

International peer review of a nuclear regulatory self-assessment

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The OECD Nuclear Energy Agency (NEA) has an acknowledged role to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy. In this context, the NEA Committee on Nuclear Regulatory Activities (CNRA) provides a forum for senior representatives from nuclear regulatory bodies to exchange information and experience on nuclear regulatory policies and practices in NEA member countries and to review developments which could affect regulatory requirements. It also promotes co-operation among member countries to use feedback from experience to develop measures to improve safety, to enhance efficiency and effectiveness in the regulatory process and to maintain adequate infrastructure and competence in the nuclear field.

CSN request for a peer review

On 25 August 2004 an event occurred at the Vandellós II nuclear power plant which affected the operation of its essential service water (ESW) system. The subsequent follow-up to this safety-related event and the licensee's associated activities carried out by the *Consejo de Seguridad Nuclear* (CSN), the Spanish nuclear regulatory authority, resulted in a CSN report entitled *Lessons Learnt from the Essential Service Water System Piping*

Degradation Event at the Vandellós II Nuclear Power Plant, referred to hereafter as the “CSN Lessons Learnt Report”.

In October 2005 the CSN, based on a request it had received from the Spanish Congress, officially asked the NEA to perform an international peer review of this CSN Lessons Learnt Report. The purpose of the review was to prepare a report regarding the adequacy and completeness of the lessons learnt, as identified by the regulator. The NEA accepted the request to organise this review, since it was clear that its result would not only benefit the CSN but would also be useful to other nuclear regulators of the member countries. The NEA established an international review team composed of senior-level experts¹, who produced a report within three months, according to the agreed schedule. The report² was well-received by the CSN, and its findings, which were presented at the June 2006 meeting of the CNRA, are summarised below.

Overview of the event and related regulatory actions

On 25 August 2004, a manhole ruptured in the piping of the essential service water (ESW) system at Unit 2 of the Vandellós nuclear power plant. The function of that system is to provide the ultimate heat sink for most safety systems of the plant. During the event, train B of that system was completely lost and cooling of the plant systems was ensured by train A. The licensee informed the CSN that the plant had been shut down to repair the ruptured manhole in train B as well as the symmetrical one in train A, and to make some additional checks of the system. The CSN checked that the plant had followed its established internal review procedures for repairs, and on 29 August,

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the plant safety committee approved the start-up of the plant. No CSN approval was deemed necessary according to the Spanish legal framework and licensing process.

The CSN Resident Inspector promptly informed the CSN main office of the event and subsequently reported on the actions taken by the licensee. On 31 August, the Resident Inspector sent a note to the CSN mentioning a number of circumstances meriting further attention. The safety significance of the event was recognised at the CSN, and there were internal discussions about whether to send a reactive inspection team to the plant. In the end, it was decided to include the ESW event as a special issue on the agenda of the CSN multidisciplinary inspection, already scheduled to begin on 20 September.

The multidisciplinary inspection and subsequent investigations performed by the CSN revealed that the licensee apparently knew of the degradation of the ESW system for some time before the actual event occurred. A root-cause analysis by the CSN showed that the licensee's routine inspections of the system had identified pervasive corrosion in the outer part of the manhole necks in both trains in 1998. Despite these findings, the licensee did not take any appropriate corrective actions or inform the regulator about the degraded state of the ESW system. The regulatory inspection programme carried out independently by the CSN over the years had also failed to uncover the degradation situation.

The widespread corrosion of the ESW system presented a risk of a common-cause failure in both trains of the system, and hence degradation of the defence-in-depth and the safety of the plant. Given the safety significance of the event and the weaknesses revealed in the licensee's safety culture, the incident was finally classified by the CSN as INES level 2.

Once the full safety significance of the event had been appreciated, the CSN took a number of regulatory actions to require the licensee to make safety improvements. Recently, the CSN also proposed legal actions against the licensee.

Furthermore, an internal CSN review was performed to identify lessons learnt from the event. This internal review process was subsequently developed in several steps, resulting in the Lessons Learnt Report approved by the CSN Plenary on 18 November 2005. The report analyses aspects of the event related to the licensing and inspection process, internal communication within the regulatory body, the interaction between the licensee and the regulator, and the regulator's communication with national and international institutions, the media and the public. In each of



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Vandellós II nuclear power plant, Tarragona, Spain.

these four areas, the report contains conclusions on lessons learnt and proposals for actions by the CSN, aiming at preventing the occurrence of similar situations in the future. It is the final version of this report, as approved by the CSN Plenary, that was used as the basis for the international peer review.

Key conclusions and recommendations of the peer review

The Review Team considered the CSN Lessons Learnt Report to be a commendable effort of regulatory self-assessment. The performance of such self-assessments is consistent with best international practices. The CSN Lessons Learnt Report, complemented by the outcome of the international peer review, should enable the regulator to take the proper actions to ensure that its regulatory supervision is also in line with best international practices.

The Review Team largely endorsed the actions proposed in the CSN Lessons Learnt Report. To these proposed actions the Review Team added its own suggestions, amplifying, developing and widening the scope of many of the actions proposed in the report. Most of the actions suggested, both in the report and by the Review Team, are of a fairly detailed technical nature. In order to provide an overview, and to facilitate turning the proposed actions into an appropriate action plan, the Review Team developed the following key conclusions and recommendations, which summarise the key actions proposed in the CSN Lessons Learnt Report, as complemented by the Review Team.

The Review Team concluded that the most important safety concerns raised by the event are first and foremost related to the significant weaknesses revealed in licensee performance with regard to safety management. The degradation

of the essential service water (ESW) system was known within the licensee organisation for several years prior to the event, but appropriate corrective actions were not taken, nor was the regulator informed. However, while the primary responsibility for safety rests with the licensee, the event also raised concerns about the weaknesses revealed in the regulatory oversight, which contributed to the regulator's failure to detect both the degradation of the ESW system and the weaknesses in licensee safety management prior to the event. The Review Team offered the following overarching recommendations:

- The regulator should benchmark the differences between its regulatory programme and associated oversight processes and tools with those of its reference programme (US NRC), while also taking into account good regulatory practices applied elsewhere, notably by other nuclear regulators within the European Union. This benchmarking review should use a holistic and systematic approach, looking beyond the specific weaknesses revealed by the Vandellós event. In particular, the review should include a thorough assessment of the regulator's approach to regulatory supervision of licensee safety management in relation to good practices both in the United States and in Europe.
- The regulator should assess the various ways in which it interacts with licensees, to ensure that there are clear and appropriate internal policies and guidelines for different types of interactions and information exchange between the regulator and the licensees. This should include a review of the way that the regulator obtains, analyses, documents and reacts to safety-related information from nuclear power plant licensees, both as a part of the normal regulatory supervision process and in the case of unexpected events.
- The regulator's Plenary should initiate an internal review of the actual working processes, identifying and implementing appropriate actions in order to ensure and facilitate the effective functioning of the organisation, with regard to both regulatory decision making and the internal management of the regulatory body. In this context, the regulator should develop clear internal guidelines for the initiation and performance of self-assessments.
- The regulator should consider the added value of having a technical expert advisory group, such as is found in the nuclear regulatory organisations of many other countries, to provide independent technical advice to the

Plenary on safety issues, thereby also playing an important role in the internal quality-assurance processes of the regulatory body.

- The regulator should develop and implement a proactive information policy and strategy, drawing on the experience available through the NEA/CNRA Working Group on Public Communication of Nuclear Regulatory Organisations (WGPC). A clear distinction between the respective roles of the licensee and the regulator in providing information to the public should be included in this information policy and strategy.

Last but not least, the regulator should turn the proposed actions in the CSN Lessons Learnt Report, together with the recommendations and suggestions of the Review Team into a specific action plan, with identification of priorities, responsibilities and associated resources for the various tasks, as well as milestones for the completion of the tasks and for the evaluation of the effectiveness of the actions taken. This action plan should start with activities aimed at creating a shared understanding within the regulatory body of current weaknesses in its regulatory oversight and how these are rooted in the prevailing attitudes and internal decision-making processes.

Closing remarks

The international peer review would not have been as successful without the active involvement of the CSN staff who took part in the review and the helpful and open manner in which they responded to the review and the team's requests for information. This "first-of-a-kind" NEA peer review in the area of nuclear safety and regulation has proven the Agency's capability to set up very quickly and efficiently "focused safety reviews", which are complementary to other activities performed by the NEA and of interest to other member countries. ■

Notes

1. The international review team was composed of the following senior-level experts: Mr. Lars Högberg (Chair, Sweden), Dr. Samuel A. Harbison (United Kingdom), Mr. Jean-Pierre Clausner (France), Mr. Ellis W. Merschoff (United States) and Mr. Jean Gauvain (NEA Secretariat).
2. NEA (2006), *Learning from Nuclear Regulatory Self-assessment: International Peer Review of the CSN Report on Lessons Learnt from the Essential Service Water System Degradation Event at the Vandellós Nuclear Power Plant*, OECD/NEA, Paris.