infringement of the Espoo Convention**.
- **A formalistic point** of view towards the implementation of the Espoo Convention cannot be acceptable, as it goes against **the objective of the Convention** – to **prevent, reduce and control significant adverse transboundary environmental impact** from proposed activities.

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Steps to be taken

In order to respect the rights of Lithuania and its citizens and implement Espoo Convention:

- Belarus should:
 1. answer 15 key/outstanding/open questions, Lithuania has been raising since 2009;
 2. invite the IAEA SEED mission and perform „stress-test“ for its NPP without any further delay;
 3. supplement the EIA report with requested information;
 4. co-organize public hearings for Lithuanian public in Lithuania.
- An expert body, modelled after the Inquiry Commission, as proposed by the IC in December 2015, would be a good instrument to give advice of technical and scientific nature to the IC for further assessment of Belarus compliance with the Convention.

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The geological and seismic aspects of Ostrovets and alternative sites: the major issues

Dr. Jurga Lazauskienė
Dr. Andrius Pačėsa
 Lithuanian Geological Survey



What criteria served for selection of Ostrovets site as priority for NPP construction?

Why equal assessment of locational alternatives is absent in the environmental impact assessment (EIA) report?



What criteria served for selection of Ostrovets site as priority for NPP construction?

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„There are **no prohibition factors in all three competing sites** (factors or conditions not permitting NPP placement according to the requirements of the corresponding normative documents);

-In Krasnopolyana and Kukshinovsk sites there is a **potential possibility of activation of suffozion-karts processes that is a complication factor.**

-Engineering-geological and hydrogeological conditions of Kukshinovsk site are complicated (the thickness of different types of soils is uneven, there is press water with piezometral level close to the surface up to 1,5 m).

- According to the totality of important factors **Ostrovetsk site has advanges** over Krasnopolyana and Kukshinovsk sites.“



Criteria for prioritisation of Ostrovets site are not motivated by data (1)

Conclusion: Ostrovets site has the least favourable seismo-tectonic conditions in comparison to alternative sites

Table 3 – Comparative characteristics of NPP sites

Characteristics	Competitive sites		
	Kukshinovsk site	Krasnopolyana site	Ostrovetsk site
Seismotectonic conditions			
Area of enlarged sites situated on stable units, km²	4.0	2.0	4.5
Distance to the nearest zone of possible earthquake centres (PEC), km (according to IAEA recommendations not less than 5 km)	12 km to Orshansk centre	24 km to Mogilev centre	39 km to Oshmyany centre
Soil category by seismic characteristics	II	II	II
Project earthquake (PE), intensity	5	5	6
Maximal counted earthquake (MCE), intensity	6	6	7
Geological and hydrogeological conditions			
Bedrock composition making quaternary deposit	Dolomite, limestone, clay, siltstone, aleurite	Chalk, marl, clay	Siltstone, marl, dolomite
Quaternary deposit thickness, m	68-72	45-55	72-103
Quaternary deposit composition	Mainly drift and lacustrine clays, morainal sand	Mainly interdrift clay, drift clays and clay sands.	Mainly drift clays and sands; morainal sand

Table 5 – Analysis of competing sites correspondence to normative documentation requirements

Factors considered in site choice	Competitive sites					
	Kukshinovsk site		Krasnopolyana site		Ostrovetsk site	
	Characteristics	Conclusions	Characteristics	Conclusions	Characteristics	Conclusions
Prohibitive factors for NPP construction (according to TKP-097-2007)						
Site is situated directly on tectonically active faults	Without active faults	Corresponds	Without active faults	Corresponds	Without active faults	Corresponds
Site with whose seismicity is characterized with MCE intensity of more than 9 or MSK-64 scale	Site seismicity PE intensity is 5, MCE intensity is 6	Corresponds	Site seismicity PE intensity is 5, MCE intensity is 6	Corresponds	Site seismicity PE intensity is 6, MCE intensity is 7	Corresponds



Parameters for selection and comparison of three sites for nuclear power plant (Kukshinovsk and Krasnopolyana and Ostrovets) are not motivated by data

Table 3 – Comparative characteristics of NPP sites

Characteristics	Competitive sites		
	Kukshinovsk site	Krasnopolyana site	Ostrovetsk site
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Table 4 – Characteristics of construction conditions on competitive sites

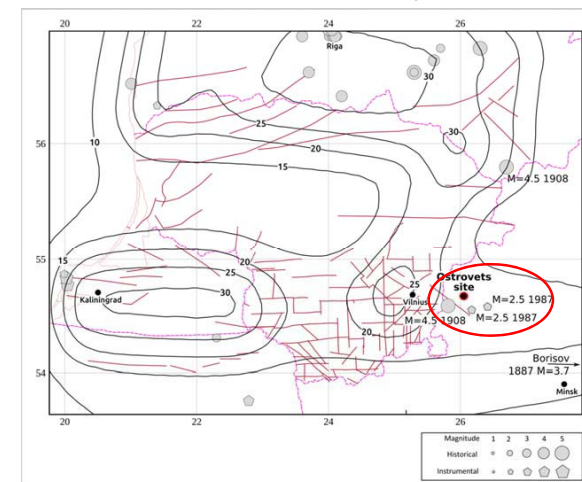
Parameters characterizing construction conditions	Competitive sites		
	Kukshinovsk site	Krasnopolyana site	Ostrovetsk site
3 Project earthquake PE, density	5	5	6
4 Maximal calculated earthquake, density	6	6	7

Table 5 – Analysis of competing sites correspondence to normative documentation requirements

Factors considered in site choice	Competitive sites					
	Kukshinovsk site		Krasnopolyana site		Ostrovetsk site	
	Characteristics	Conclusions	Characteristics	Conclusions	Characteristics	Conclusions
Prohibitive factors for NPP construction (according to TKP-097-2007)						
Site is situated directly on tectonically active faults	Without active faults	Corresponds	Without active faults	Corresponds	Without active faults	Corresponds
Site with whose seismicity is characterized with MCE intensity of more than 9 or MSK-64 scale	Site seismicity PE intensity is 5, MCE intensity is 6	Corresponds	Site seismicity PE intensity is 5, MCE intensity is 6	Corresponds	Site seismicity PE intensity is 6, MCE intensity is 7	Corresponds



Ostrovets site has the least favourable seismo-tectonic conditions in comparison to alternative sites



2 instrumentally recorded earthquakes and 1 historical earthquake with intensity 5 to 6 (MSK-64 scale) in 1908 in Gudogai has been indicated. In site vicinity.

Seismic hazard map of Lithuania and adjacent territories. Grey circles mark historical earthquakes, octagons – instrumental earthquakes, brown lines – known faults, black contour lines indicate PGA values which can be exceeded within 50 years with 10 % probability, four digit number near earthquakes indicate the year then the earthquake was recorded.

Criteria for prioritisation of Ostrovets site are not motivated by data (2)

The **absences of suffusion-karst processes** is the **most important geological factor that allowed the prioritization of the Astravets site** in comparison with two other alternative sites.

Karst - dissolving action of water on carbonate bedrock (usually limestone, dolomite). Karst sinkholes form by the process of 'suffusion' when loose, unconsolidated material (soil, 'head', loess and clay) overlies fissures in the underlying limestone, and material is washed into these fissures and into the caves beneath. Over time, this creates a depression on the landscape of varying depth (BGS info).

Table 5 – Analysis of competing sites correspondence to normative documentation requirements

Factors considered in site choice	Kukshinovsk site		Competitive sites Krasnopolyana site		Ostrovetsk site	
	Characteristics	Conclusions	Characteristics	Conclusions	Characteristics	Conclusions
<i>Prohibitive factors for NPP construction (according to TKP-097-2007)</i>						

Continuation of table 5

Factors considered in site choice	Kukshinovsk site		Competitive sites Krasnopolyana site		Ostrovetsk site	
	Characteristics	Conclusions	Characteristics	Conclusions	Characteristics	Conclusions
Territory with a proved fact of active karst possibility of activation of piping-karst processes	No active karst	Corresponds	No active karst	Corresponds	No active karst or possibility of activation of piping-karst processes	Corresponds
	Potential possibility of activation of piping-karst processes in cavernous and karsted dolomites.	Complication factor	Potential possibility of activation of piping-karst processes in marl-chalk layers under the quaternary sands.	Complication factor		



Clear geological information on the absence of the risk of potential activation of the suffusion-karst processes in Ostrovets site is not provided

Questions:

1. It is not clear if **100 m thick chalk (carbonate) succession occur or not in Ostrovets site**, and, respectively, if potentially possible activation of suffusion-karst processes could occur?

2. It is not clear if **potentially possible activation of suffusion-karst processes in Ostrovets site** has been studied with the same accuracy as for alternative sites?

- based on the data provided for Lithuanian side Ostrovets site is investigated only by **few? wells** e.g., Krasnaya Poliana site is investigated by 140 wells and seismic surveying;

- the Devonian sediments in Ostrovets site are penetrated by drilling only **1-13 meters** in 2? wells".

No clear answer

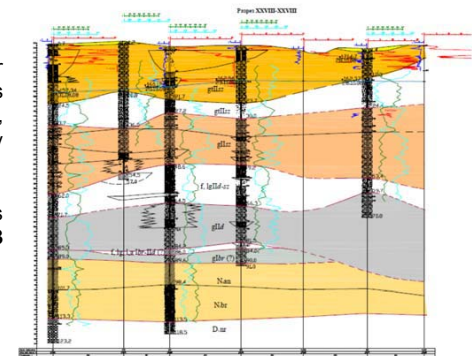


Fig. 39 – Geological cross-section along the line XXVIII-XXVIII



Inconsistent information about geological structure of Ostrovets site

Supplementary information presented by Belarus document No. 13-15/2858-BH
„Information to support justification on NPP site selection“

„The Cimmerian and Alpine complex is represented by depositions of chalk, neogene and tertiary: green terrigene-glaucconite phosphorite carrying formation (Alb and Cenomanian), **formation of writing chalk (Cenomanian, Turonian, Maastricht) having thickness of more than 100 m**; a predominantly glacial complex of tertiary depositions having thickness from 80 to 140 m.“

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„**Neogene sands are underplayed by sediments of Narovskii horizon of mid-Devonian (D2nr)**, namely, by siltstones and marls often interleaved by dense cracked dolomites with sublayers. **The layers of clay and chalk are also met in marls.** There are blue-green-gray sediments and speckled gray-brown siltstones. The revealed thickness is 2.2-11.8 m.“

Criteria for prioritisation of Ostrovets site are not motivated by data (3)

The sites are not **equally evaluated in terms of hydrogeological and hydrological conditions**:

- EIA report proves (page 188, 192) that drainage of ground and surface water is actual also at Ostrovets site, not only in Kuksinovsk site.
- Ostrovets site is not evaluated in the terms of technogenic flood (the source of which is not the river) and change of soil water regime.
- Due to complicated hydrological conditions in Ostrovets site, the safety of the facility could be affected and additional measures will be needed to avoid dangerous surface and soil water factors.



What type of seismic safety assessments were carried out taking into account seismicity of the territory of Belarus and adjacent territories?

- What are seismic hazards assessment values in terms of obtaining ground motion values (e.g. seismic hazard levels SL-1 and SL-2) for design basis in terms of IAEA safety standards SSG-9 and NS-R-3?
- How do provided values of Design-basis Earthquake (DE) and Maximum design-basis Earthquake (MDE) correspond to the IAEA requirements seismic hazard levels SL-1 and SL-2?
- Explanations on the inconsistency between calculated peak acceleration and MDE (horizontal component) provided in term of acceleration are needed?.



What are seismic hazards assessment values in terms of ground motion values (e.g. seismic hazard levels SL-1 and SL-2) for design basis following IAEA safety standards SSG-9 and NS-R-3?

EIA Report and Belarus NPP post-project analysis Program define seismic hazards of Ostrovets site in terms of intensity (MSK-64 scale intensity points): **DE=6** and **MDE = 7**.

Belarus NPP post-project analysis Program:

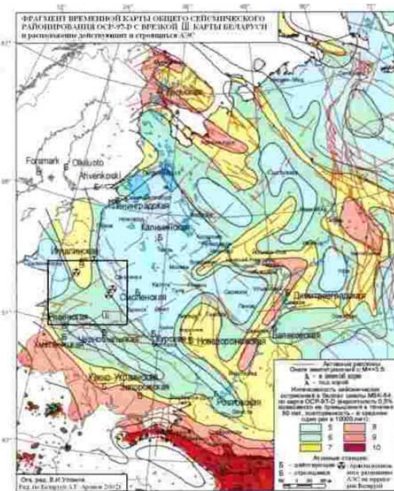
DE corresponds to „horizontal acceleration“= **54.29 cm/s²** and **MDE = 67.22 cm/s²**.

Questions:- How seismic hazards in MSK-64 intensity points were converted to „acceleration values“ (supposing Peak Ground Acceleration (PGA) values?).

- How do provided values of Design-basis Earthquake (DE) and Maximum design-basis Earthquake (MDE) correspond to the IAEA requirements, e.g. seismic hazard levels SL-1 and SL-2?

Table 2 – Summary of natural initiating events in the Belarusian NPP area and at the site to be taken into consideration in the project for the purpose of emergency situation response planning.

No.	Processes, events, factors	Parameters considered in the project backgrounds	Parameter amounts or impact characteristics	Frequency	NPP site affected or not (or hazard degree)
2	Design seismic impacts	Design-basis earthquake (DE) intensity Maximum design-basis earthquake (MDE) intensity Maximum accelerations (50% occurrence): MDE - horizontal component MDE - vertical component DE - horizontal component Maximum vertical acceleration	6 (MSK-64 scale) 7 (MSK-64 scale) 67.22 cm/s ² (0.069g) 44.81 cm/s ² (0.046g) 54.29 cm/s ² (0.055g) Assumed to be 2/3 of the maximum horizontal acceleration		



Inconsistent information for Probabilistic Seismic Hazard assessment

Seismic hazards of Ostrovets site were determined in terms of intensity points (MSK-64 scale) using the deterministic method and probabilistic method (based on *Northern Eurasia map of seismic risk zoning OCP-97-D (1:10000000; 1997), compiled before the Kaliningrad earthquakes of 2004* of $M_W=5.2$ (Gregersen, 2007); Russian Academy of Sciences - magnitude of main shock - $M_b=5.4$..

Design-basis Earthquake DE = 6
Maximal Design-basis Earthquake MDE = 7

50 years, reoccurrence – an average of once in 10000 years):
5 6 7 8 9 10
Atomic power plants:
5 – in operation – possible sites for the APP location in the territory of Belarus
6 – under construction

Figure 40 – A fragment of the general seismic zoning map OCP-97-D with an inset map [3] of Belarus



Active faults
Earthquake sources $M \geq 3.5$:
A – in the Earth crust
A – under the Earth crust
The magnitude of seismic shakings measured by MSK-64 scale according to OCP-97-D map (0.5% probability of its possible exceedance during

What are seismic hazards assessment values in terms of ground motion values (e.g. seismic hazard levels SL-1 and SL-2) for design basis following IAEA safety standards SSG-9 and NS-R-3?

BY statement: Belarus carried out **48 explosions** at Ostrovets site and were measuring **ground accelerations** to simulate natural earthquakes from Oshmyany seismogenic zone.

But: induced explosions could significantly differ (by frequency range and focal mechanisms) from the shocks caused by natural earthquakes. Earthquakes of magnitude $M=4.5$ or $M=5.0$ could be hardly achieved using the explosions' simulations.

Thus, Belarus side established relation **between seismic source magnitude** (earthquake magnitude) and **“maximum acceleration”** of the soil particles (or PGA?) but **not between macroseismic intensity and PGA**.

The same question:- How seismic hazards in MSK-64 intensity points were converted to „acceleration values“ (supposing Peak Ground Acceleration (PGA) values?).



Inconsistent information for seismic hazard assessment following IAEA safety standard NS-G-1.6

Question: - It is not clear if MDE is considered to be equal to $0.1g$ ($\sim 100 \text{ cm/s}^2$) at least, following recommendations of IAEA Safety standard NS-G-1.6, item 2.7 ($SL-2 \geq 0.1g$; $0.1g = 0.98 \text{ m/s}^2 = 98 \text{ cm/s}^2$).

BY statement: „The highest estimate of calculated peak acceleration, obtained for the Ostrovets site, is a little more than 100 cm/s^2 and, accordingly, is much less than $0.1g$ “, e.g. “Maximum calculated peak acceleration (MCPA) $> 100 \text{ cm/s}^2$ and MCPA $<< 0.1g$ ”. Statements that MCPA $> 100 \text{ cm/s}^2$ and MCPA $<< 98 \text{ cm/s}^2$ contradict.

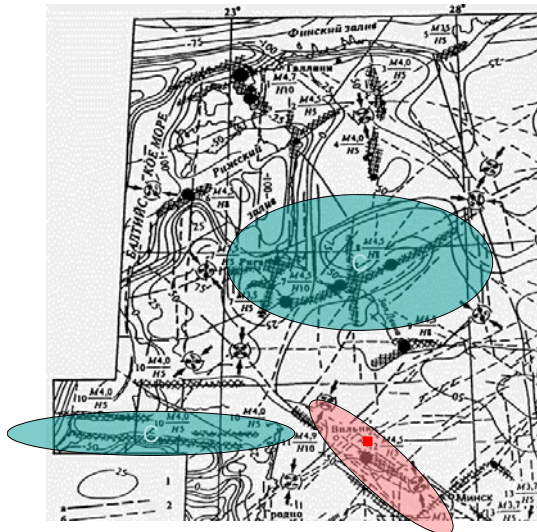
The same Question: What is the final estimation of MDE (or SL-2?) provided in terms of acceleration considering the requirements of IAEA Safety standard?

Table 2 – Summary of natural initiating events in the Belarusian NPP area and at the site to be taken into consideration in the project for the purpose of emergency situation response planning.

No.	Processes, events, factors	Parameters considered in the project backgrounds	Parameter amounts or impact characteristics	Frequency	NPP site affected or not (or hazard degree)
2	Design seismic impacts	Design-basis earthquake (DE) intensity Maximum design-basis earthquake (MDE) intensity Maximum accelerations (50% occurrence): MDE - horizontal component MDE - vertical component DE - horizontal component Maximum vertical acceleration	6 (MSK-64 scale) 7 (MSK-64 scale) 67.22 cm/s^2 (0.069g) 44.81 cm/s^2 (0.046g) 54.29 cm/s^2 (0.055g) Assumed to be 2/3 of the maximum horizontal acceleration		



Inconsistent information regarding Deterministic Seismic Hazard Assessment



After: R. E. Aizberg, A. G. Arovov, R. G. Gareckij, A. K. Karabanov,

3 seismogenic source zones close to Ostrovets site are distinguished:

- **Oshmyany** seismogenic zone, $M_{\max}=4.5$; $H=5$, 19 km south from site;
- **Daugavpils** seismogenic zone, $M_{\max}=4.5$; $H=8$, 67.5 km north to site;
- **Kaliningrad** seismogenic zone, $M_{\max}=5.1$; ~ 180 km south from site.

2 – Tectonic faults;
SSZ zones parameters:
(M) max magnitude;
(H) – min hypocentre depth;



Inconsistent information regarding Deterministic Seismic Hazard Assessment

For Deterministic Seismic Hazard Assessment (DSHA) assumption $M_{\max}=M_{\text{observed}}$ for the two closest seismogenic zones (Daugavpils and Oshmyany) to Ostrovets site was used by Belarus side.

Question: - It is commonly accepted that some safety margin should have been set to M_{\max} (usually $M_{\max}=M_{\text{observed}} + 0.5$ for platform areas having low seismicity)?.

BY statement: - „We did not meet these common postulates in practice in assessing the maximum magnitude“.

But: the Belarus side used safety margin to characterize Vrancea (Romania) seismogenic zone where M_{observed} was 7.6 and M_{\max} was assigned to 8.0.

Later: Belarus side accepted that M_{\max} could have been reviewed for Kaliningrad seismogenic zone ($M_{\text{observed}} = 5.1$ and $M_{\max} = 5.1+0.5=5.6$) using DSHA.

But: no re-calculations of peak ground accelerations and intensities for two closest seismogenic zones (Daugavpils and Oshmyany) to Ostrovets site.

Question?

Why different methodologies were used assessing different seismogenic zones?

Inconsistent information regarding Seismic hazards assessment – lost in terminology

Describing seismic hazard of Ostrovets site the Belarus side is using a several different terms: Design Earthquake (DE), Maximum Design Earthquake (MDE), Calculated Earthquake (CE) and Maximum Calculated Earthquake (MCE), Maximum calculated peak acceleration (MSPE), acceleration values, ground acceleration, horizontal acceleration etc.

Should be guessed that DE=CE=SL-1 and MDE=MCE=SL-2?

However, Belarus side haven't explained exact meaning of DE, MDE, CE, MCPE and MCE and haven't confirmed if these terms correspond to commonly accepted terms SL-1 and SL-2.

Question remaining:

What are seismic hazards assessment values in terms of ground motion values (e.g. seismic hazard levels SL-1 and SL-2) for design basis following IAEA safety standards SSG-9 and NS-R-3?



Belarusian NPP impact on the radiation safety state in Lithuania

Gintautas Balčytis

Radiation Protection Centre
2016

Location of the Astravets NPP



Belarusian NPP

Belarusian NPP, currently known as Astravets NPP, will be constructed by Russia's Atomstroyexport.

It would be equipped with third generation VVER 1200 type 2 reactors.

Each reactor is planned to have 1150 MWe capacity.

The first reactor of the Astravets NPP is expected to be operational by 2018, and the second by 2020

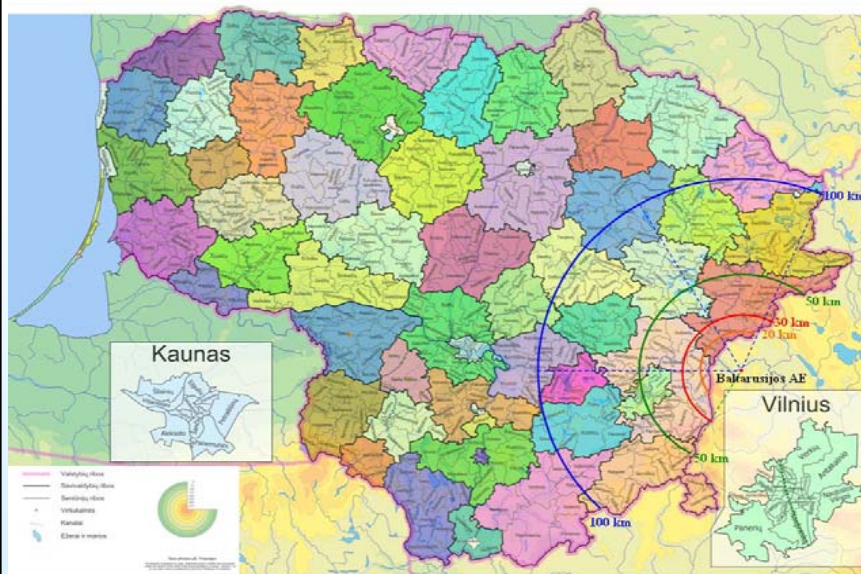
HERCA-WENRA Approach for a better cross-border coordination of protective actions during the early phase of a nuclear accident

(Stockholm, 22 October 2014)

1. In 5 km radius from NPP evacuation shall be organized;
2. In 20 km radius – sheltering and iodine prophylaxis;
3. Should be possibility to increase the radius of evacuation up to 20 km, with applying sheltering and iodine prophylaxis up to 100 km radius (it means 14 districts of Lithuania, including Vilnius region).

HERCA - Heads of European Radiological Protection Competent Authorities

WENRA - Western European Nuclear Regulators Association



The following considerations summarize our concerns:

1. Safety of Lithuania's population in the event of minor and major NPP failures and accidents;

Evaluation of Institute of Physics (At present Center for Physical Sciences and Technology) of consequences of severe accident (7 level of INES), Effective dose for population of Vilnius (at 50 km distance, if protective measures will not be applied, average scenarios of 7 level):

57 mSv (in period of first 7 day)

100 mSv (in period of first 30 days)

230 mSv (in period of 1 year)

Evacuation or relocation shall be needed

In EIAR of Belarusian NPP only accident of 5 INES level was evaluated

The Quantity of single dose of potassium iodide (KI) for Lithuanian population living in protective action planning zone (according current Lithuanian legal requirements)

Different zones	Zones	The number of 65 mg of KI tablets	The number of packages containing 10 tablets	The number of population
A	Urgent protective action planning zone up to 30 km	66 000	6 600	32 958
B	Distant zone 30–50 km	1 275 000	127 500	637 331
C	Distant zone 50–100 km	497 000	49 700	248 894
A+B+C	Urgent protective action planning zone and distant zones up to 100 km	1 838 000	183 800	919 183

2. Effects on possible contamination of water (basin of river Neris, ground water), vegetation and habitat over the entire land area of Lithuania;

The problem: limited water resources for cooling reactors of Belarusian NPP. The water of Neris river will be used for cooling reactors.

The Neris river is the principal source of potable water for population of Vilnius. That means the risk of contamination of drinking water in the Vilnius area.

As evaluated by company „Vilniaus hidrogeologija“, if radionuclides get in Neris river, significant part of them (depending on the type of Watering place) will be found in watering places near Vilnius.

3. Plans, funds and provisions to resolve long term contamination effects should be elaborated in case of contamination of territories and premises

4. System of early notification and additional monitoring stations should be implemented

5. More transparency and work in the field of public information is necessary

Thank You for attention

