

1. INTRODUCTION

1.1 Background

This Environmental Impact Assessment (EIA) has been prepared in connection with the project of the Ukrainian national power utility - Energoatom (formerly Goskomatom) - to complete and upgrade Unit 4 of Rivne (R4) and Unit 2 of Khmelnytsky (K2) nuclear power plants (NPP), the construction of which was stopped in May 1991 as a consequence of a Moratorium by the Ukrainian Government.

On 19 December 1995 representatives of the G7 and Ukrainian governments signed a Memorandum of Understanding concerning closure of the Chornobyl NPP by the year 2000. In this Memorandum, a "completion and safety upgrading" project for Rivne 4 and Khmelnytsky 2 was identified as one of the projects having priority to offset the consequences of closing Chornobyl. To this end, the European Commission (EC) asked a consortium composed of EDF, IVO and Tractebel (the Project Management Group - PMG) to assist Goskomatom.

For completion of K2 and R4 the EC required an environmental assessment covering radiological and other aspects, determining whether the potential effects of completing the new units would be compatible with European standards and practices in respect of the environment and public protection. The EC also required evidence that the protection of workers would be compatible with current best practice, in particular as regards radiological protection.

The terms of reference for the required study included the following main tasks.

- Determining the division of responsibilities between national, regional and local bodies as well as the operator.
- An audit of the situation as it existed at the two sites.
- Production of a radiological environmental impact assessment for each of the two proposed units based on data corresponding to that listed in Commission Recommendation 91/4/Euratom (Appendix A). This assessment was to include impacts on persons living in Ukraine and to take particular account of critical groups in the populations concerned. It was also to have been complemented with reference to non-radiological aspects taking into account Articles 3 and 5 of Council Directive 85/337/EEC (Appendix A).

The resulting EIA report could reasonably be expected to have given consideration to the topics listed in Table 1.1. The present report concerns Khmelnytsky Unit 2 (K2) which was due to begin to produce electricity before the end of 1991, when its construction was stopped.

Table 1.1
Anticipated content of the EIA report for the original study (Appendix A)

- THE SITE AND ITS SURROUNDINGS
 - Geographical and topographical situation
 - Geology and seismology
 - Hydrology
 - Meteorology and climatology
 - Natural resources
 - Other activities within the vicinity of the site
 - Population
- THE PLANT
 - Main features
 - Ventilation system
 - Containment
 - Time scale
 - Decommissioning and dismantling
- RELEASE OF AIRBORNE RADIOACTIVE EFFLUENTS IN NORMAL OPERATION
 - Authorisation procedure in force
 - Technical aspects
 - Monitoring of discharges
 - Evaluation of transfer to man
 - Models and parameters
 - Evaluation of concentrations and exposure levels
 - Consideration of other sources of radioactive discharge in the site vicinity
- RELEASE OF LIQUID RADIOACTIVE EFFLUENTS IN NORMAL OPERATION
 - Authorisation procedure in force
 - Technical aspects
 - Monitoring of discharges
 - Evaluation of transfer to man
 - Models and parameters
 - Evaluation of concentrations and exposure levels
 - Consideration of other sources of radioactive discharge in the site vicinity

Table 1.1 (continued)

- UNPLANNED RELEASE OF RADIOACTIVE EFFLUENTS
 - Review of accidents which could result in unplanned releases of radioactivity
 - Reference accident(s) considered by competent national authorities
 - Evaluation of the radiological consequences of the reference accident(s)
 - Entailing release to atmosphere
 - Entailing releases into the aquatic environment
 - Emergency plans
- ENVIRONMENTAL MONITORING
- ASSESSMENT OF THE DIRECT AND INDIRECT IMPACTS OF THE PROJECT
 - Human beings, fauna and flora
 - Soil, water, air, climate and the landscape
 - Interactions between the above two items
 - Material assets and cultural heritage
- MEASURES TO AVOID, REDUCE OR REMEDY SIGNIFICANT ADVERSE EFFECTS

1.2 **Objectives**

The present study required that the draft EIA used as the basis for the initial public consultation should be updated to take account of the results of comments received, so as to meet the requirements of EBRD and Euratom, and to gain the approval of relevant Ukrainian national authorities. The terms of reference for the present study are provided in Appendix B. The requirements of Euratom have, for the present study, been interpreted as those for the original study (above).

EBRD is directed by its founding agreement to "promote in the full range of its activities environmentally sound and sustainable development" [1.1]. The various ways in which EBRD promotes such development are described in the Bank's Environmental Policy document [1.1]. That document notes that an EIA is carried out to identify, predict and assess the future environmental impacts associated with a particular operation where the impacts are potentially significant and cannot be readily identified, assessed or mitigated. The detail and scope of an EIA depend upon the likely types and extent of an operation's environmental effects and the sensitivity of the locations affected. These are usually determined through scoping. Scoping is a process to identify the important issues and alternatives that should be examined in an EIA. For the present study the original EIA document taken in conjunction with the terms of reference for both the original and present study provide a clear indication of the scope of the required EIA.

The Ukrainian national power utility will use the EIA as an input to the Environmental Impact Report (OVNS) which is required by Ukrainian law to obtain the operational permit for Khmelnytsky Unit 2. The OVNS is being prepared by KIEP, the design bureau of Energoatom.

1.3 Scope of work

The scope of the EIA was originally defined as comparing the projected environmental impact of the plants to accepted international standards. The proposed table of contents was discussed and approved during the scoping process (Appendix C).

The EBRD environmental procedures [1.1] provide a sample report format for an EIA as reproduced in Table 1.2.

Table 1.2
Environmental Impact Assessment: EBRD sample report format [1.1]

1.0	Operational context
1.1	Purpose and need
1.2	Legal and institutional framework
1.3	History of the operation including alternatives considered
2.0	Description of the operation
3.0	Description of the existing environment
3.1	Climatic conditions
3.2	Geomorphology and geology
3.3	Surface and groundwater quality
3.4	Landscape
3.5	Ecology and biotic resources
3.6	Air quality
3.7	Noise
3.8	Ground conditions
3.9	Socio-economic and cultural issues
3.10	Land use and settlement patterns
4.0	Description and assessment of the significant environmental impacts of the proposed operation at the local, regional and global levels
4.1	Impacts associated with construction
4.2	Impacts associated with operation
4.3	Impacts associated with closure and decommissioning
4.4	Identification of key uncertainties and data gaps
4.5	Comparison of impacts associated with alternatives, including the do-nothing alternative
4.6	Summary of least-cost analysis of alternatives

Table 1.2 (continued)

5.0	Description of mitigation measures and/or measures to enhance environmental benefits
6.0	Outline of an environmental monitoring plan
6.1	Monitoring during the construction phase
6.2	Monitoring during operation
Appendices	
i)	Names of those responsible for preparing the EIA
ii)	Written material references used in preparing the EIA
iii)	Records of public meetings and consultations in preparing the EIA
iv)	Technical data that may relate to the assessment but is too detailed to be included in the main text

This Table indicates a number of items additional to those included in the original study (Table 1.1) as follows.

- The need to consider alternatives in the operational context.
- The need to include consideration of socio-economic and cultural issues.
- The need to consider impacts associated with construction.
- Identification of key uncertainties and data gaps.
- Comparison of impacts associated with alternatives including the 'no-change' alternative.
- Summary of least-cost analysis of alternatives.

These items have therefore been given prominence whilst revising and updating the EIA.

In addition, to the above, the terms of reference for the present study (Appendix B) required the preparation of an outline Environmental Action Plan (EAP). EBRD [1.1] define the purpose of the EAP as "to obtain an agreement concerning key environmental, health and safety performance criteria, corrective actions and improvement programmes, and to define monitoring and reporting requirements". It is noted that, normally, the EAP will form part of the legal documents of the Bank's investment.

1.4 Sources of information

The K2 project is for a VVER-1000 similar to that of Rivne 3 and Khmel'nitsky 1. Therefore, when the need arose, the assessment was based on information concerning the functioning of those two plants. The 'completion and upgrading project' as envisaged by PMG in 1997 was also taken into account.

1.4.1 Available data for the EIA

The following main documents were considered during the preparation of the original EIA.

- Risk audit Rivne 3 safety evaluation, IAEA VVER-1000 study [1.2].
- Data provided by KIEP (the design bureau of Energoatom) [1.3]

- Report on the status of nuclear and radiation safety in Ukraine for 1995 [1.4]

The EIA refers to all the documents which were originally available to the authors, as well as a number of supplementary documents provided by the State Scientific Engineering Center of Control Systems and Emergency Response (SSEC CSER) [1.5]. It is therefore based to a large extent on existing information and data as provided by the Ukrainian partners.

1.4.2 Interviewees

Discussions have taken place with the following organisations:-

- Derzhkomatom (now the Department for Nuclear Power within the Ministry of Power of Ukraine).
- Management of the plant.
- Nuclear Regulatory Administration.
- Nuclear Safety Inspectorate.

These discussions will be supplemented by additional discussions during preparation of the final EAPs.

1.5 Organisation of this report

To meet the various requirements of Euratom, EBRD and Ukraine national authorities, the following structure has been adopted whilst revising and updating the original EIA.

- *Section 2* provides the legal and institutional framework within which the proposed project rests.
- *Section 3* provides a description of the existing environment in the vicinity of the Khmelnytsky NPP including the results of monitoring of the environmental effects of the existing NPP.
- *Section 4* describes the proposed new plant in the context of those features which may lead to impacts on the workforce or the surrounding environment and man.
- *Section 5* discusses legislation relating to radiation protection of the workforce and members of the public along with operational safety matters.
- *Section 6* identifies the potential sources of emissions, effluents and wastes arising from construction, operation, decommissioning and dismantling, and provides a quantitative source term for assessments of the impacts of routine operation of the proposed new plant.
- *Section 7* provides a summary of the approach that has been taken to estimate the impacts of construction and routine operation of the plant on the environment and on members of the public, and of the results of the impact assessments that have been carried out.
- *Section 8* summarises results of analyses of the potential radiological impacts of unplanned releases of radioactive materials.
- *Section 9* discusses mitigation measures that have been, or can be introduced, to avoid or reduce any adverse effects during construction and operation with reference to the outline EAP (Appendix D).
- *Section 10* provides a brief comparison of the impacts of the proposed project with alternatives, the emphasis being placed on the 'no change' base case alternative.
- *Section 11* provides the conclusions of the EIA.

Results of public participation undertaken to date are provided in Appendix C.

1.6 References

- 1.1 European Bank for Reconstruction and Development. Environmental procedures. September 1992. Revised 1996.
- 1.2 IAEA. Safety issues and their ranking for VVER-1000 model 320 nuclear power plants. IAEA, Vienna, March 1996. And subsequent assessments of the completion and upgrading programme prepared by Risk Audit.
- 1.3 Kyivenergoproekt. Khmelnytsky NPP- data for environmental impact assessment. 1996. UKKE00001.
- 1.4 Report on the status of radiation and nuclear safety in Ukraine – 1995 reporting year. Ministry of Environment and Nuclear Safety.
- 1.5 SSEC CSER. Information for updating of EIA for KNPP (Parts 1 and 2). November 1997.