Terms of REFERENCE (ToR)
for the
THIRD REVISION OF THE KRŠKO NPP DECOMMISSIONING PROGRAM

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<th>Revision</th>
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<tr>
<td>Date</td>
<td>October 19, 2017</td>
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<th>Prepared by</th>
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<td>ARAO: Leon Kegel</td>
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<td>Fond: Zdenko Vrankić</td>
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<td>NEK: Božidar Krajnc</td>
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<td>NEK: Stane Rožman, Hrvoje Perharić</td>
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<td></td>
<td>ARAO: Sandi Viršek</td>
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<td>Fond: Tvrtko Brajković</td>
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1. INTRODUCTION

Pursuant to Articles 10 and 11 of the BA, two documents shall be prepared and periodically reviewed: the Krško NPP Decommissioning Program and the Krško NPP RW and SF Disposal Program. On the basis of the NPP Krško Decommissioning Program decommissioning of NPP Krško will be undertaken, as well as management of all RW and other wastes generated during decommissioning up to transport from the NPP Krško site, an estimate of financial resources needed for all the tasks, and a time schedule for the decommissioning.

Each of the BA Contracting Parties provides regular payments into its national fund to cover future decommissioning and RW and SF disposal expenses in the amount that is estimated by approved Decommissioning and Disposal Programs. Funds are used for financing all the activities related to decommissioning and disposal of RW and SF generated during the operation of Krško NPP and its decommissioning.

Pursuant to a Decision of the IC, the first revision of the Krško NPP Decommissioning Program and the LILW and SF Disposal Program was prepared in 2003 and 2004 as a single document using the
1996 NIS study as the starting point. After international peer review by Électricité de France, the First revision of the Program was confirmed by the IC after obtaining prior consent from the Government of the RC, the Government of the RS and the Croatian parliament. In accordance with the BA, the First revision of the Program was also approved by the SNSA.

During the 2008-2011 period, the Second revision of the Krško NPP Decommissioning Program and the LILW and SF Disposal Program was being prepared, for which purpose a set of technical documents was prepared, including the Preliminary Decommissioning Plan (PDP revision 5). Since circumstances changed considerably since the ToR for the second revision was prepared, the IC decided on its 10th session held on July 20, 2015[1] to suspend all activities related to the second revision and ordered the drafting of ToR for the Third Revision of the Krško NPP Decommissioning Program and ToR for the Third Revision of the Krško NPP RW and SF Disposal Program.

Responsible expert organizations appointed by the Government of the RC and the Government of the RS are:

For the RC: FOND - Fund for the decommissioning and disposal of radioactive waste and spent nuclear fuel from Krško Nuclear Power Plant,

For the RS: ARAO - Agency for radioactive waste j.g.z.

NPP Krško d.o.o. is responsible for preparation of revision 3 of DP and cooperate with above mentioned expert organizations.

To achieve and maintain a high level of safety in radioactive waste and spent fuel management it is necessary to take appropriate steps to avoid any undue burden on future generations due to SF and RW. In this context, the purpose of this project is to continue the preparation of Krško NPP decommissioning that will start with its end of life time, in order to improve the following estimates: use of technical devices and technologies; duration of operations; quantities of waste generated by decommissioning, LILW and HLW in particular; size and types of workforce needed as well as expenses. New estimates are needed in order to collect adequate financial means in national funds for decommissioning and management / disposal of RW and SF on time to finance the establishment of needed facilities and all future activities related to decommissioning.

2. PROJECT SCOPE AND OBJECTIVES

2.1 General objectives of this project

General objectives of this project are as follows:

a) To carry out regular review of the existing Krško NPP Decommissioning Program in accordance with Article 10, Paragraphs 3 to 7 of the BA, taking into account all new circumstances, such as: new RW and SF disposal national strategies and programs, extension of Krško NPP’s lifetime, agreement between the co-owners regarding an on-site SF dry storage at Krško NPP, as well as new developments in decommissioning technologies.

b) Assessment of:

(A) LILW and HLW quantities (determined in type, weight and volume) to be generated by decommissioning. Estimates will be used in the Krško NPP RW and SF Disposal Program.
(B) Time schedule and costs associated with decommissioning in 2018 Euro (€) prices (nominal cost). Nominal cost of decommissioning should also be discounted.

The third revision of the Krško NPP Decommissioning Program should be carried out according to the requirements of the IC and using all available technical documentation prepared for first and second revisions, taking into account existing technical and technological changes and all other changes that have occurred at Krško NPP, regulations in the RS and other relevant documents.

2.2 Project Objectives

In order to achieve the objectives of the project it is necessary to:

a) Revise the technical document PDP rev. 5 which was prepared in April 2010 by the company NiS Siemplekamp GmbH so that it is aligned with the conclusions 2.1-2.4 of the 10th session of the IC (termination of Krško NPP’s operation in 2043 and the construction of dry storage for SF at the location of the NPP) taking into account existing, valid and confirmed NPP Krško plans related to long-term operation and radioactive waste management. Introduced modifications will have an impact on the time frame of decommissioning operations, assessment of LILW and HLW quantities generated by decommissioning and expenses of decommissioning operations. Modified document will be PDP rev.6.

b) Prepare and develop a document Choice of discount parameters and methods of calculating annuity for projects of long duration.

c) Prepare a document Third Revision of the Krško NPP Decommissioning Program that includes: (A) an overview of all technical and technological procedures used in decommissioning operations and time schedule with all major operations based on PDP Rev.5[2]; (B) an estimate of the costs of decommissioning and all other operations related to the decommissioning of Krško NPP, in euros expressed in 2018 prices; (C) an assessment of the discounted cost of decommissioning; and (D) an estimate of the quantities and types of LILW, HLW and other waste that will be generated during decommissioning and should be safely disposed of. Document shall be prepared in accordance with JV5 requirements [3] (see Chapter 3).

Calculations of the costs of decommissioning must be in accordance with Slovenian VAT regulations. Cost of incentives to the local community shall be included in decommissioning costs, in accordance with the current Slovenian legislation. Likewise, due to the possibility of future events and circumstances which are likely, but not certain, events that may significantly affect the course and costs of decommissioning shall be registered and described in the document (base case should include best estimates values). Related to that, events contingency (in percentage) in both positive and negative direction should be estimated and presented as low and high cost sensitivity cases. Total nominal costs should therefore include base case costs. Total cost shall be discounted.

3. DELIVERABLES

Krško NPP and Expert organizations will submit the document entitled Third Revision of the Krško NPP Decommissioning Program to the IC in digital form and hard copy. The document will be prepared in English.
The document will have the following contents (in accordance with Slovenian Rules on radiation and nuclear safety factors, JVS, Off. Gaz. of the RS 74/2016):

a. Executive summary
b. Abbreviations
c. Introduction
d. Description of the facility
e. Decommissioning strategy
f. Project management
g. Decommissioning activities
h. Inspections and maintenance
i. Waste management
j. Costs estimate
k. Safety assessment
l. Environmental assessment
m. Occupational safety
n. Quality assurance
o. Emergency plan
p. Physical security and safeguards of nuclear and radioactive substances
q. Conclusions and recommendations
r. Attachments

4. INPUTS

NPP Krško will use where appropriate all available technical documentation relevant to this revision, prepared during previous revisions of the decommissioning and disposal programs, and in particular documents made during the second revision such as PDP rev. 5[2].

5. PROJECT ORGANIZATION

NPP Krško d.o.o. is responsible for preparation of revision 3 of DP and cooperate with ARAO and Fond.

Project Implementation Coordination Committee (ICC) will be nominated by the ICC. The ICC supports the activities for new revision of DP based on this ToR. NEK as responsible party for preparation of new revision of DP reports in regular ICC-meetings on project progress and critical issues if existing. ICC shall meet every 4 – 6 months or more frequently if needed.

After the preliminary estimates of the total cost and the total discounted costs for decommissioning are made, the expert organizations and NPP Krško will prepare a presentation of the work on the project and preliminary results for the ICC. The final document will be prepared after the ICC issues approval in the form of conclusion in the Minutes of meeting.
6. PROJECT RESULTS APPROVAL – PROJECT CLOSEOUT

After Krško NPP has prepared revision 3 of the DP, it should be adopted according to article 10 of the BA.

7. ADDITIONAL REQUIREMENTS AND LIMITATIONS

Pursuant to Article 3 of the Act on Ratification of the IA and the joint statement on the occasion of the signing of the BA (Official Gazette - Intergovernmental agreements 9/2002), for the Krško NPP Decommissioning Program and the Krško NPP RW and SF Disposal Program, prior consent of Croatian Parliament is needed.

Pursuant to Article 10, Paragraph 5 of the BA, the decommissioning program must also be approved by the administrative body of the RS responsible for nuclear safety.

Since Article 10 of the BA requires that the Decommissioning Program and RW and SF Disposal Program are consistent with international standards, this revision must be in full compliance with all conventions and international agreements which the Republic of Croatia and the Republic of Slovenia are parties.

Since Article 10, Paragraph 1 of the BA establishes Krško NPP’s decommissioning and RW and SF disposal as a joint responsibility of both parties, the Revision of the Decommissioning Program shall be carried out in accordance with national strategies and national RW and SF management programs with:

- *Resolucija o nacionalnem programu ravnanja z radioaktivnimi odpadki in izrabljenim gorivom za obdobje 2016–2025* (ReNPRRO16-25)
- *Strategija zbrinjavanja radioaktivnog otpada, iskorištenih izvora i istrošenog nuklearnog goriva* (NN br. 125/14)

All decommissioning procedures and work on decommissioning must be in agreement with Slovenian legal framework.

Boundary Conditions for the Third Revision of the Krško NPP Decommissioning Program are an integral part of these ToR included in chapter 11.

Working documents of this project represent proprietary information of Krško NPP. Non-disclosure agreements will be signed if needed. The final document of the project *Third revision of Krško NPP Decommissioning Program* will be available without restrictions only after approval by the IC.

8. TIME SCHEDULE

Timeline of project activities is as follows:
<table>
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<tr>
<th>Number of activity</th>
<th>Activity</th>
<th>Responsible organization</th>
<th>Supporting organization</th>
<th>Result of activity</th>
<th>End of activity (months)</th>
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<td>ToR approval</td>
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<td>Preparation of Revision to PDP, Rev.6</td>
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<td>ARAO and Fond</td>
<td>Revision to PDP, Rev.6</td>
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<td>ARAO and Fond</td>
<td>Report Discount parameters and methods of calculating annuity</td>
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<td>Krško NPP</td>
<td>ARAO and Fond</td>
<td>Preparation of DRAFT Decommissioning Program, Rev.3 and Presentation of preliminary results</td>
<td>T₀ + 8</td>
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<tr>
<td>5</td>
<td>Presentation of the preliminary results to the IC</td>
<td>Krško NPP</td>
<td>ARAO and Fond</td>
<td>Conclusion in the Minutes of the IC meeting with approval to finish the project</td>
<td>T₀ + 10</td>
</tr>
<tr>
<td>6</td>
<td>Preparation of Third revision of NPP Krško Decommissioning Program</td>
<td>Krško NPP</td>
<td>ARAO and Fond</td>
<td>Third revision of NPP Krško Decommissioning Program</td>
<td>T₀ +11</td>
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<td>7</td>
<td>The Third revision of NPP Krško Decommissioning Program is sent to IC</td>
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<td>ICC</td>
<td>Conclusion in the Minutes of the IC meeting</td>
<td>T₀ + 11</td>
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9. EXPENSES

NEK will cover all the expenses of this project from its normal budget.
10. BOUNDARY CONDITIONS

A. General boundary conditions

1. NPP Krško will be in operation until 2043 after successful completion of the periodic safety reviews in 2023 and 2033.

2. If the BA contracting parties are unable to reach agreement on joint solution for radioactive waste disposal, they will take over their share of waste in period 2023-2025 as stated in the agreement.

3. It is assumed that during the remaining service life of NPP Krško there will be no major incidents or accidents. The possibility of incidents and accidents or early termination of the service will be recorded in the risk register.

4. Implementation of Spent Fuel Dry Storage Project for Phase 1 (first 592 FA), Phase 2 (additional 592 FA) will be covered by the NPP Krško directly from the price of kWh. Other phases will be covered by both Funds (as part of the waste disposal costs).

B. Financial boundary conditions

5. All the nominal costs are expressed in € 2018.

6. All the costs are calculated with and without VAT.

7. Costs of institutional control of locations after decommissioning and closure of the facility will be assessed according to international experience and recommendations.

8. NPP Krško Decommissioning Program states specific nominal costs and total nominal cost of decommissioning as well as discounted specific costs and total discounted cost of decommissioning presented as base case scenario costs.

C. Boundary conditions for Krško NPP Decommissioning Program

9. In this revision only strategy of immediate dismantling will be considered respecting the need for wet storage with 5 years of operation beyond NPP Krško operation for last discharges of reactor fuel.

10. Dry storage for SF will be established on the location of Krško NPP where it will be in use for at least 60 years. Phase 1 and 2 of Dry storage project will be implemented on NPP Krško site before 2043.
11. REFERENCES

[1] IC Minutes of 10th Meeting, dated 20.07.2015
[3] Pravilnik o dejavnikih sevalne in jedrske varnosti (JV5, Uradni list RS, št. 74/16)