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Organisation de Coopération et de Développement Économiques
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English - Or. English

NUCLEAR ENERGY AGENCY
RADIOACTIVE WASTE MANAGEMENT COMMITTEE

Cancels & replaces the same document of 09 July 2014

Working Party on Decommissioning and Dismantling (WPDD)

Summary Record of the 7th Meeting of the DCEG

**10-11 June 2014
Malmö, Sweden**

This document cancels and replaces the previous version due to an update with the formatting.

For any further information, please contact Ivan Rehak (ivan.rehak@oecd.org)

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Complete document available on OLIS in its original format

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MEETING MINUTES OF THE DCEG-7

The 7th Meeting of the Decommissioning Cost Estimation Group was held on 10th and 11th June 2014, in Scandic Hotel Malmö, Triangeln 2, Norr, 21143 Malmö, Sweden. A technical site visit was organized on 12th June 2014 to Barsebäck NPP.

1. Opening of the meeting

Main observations

Mr Björn Hedberg, the DCEG Chairman, opened the meeting and welcomed the attendees. Attendees introduced themselves.

Attendees – see Appendix.

Decision

All presentations made available at the meeting will be posted on the website (done – follow the link: <https://www.oecd-nea.org/download/wpdd/dceg/dceg-7/>).

2. Review and adoption of agenda

Main observations

No amendments.

Decision

Approved.

3. Approval of the DCEG-6 Summary Record (18-20 June 2013) [[NEA/RWM/WPDD\(2013\)4](#)]

Main observations

No amendments.

Mr Ivan Rehak noted that in accordance with the DCEG-6 Summary Record, Decision No. 6, since the Secretariat received only minor comments from DCEG members on the document *International Peer Reviews of Decommissioning Cost Studies*, the document was passed to WPDD members for commenting, and their comments were also implemented. After approval by the WPDD Core Group the document will be sent for publication.

Decision

Approved.

4. Briefing on activities from the past year

Main observations

a. RWMC/WPDD

Mr Ivan Rehak reported on RWMC/WPDD main achievements. The 14th Annual Meeting of the WPDD (November 18-20, 2012, Issy les Moulineaux, France) held a topical session on Preparation for Decommissioning during Operation and after Final Shutdown. He also informed on the status of WPDD TG on Radiological Characterization and Decommissioning, and on TG Nuclear Site Restoration, as well as on the WPDD work plan. He briefed on current status of activities of the Co-operation Programme on Decommissioning (CPD). The WPDD Report on *Radiological Characterisation for Decommissioning of Nuclear Installations* is made available from WPDD public website <http://www.oecd-nea.org/rwm/wpdd/>. WPDD Report on *Future R&D and Innovation Needs for Decommissioning* and CPD Report on *Nuclear Site Restoration and Remediation* should be available soon. The 15th Annual Meeting of the WPDD will be held on 14-16 October 2014, in Moscow.

b. DCEG

Mr Björn Hedberg, the DCEG Chair, highlighted that DCEG aims to support all activities that may further improve decommissioning costing culture (transparency, auditability, and traceability). He summarized recent achievements of the DCEG, including the DCEG-6 outcomes. The DCEG document *International Peer Reviews of Decommissioning Cost Studies* is completed, and is in the approval process. The document *Practice of Cost Estimation for Decommissioning* has reached the stage of a very advanced draft. A new project on uncertainties in decommissioning costing has been launched.

c. Update on the IAEA Activities

Mr Vladimir Michal reported on the International Decommissioning Network's (IDN) mission, its recent activities and planned 8th IDN Annual Forum (9th-11th December 2014). He noted about planned International WS on Deferred Dismantling (23-26 June 2014, London, followed by a site visit to Bradwell / Berkeley). He focused on three on-going IDN projects: DRiMa (decommissioning project risk management), CIDER (global constraints to implementing decommissioning and environmental remediation projects), and DACCORD (data analysis and collection for research reactor decommissioning). A document on *Cost Estimation for Research Reactor Decommissioning* (IAEA NE Series NW-T-2.4, (2013)) has been published, and contains a CD with the CERREX code (MS Excel-based Software for Preliminary Cost Calculation). The next Scientific Forum of the IAEA (23-24 Sept 2014) will focus on radioactive waste (notably on origin and types of radioactive waste, technical solutions for safe radioactive waste management, and future trends on promising methods).

d. Update from the Nuclear Development Committee (NDC) – Ad-hoc Group on ‘Costs of Decommissioning’

Mr Ivan Rehak reported on behalf of Ms Maria-Elena Urso (NDC) on the progress of the NDC Project on Costs of Decommissioning, the initiative on update of publication *Decommissioning Nuclear Power plant – Policies, Strategies, Cost* (2003), aiming to gather and assess available knowledge from countries on costs of completed decommissioning projects, review funding mechanisms in place or under consideration, and to the extent possible, consider cost estimates for high level processes. The report is expected to be finalised by the end of 2014.

Decision

DCEG will be informed about the outcomes of the NDC ad hoc group. It was noted that a number of DCEG members were also active in the NDC ad hoc group.

5. The DCEG Report “The Practice of Cost Estimation for Decommissioning”**Main observations**

Mr Ivan Rehak summarized comments by the Secretariat from DCEG members on the document *The Practice of Cost Estimation for Decommissioning*, and informed DCEG on implementation of the comments to the document. Amongst the changes made, the descriptions of country specific approaches in cost estimates (case studies) were added to the appendix (namely EDF, France; Sogin, Italy; and Sweden). Other participants were invited to contribute similar description of the approaches in their respective countries.

In the discussion it was noted that it is a good document providing basic information on practice in D&D cost, and the chapter on the basis of schedule was appreciated. The case study approach will improve the generic overview of the current report. It was suggested that a glossary of the most important terms could be useful to add, as presented in item 6b.

It was noted that quantitative risk analysis is described in considerable detail, and that there is perhaps no need to mention specific software. Using Monte Carlo’s triangular approach is different for contingencies and for risk estimation. Mr Andy Ridpath (NDA) may deliver a proposal for a more balanced text.

Representatives from Spain, Switzerland, and the UK may deliver case studies.

Decision

The document was approved in principle. DCEG members are invited to send their comments and case studies on country specific approaches in cost estimates by 9th July 2014. The document will then be finalised and sent to WPDD members for their comments.

6. The DCEG Work on Risk Analysis in Decommissioning Costing**6.a Dealing with uncertainties in decommissioning cost estimation**

Mr Simon Carroll informed the group about a joint activity established between the OECD/NEA & IAEA. The Terms of Reference (ToR) of a proposed activity were developed in January 2014 by DCEG Core Group members, and the NEA and IAEA Secretariats. The outcome of the two year project would be a report dealing with uncertainties and risk analysis in decommissioning costing. The ToR were circulated to DCEG members, and comments received on the ToR were implemented in a revised final version. A ‘seed’ document, being prepared by Alastair Lair, will be worked on further by two work groups (WGs). WG1, under auspices of the NEA, will be working on uncertainties in the project scope, while WG2, under auspices of the IAEA, on uncertainties out of the project scope. Later in the project the outputs of both WGs would be merged.

6.b. Treatment of Risks and Uncertainties through the Project Development Cycle

Mr Alastair Laird reported on current status of the ‘seed’ document (see 6.a) and presented basic considerations on uncertainties. The document identifies a number of key themes and principles, which are intended to assist discussion in the working groups. Highlights of the presentation included:

- As project maturity rises from idea of the project, concept, through study/options, up to detailed design, - the uncertainty decreases. At early stages contingency is primarily driven by uncertainty. At later stages, including during implementation a contingency is increasingly driven by risk and opportunities.
- A Base Cost (P0) is a Best Estimate minus Contingency. A Best Estimate Cost (P50) is a Base Estimate plus Contingency.
- Radiological characterisation is a mitigation of risk and it costs money.
- Black swans are uncontrollable.
- There may be a way to move out-of-scope uncertainties to into in-scope uncertainties by mitigation, e.g. by defining a couple of alternative scenarios.
- A glossary is an important element of the document to overreach language barriers and achieve unambiguous understanding of basic terms.

Discussion: When considering uncertainties, the D&D projects, repositories projects and remediation projects need to be considered individually. Poor definition of the basis of estimate (and the basis of schedule) implies a lot of issues not being identified in the planning phase of the decommissioning project, which should be addressed by contingencies. Consequently, an implementation phase may require more money. The Uncertainties Project will not analyse uncertainties in funding, only consequences of uncertainties in decommissioning costing on funds.

Optimism bias is a concept to be studied further, including by statistical analysis, for example different models with reference classes.

Countries' approaches are different (in the UK – D&D best estimate is with contingencies, in Germany – best estimate is without contingencies).

Decision

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7. Session on Decommissioning Cost estimates

7.a A Preliminary Study on the Swiss Cost Estimates

Mr Hannes Hänggi informed that last D&D cost studies of 2011 have to be updated in 2016, reflecting ENSI's recommendations based on a number of considerations, including: Muhleberg NPP shutdown in 2019; more strict clearance levels; a 30 percent of contingency stipulated by law in both D&D and WM Funds; D&D plan has to be improved to a level of D&D projects. The 2016 studies will be prepared in two steps (qualitative and quantitative). A fee to the Funds may be updated based on studies' results. Waste management costs include the repository construction costs.

ENSI have issued a new decommissioning guideline (04/2014).

7.b Cost calculation and results from actual decommissioning of Jose Cabrera, Spain

Mr Jorge Borque Liñán presented the mission of Enresa, briefly described NPP José Cabrera, introduced the decommissioning plan and waste management streams, and then focused on cost estimates, highlighting also real costs of already performed work (2000-2012). Neither spent nuclear fuel (SNF) storage cost (as a centralised store will be operated), nor low and

intermediate level waste (LILW) transport & disposal costs are included in the estimation. Some contractors did not have previous experience with the work in the nuclear sector and related additional standards. Some regulations were strengthened during the project, which implied additional costs. Upgrading of the ventilation system was more expensive and took more time than planned. Modifications and/or upgrade of auxiliary systems are inevitable in such projects. Use a fuel pool cavity for underwater cutting of internals required assurance of its tightness and filtering the water by portable equipment. Shifts were doubled for dismantling to cover previous time delay generated in the preparatory phase. The project is currently progressing according to planned budget and time, and about 60 percent of planned work has been performed. A strict project monitoring and flexible managing of delays in a multi-contractor environment is vital. Site operation & support cost (the service provided by former operator) is an important cost driver. Site restoration and site release costs (after conventional demolition) have a high level of uncertainty since the site release limits have not been stipulated by the Regulator.

Discussion: The production of the Environmental Impact Assessment (EIA) Report is included in total cost. The project time is 4 years of transition, and 7 years of decommissioning. The Reference Cost Study 2003 is a basic document submitted to the Ministry of Industry and Energy; CSN (the Regulator) do not control costs. The work is performed by contractors, while Enresa manages the project having taken over the nuclear licence from the operator and has its own supervisors on the site.

7.c Swedish Cost Estimations on NPPs – Introduction

Mr Fredrik De la Gardie briefed on the history of Swedish financing system and past cost studies (from reference plant to site specific studies). SKB's calculation model is updated on 3 year bases to adjust the fee to the Fund. The most recent NPP decommissioning studies for Oskarshamn, Ringhals, Forsmark (2013) were presented in the ISDC format. There is also an earlier study for Barsebäck (2008). Site restoration costs are reported separately. The radioactive waste management infrastructure was presented (an extension to the existing Forsmark repository is planned in order to accept decommissioning wastes, and a new "SFL" final repository for long-lived low and intermediate level radioactive waste is expected to be available from 2045). Based on uncertainty analysis, approx. 30 % was added to the total costs (SEK 7 out of 30 billion). Factors of cost increase were identified: regulatory framework, availability of competence, the timing of the availability of the extended SFR facility. Cost decrease factors: learning curve, management.

Discussion: Total costs include D&D of all NPPs, on-site radioactive waste management (and very low-level waste disposal on-site, for those NPP which have such disposal facilities), containers; and excludes transport and final disposition (SFR, SFL). D&D of one unit is planned for 5-7 years.

7.d Cost estimation for Ringhals

Mr Svante Andersen presented basis of decommissioning cost estimate for Ringhals NPPs. Best estimate is made for 4 units (1 x BWR, 3 x PWR), of 50 years operational life time (later decided extension on 60 years for R3&4), with immediate dismantling after shutdown and the end-state for industrial use. Large components (incl. RPV) will be removed in one piece. RPV internals will be segmented for BWR, and left in the vessel for PWR, and RPV shipped off-site. Activity dependent costs are based on TLG study and unit cost factors for common components. For large components an individual approach was made. Time

dependent and collateral costs estimation reflects Swedish organisation model, experience from Swedish NPPs and TLG study. Total results, schedule and waste volumes were presented.

Discussion: It was noted that although transport of RPV with internals (PWR) on a ship meets radiation protection criteria, there is uncertainty that these criteria may be changed in 20-30 years and may impact currently planned D&D scenario. This uncertainty should be covered by appropriate contingency.

7.e. Presentation on NDA's report on the Swedish cost calculations from 2013

Mr Simon Carroll informed that the NDA was asked by the SSM to analyse three 2013 decommissioning cost studies for Swedish NPP sites with focus on how risk and uncertainty should be treated. The NDA uses their own criteria for evaluating the quality of decommissioning plans in the UK. For the NDA, decommissioning plans and cost estimates are presented as an integrated document. The NDA review report contains 21 observations, including recommendations for possible improvements. The SSM will use the NDA review report on analysis of the decommissioning cost studies, and for the planned dialogue with industry on future improvements of the decommissioning cost estimates in Sweden.

Discussion: The NDA was chosen based on their experience with D&D project and contract management, reviewing D&D plans and costs for the legacy, and for four reactors in operation and new builds. The NDA did not comment on the actual estimates presented in the reports, but tested the logic of estimate and the process. The NDA has a good experience with transition from planning to implementation, reviewing operational plans that often (if not always) increase the costs, and with accompanied experience on transition of human resources.

7.f Update of Barseback NPPs decommissioning strategy

Mr Hakan Lorentz presented information on the basic characteristics of Barsebäck NPP, ownership, staff reduction and their organisational structure, D&D plan, activities to be performed during Service Operation (i.e. transition period covering Care & Maintenance, and planning and preparation for decommissioning) till 2023. Primary systems were decontaminated by Cord-UV (Areva), electrical and operational systems were modified. Characterisation was performed in 2011. RPV one-piece removal studies, demolition studies and radioactive waste management plan were developed. Cutting RPV internals should be performed during the Service Operation, a buffer store should be built by 2018 to accommodate them. Building the buffer store may be delayed due to public acceptance, and if this is the case alternative solutions may need to be considered.

There are two RWM scenarios: 1. mainly using the SFR (TLG study) or 2. to focus on recycling to reduce SFR disposal. SSM defined material clearance limits, but not site release limits (as yet only case-by-case approach).

Discussion: Reactors (2) were shut down earlier than planned (40 years), the site was originally planned to accommodate five reactors. There was a limited-time guarantee of employment after reactors shutdown. Although the High Court decision is in favour to go ahead with construction of the buffer storage, approvals by local municipality and Civil Construction Office are pending.

The difference in decontamination factors (DFs) for Cord decontamination of R1 and R2 was caused by different operational time of reactors. DFs were anyway higher than expected, since taking lessons learned from Oskarshamn.

7.g Cost estimates of Barseback NPPs

Lars-Olov Jonsson informed that the first TLG cost study was completed in 2008, and updated in 2011-2013 (for the basis of estimate - see the overheads and also item 7.f). Best estimate includes 18 percent contingency. Estimation does not include off-site transport and disposal, SNF management, system decontamination, and costs related to outside industrial area. Packages, material balance, time schedule and costs for main activities were presented.

7.h Session Discussion and Summary

Site Advisors (former operator at Barseback) have been contracted, and are usually present for 2 hours a day on the site, and reachable 24 hours, if needed. Security and surveillance services are also contracted. The project on cutting internals is in the tender procedure. On selection of winning offer the DSAR (related parts) will be updated accordingly to be submitted to the SSM.

An operator is licenced for operation, D&D and disposal, not for a facility itself. There is not a separate licence for decommissioning. SSM approvals are requested before starting each specific operation. The local authority gives a construction/demolition permission. Build up the buffer storage may be challenge, since the site now being EoN property and planned to be industrial area, might also be an attractive residential area.

Mr Simon Carroll, Session Chair, summarised the session (see overheads).

Decision

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8. UK Capital Project & Wider Cost Benchmarking Programme

Main observations

Mr Alastair Lair informed on NDA benchmarking program that is completed for 28 NDA's Major Projects. Benchmarking Tool and Cost Model used previously in the NDA was further developed. Outputs were actively deployed to support Sellafield Performance Plan Assurance. The software offers Summary Dashboards for a number of Major Projects for easier comparison. The best current available scope, schedule and cost data were used for benchmarking. Engagement Sessions were organised to challenge and ensure understanding of differences (deltas). Benchmarking needs a measured approach, requires good data and matured approach, and has always to be performed in understanding of the context in which benchmarking data are treated.

Decision

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9. Brief country updates on decommissioning costing activities

Main observations

Oral reports on country updates on decommissioning costing activities were given by representatives from Czech Republic, Germany (EoN), Italy, the United Kingdom, Spain, and Switzerland.

Decision

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10. Nuclear Decommissioning: Management of Costs and Risks

Main observations

Mr Simon Carroll informed on the report prepared by Öko-Institute e.V., Germany for the European Parliament's Committee on Budgetary Control, 2013. The publication was created in the context with making the decision of European Parliament to continue with the financial support to three decommissioning projects – Bohunice V1&2, Ignalina 1&2 and Kozloduy 1-4 NPPs. The task of the study was to identify, describe and characterise best practice examples for decommissioning in Europe; to understand, describe and compare certain other projects with these best practice examples; and to derive recommendations for improvements in these decommissioning projects.

Discussion: Mr Ivan Rehak noted that DCEG-5 (2012) received the invited presentation on the Ignalina Decommissioning Project.

Decision

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11. Discussion and recommendations in relation to the DCEG work programme

Main observations

Mr Simon Carroll opened the discussion on organisation of the work on the project on uncertainties in decommissioning costs. Additional participants are invited to the WG1. Mr Vladimir Michal informed that the WG2 will meet also in spring 2015 (besides August and December 2014). An initial draft should be presented to DCEG-8 and WPDD-16 in 2015. The final draft should be presented to the DCEG-9 and submitted for approval to WPDD-17 in November 2016.

Decisions

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12. Election of New DCEG Chairman

Main observations

Mr Björn Hedberg, Sweden, SSM, announced his decision to terminate his service as the DCEG Chairman. On behalf of the Secretariat Mr Ivan Rehak thanked Mr Hedberg for his service and appreciated his excellent contribution to the DCEG work. Mr Simon Carroll,

Sweden, SSM, was introduced as Secretariat's nomination for the DCEG Chairmanship. No other proposals of nominations were made by participants.

Decision

Mr Simon Carroll, Sweden, SSM, was elected by the DCEG-7 meeting as the new Chairman of the WPDD Decommissioning Cost Estimation Group.

13. Composition of DCEG Core Group

Main observations

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Decision

Composition of the DCEG Core Group is: DCEG Chairman, Stefano Buonarroti (Italy, Sogin), Vladimir Daniska (Slovakia, DECOM), Sylvain Desecures (France, EDF), Thomas Lexow (Germany, Siempelkamp).

14. Date and place of DCEG-8

Main observations

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Decision

The 8th meeting of the DCEG will be held on 16th and 17th June 2015, at the NEA Office, Issy les Moulineaux, France.

15. Any other business

Main observations

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Decision

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16. Review of main items and decisions

Main observations

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Decisions

As mentioned in the "Decision" sections of this Record.

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