Siempelkamp
NIS Ingenieurgesellschaft mbH

TECHNICAL DOCUMENT
Document No.: 8229 / CA / F 008240 8 / 00

Title: ***GKN – Evaluation of Decommissioning of the Dodewaard NPP -New Decommissioning Cost Estimate-***

Task 2: Deferred Scenario
Starting date of decommissioning: 2045
Clearance levels: KEW and IAEA

Customer: **B.V. Gemeenschappelijke Kernenergiecentrale Nederland (GKN)**

00	16.04.2010	IC / R. Paul		
Rev.	Release Date	BU / (Name) Prepared	(Signed) Reviewed	(Signed) Approved

Executive Summary

The objective of the present study is to provide a new cost estimate for the complete dismantling of the "Kernenergiecentrale Dodewaard" (KCD) after Safe Enclosure (SE) called "KCD new Decommissioning Cost Estimate".

The KCD new Decommissioning Cost Estimate is evaluated in the frame of a **"Deferred Decommissioning Scenario"**. Under this scenario, it is assumed that the actual KCD dismantling works start in **2045**. Licensing and preparation start about 4 years earlier.

Two different tasks are evaluated:

Task 1.1:

Using best estimate assumptions, including clearance levels as defined in the Dutch "Kernenergiewet" /3/.

Task 1.2:

Using best estimate assumptions, but with IAEA RS-G-1.7 /4/ clearance levels.

The new cost estimate is performed in a frame of a Preliminary Decommissioning Plan (PDP). The sections of the present study represent a table of content for this PDP as given in Appendix 1 of the Technical Requisition File (TRF) /6/. The level of detail provides a full understanding how the decommissioning costs are obtained and shows that they are in compliance with Dutch Laws and context specifications taking into account all KCD conditions.

The present study is prepared by NIS Ingenieurgesellschaft mbH (NIS). For almost 30 years now NIS has been involved in nuclear decommissioning projects and has analyzed them from a technical and an economical point of view. These experiences have steadily been included in the NIS calculation programme CORA & CALCOM to assure an up-to-date cost calculation with regard to modern techniques /7/.

The main assumptions made in the present study are:

- The decommissioning costs of the "Deferred Decommissioning Scenario" are extrapolated from the decommissioning cost estimate under the "Reference Scenario" /14/.
- Only dismantling costs (incl. licensing and preparation) are estimated. Operational costs for Safe Enclosure (SE) are not included. Based on present expenses the yearly costs for SE period are 1,3 M€ per year.
- Costs related to Authorities are included with 15.000 € per year.
- The wages used (GKN and Main contractor for the nuclear part) are based on relevant wages of German companies active in decommissioning activities. The wages used for Building demolition and the Site recovery are given by GKN based on information from a Dutch demolition company.
- The goal of the decontamination and dismantling activities is to reach "Green field". The dismantling includes the removal of the buildings, of all the various underground structures, including among others the foundation piles, the cooling water inlet structures, and bringing the soil of the site at the same level as the surroundings.

- An updated status of KCD (using the most recent physical and radiological data inventories stored in Dodewaard Information System - DIS) has been taken into account.
- All materials in the controlled area are supposed as being radioactive, unless measurements indicate that the contamination is below the clearance levels.
- The radiation exposure is kept ALARA. In any case, the radiation exposure per person is limited to 20 mSv per year. This is the current Dutch dose limit for workers occupationally exposed to radiation.
- The COVRA waste management costs given in the Appendix 7 of the TRF /6/ updated to 2009 costs by E-mail (dated 25. Feb. 2009) have been used. The costs for "Transport, Interim Storage at COVRA, and Disposal" for KONRAD Type II containers are based on an E-Mail from COVRA dated 7. Oct. 2009 /10/.
- Both absolute and net present value costs are estimated; the discount rate (the rate of return that could be earned on an investment in the financial markets with similar risk) is 4 % above inflation. This figure serves as a standard indexing number, as it was chosen in the past. Therefore, it is used in the present study as well, in order to make a comparison between studies possible.
- The reference date for the price level of the cost estimate is taken as 01.01.2009. VAT is not included in the costs.

The results of the new Decommissioning Cost Estimate KCD are as follows. The first table gives an overview of the produced amount of radioactive waste, the necessary packages, the waste storage volume as well as the costs for transport, interim storage at COVRA and final disposal.

Task No.	Free Release Levels taken from	Packed Mass [Mg]	Number of Disposal Containers [-]	Disposal Containers Costs [M€]	Storage Volume [m^3]	Costs for Transport, Interim Storage, Disposal [M€]
1.1	KEW NL	1134,8	2316	2,6	1168,1	33,6
1.2	IAEA	1344,3	2371	3,1	1423,2	44,6

The second table shows the results of the cost estimate considering the different tasks.

Task No.	Free Release Levels taken from	Costs	
		Absolute Value [M€]	Net Present Value (4% above inflation) [M€]
1.1	KEW NL	180,3	38,8
1.2	IAEA	193,0	41,4

It should be noted that it is rather difficult to anticipate and evaluate the uncertainties on the decommissioning costs resulting from some fifty years time-scale period (between now and the end of the decommissioning).

The overall duration of the project (starting with planning and ending with "Green field" conditions) takes about 14 years.

More detailed results can be found in the following sections of the study or on the CD (delivered in the frame of the present study).