**Description**

**Background**
Availability of specific packages of Severe Accident Management Guidelines (SAMG) and Symptom-based Emergency Operating Procedures (SB EOP) at each NPP power unit provides an important contribution to the implementation of the Defence in Depth concept aiming to ensure nuclear safety of the power unit. SAMG shall naturally supplement the SB EOPs used by the NPP staff to prevent escalation of a possible beyond design-basis accident to a severe phase.

At the time of programming this project, SB EOPs had been developed and implemented at a number of Ukrainian NPP units. The existing scope of these SB EOPs covered the management of the design-basis and beyond design-basis accidents up to the moment of their escalation to the severe phase. All these EOPs were developed for the reactor initial state “power operation” and did not cover the events which could occur during situations when the reactor was under shutdown conditions. Similar scope SB EOPs were planned to be implemented by Energoatom also at the remaining Ukrainian NPPs by the end of 2009.

In order to complete the establishment of the industry-wide integrated system of emergency documentation at Ukrainian NPPs, it was necessary also to develop and implement sets of SB EOPs covering the situations when the reactor is under shutdown conditions (SB EOPs SR) as well as a complete set of Severe Accident Management Guidelines for all Energoatom NPPs. The project activities were intended to support the NNEGC Energoatom Industry Programme for Severe Accident Analysis and SAMG Development (PM-D.0.41.491-09) and other relevant activities intended to complete the formation of a comprehensive set of emergency documentation at Ukrainian NPPs. The Energoatom Programme PM-D.0.41.491-09 was developed and approved by NNEGC Energoatom on 17.08.2009 and subsequently endorsed by the Ukrainian nuclear regulatory authority, SNRIU.

At the outset of the project there was also no adequate regulatory and legal framework in Ukraine in the field of severe accident management. Therefore, in parallel to this project, another INSC project was launched with the Ukrainian nuclear regulator and its Technical Support Organisation to assist in the development of the necessary regulatory framework (Contract 292652). This parallel action was intended to ensure that changes initiated under the present project in the operation and maintenance of NPPs would be covered by the relevant modifications of standards, codes or regulations.

**Objective**
The main objective of the project was to develop Severe Accident Management strategies and associated Severe Accident Management Guidelines (SAMGs) for the 3 types of Ukrainian NPPs. These SAMGs should cover severe accidents which could occur for both at
power condition and shutdown state of the reactor. The project was also including the
development of Symptom Based Emergency Operating Procedures for situations when the
reactor was under shutdown conditions (SB EOPs SR). This set of EOPs was complementing
the EOPs for situations when the reactor is at power that had been already implemented on
Ukrainian NPPs in the frame of previous projects. The three pilot units which were considered
in this project were Rovno NPP Unit 1 (VVER 440/213), South-Ukraine NPP Unit 1 (VVER
1000/302) and Zaporozhye NPP Unit 1 (VVER 1000/320).
The target of the project was also, like for any other INSC projects, to ensure the best
possible transfer of knowledge between the consultant implementing the project and the
beneficiary, here NNEGC Energoatom. Therefore as part of the project, specific efforts were
planned to ensure that NNEGC Energoatom staff would be trained in developing and
implementing the new procedures and guidelines with respect to NNEGC Energoatom
practices related to safe operation of Nuclear Power Plants.

Results
Apart from the administrative tasks the first part of the project, which took place between
January 2011 and June 2014, was to perform a review of the Best International Practices and
the situation in Ukraine regarding Accident Management strategies and procedures.
Then the development of the Severe Accident Management Guidelines and Symptom Based
Emergency Operating Procedures for Shutdown reactor was performed following the below
listed steps:

- Development of the Initiating Events (IE) list for the shutdown reactor state
- SAMG Strategies preparatory work (consisting mainly of a common development, verification and
  validation between the Consultant and the Beneficiary of MELCOR 1.85 computational models for
  VVER-1000/320, VVER-1000/302 and VVER-440/213 reactor designs).
- Identification, development and analytical justification of the accident management strategies for
  SAMGs and SB EOPs SR
- Assessment of the availability, applicability and adequacy of Structures, Systems and
  Components (SSC) for severe accident management
- Development of a Writer’s Guide and a User’s Guide for EOPs and SAMGs
- Writing of the SAMG and EOPs for three pilot units
- Verification, Validation and workshop on SAMGs and SB EOP SR

In each of the tasks the work was split between the Consultant and the Beneficiary in a way
ensuring the best transfer of knowledge. To ensure that the project ran smoothly and would
later be easy to disseminate to the other Ukrainian NPPs, the project Terms of Reference
included the development before the beginning of each main technical task of a set of
Procedural Guidelines (PGs) describing the way the task would be implemented in terms of
project management, QA, interaction with other tasks as well as work split and information
exchange between the Consultant and End User/Beneficiary.
It has to be mentioned that with the Fukushima accident in March 2011 and the following EU
Stress Tests to which Ukraine participated, the project organisation was quite challenged and
the workload for the Consultant and the Beneficiary became even more important. However,
the project was successfully completed in June 2014.
### General Information

<table>
<thead>
<tr>
<th><strong>Title:</strong></th>
<th>Accident Management Guidelines and Procedures: Improvement of the Emergency Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Programme:</strong></td>
<td>INSC</td>
</tr>
<tr>
<td><strong>Amount:</strong></td>
<td>€ 2,722,400.00</td>
</tr>
<tr>
<td><strong>Budget year:</strong></td>
<td>2008</td>
</tr>
<tr>
<td><strong>Countries:</strong></td>
<td>Ukraine</td>
</tr>
<tr>
<td><strong>Nature:</strong></td>
<td>Services</td>
</tr>
<tr>
<td><strong>Types of activities:</strong></td>
<td>On Site Assistance</td>
</tr>
<tr>
<td><strong>Duration (months):</strong></td>
<td>36</td>
</tr>
<tr>
<td><strong>Contracting authority:</strong></td>
<td>European Commission</td>
</tr>
<tr>
<td><strong>Contractors:</strong></td>
<td>TVONS (TVO Nuclear Services Oy)</td>
</tr>
<tr>
<td><strong>Status:</strong></td>
<td>On-going</td>
</tr>
<tr>
<td><strong>CRIS number:</strong></td>
<td>240795</td>
</tr>
<tr>
<td><strong>Project reference:</strong></td>
<td>U1.05/08 T1+2</td>
</tr>
<tr>
<td><strong>Decision number:</strong></td>
<td>NSI/2008/020-363</td>
</tr>
<tr>
<td><strong>Method of procurement:</strong></td>
<td>Restricted Call for Tender</td>
</tr>
<tr>
<td><strong>Signature date:</strong></td>
<td>15/12/2010</td>
</tr>
<tr>
<td><strong>Effective contract date:</strong></td>
<td>20/12/2010</td>
</tr>
<tr>
<td><strong>Contract end date:</strong></td>
<td>17/01/2014</td>
</tr>
</tbody>
</table>

**Contract Documents:**  [Leaflet with project description](#)