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NUCLEAR ENERGY AGENCY
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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NUCLEAR ENERGY AGENCY

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The mission of the NEA is:

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- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include the safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information.

The NEA Data Bank provides nuclear data and computer program services for participating countries. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

Also available in French under the title:
Bulletin de droit nucléaire n° 91

Cover photos: Fukushima control room (TEPCO, Japan); Second Annual Meeting of the Nuclear Law Association (NLA, Mumbai, India).

Foreword

This edition of the *Nuclear Law Bulletin* marks the 45th anniversary of the publication of the Nuclear Energy Agency's leading periodical in the field of nuclear law. The *Bulletin* was first published in 1968 with the notation that "frequency of publication of the Bulletin will depend on the amount of information and texts relating to nuclear law." Since its first publication the *Bulletin* has appeared without interruption every year, usually with two issues in both English and French editions. Over the years the *Bulletin* has reported on developments in national and international law that have shaped the nuclear energy field. It has also acted as a forum for the exchange of ideas on new developments and the challenges related to nuclear energy regulation and development. The NEA has been pleased to provide the *Bulletin* as a resource for legal professionals, government officials, academics, researchers, students and others who are interested in the legal aspects of nuclear energy.

The *Bulletin* has consistently aimed to foster dialogue on current developments in nuclear law, and the current issue of the *Bulletin* is no exception. This year marks the second anniversary of the TEPCO Fukushima Daiichi nuclear power plant accident. In the two years since the accident occurred, national governments, international organisations, and plant operators have focused on improvements in the framework for ensuring the safety of nuclear installations. Three lead articles in this issue of the *Bulletin* focus on the response and lessons of the Fukushima Daiichi accident. In the first, the Director of the Office of Legal Affairs of the IAEA describes the outcome of the extraordinary meeting of the parties to the Convention on Nuclear Safety to consider the impact of the accident on the review process under the convention. The second article provides the perspective of a Commissioner of the US Nuclear Regulatory Commission on the decision-making process for considering potential safety improvements to US reactors within the framework of the US regulatory regime. Finally, a leading academic with several decades of experience in the nuclear field reflects on the international regime for enhancing nuclear safety. The *Bulletin* also contains a report on the second annual meeting of the Nuclear Law Association of India, a country that is engaged in further development of its civilian nuclear energy programme.

In the first edition of the *Bulletin*, the editors reminded the readership that "Regular publication of the *Nuclear Law Bulletin* can be achieved only with the kind co-operation of correspondents from competent departments in the different countries or international organisations." The NEA would like to express its sincere appreciation to national correspondents, authors, contributors, and of course its readers for their contributions and support in ensuring the success of this publication over the years.

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The information submitted to the NEA by these individuals represents the opinions of the authors alone and does not purport to represent the official views or the policies of their governments or any other entity.

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The post-Fukushima Daiichi response: The role of the Convention on Nuclear Safety in strengthening the legal framework for nuclear safety

By Peri Lynne Johnson[*]

The accident at the Tokyo Electric Power Company's Fukushima Daiichi nuclear power plant (hereinafter the Fukushima Daiichi accident) on 11 March 2011 brought nuclear safety to the forefront of global attention.

Less than an hour after the earthquake struck off the east coast of Honshu, Japan, and following notification from the International Seismic Safety Centre (ISSC), the Incident and Emergency System (IES) of the International Atomic Energy Agency (IAEA) was activated and placed in "full response mode".[1]

From the early days after the accident, the Director General of the IAEA consulted with the Director General of the World Health Organization (WHO), the Director General of the Food and Agriculture Organization (FAO), the Executive Secretary of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) and the Secretary General of the World Meteorological Organization (WMO) for effective co-ordination of activities.[2] From 17 to 19 March 2011, the IAEA Director General also visited Tokyo to obtain first-hand information on the accident, to pledge the IAEA's full support and expert assistance and to convey offers of assistance from more than a dozen countries.[3]

The first major international nuclear safety meeting following the event was the Fifth Review Meeting of the Contracting Parties[4] to the Convention on Nuclear Safety (CNS),[5] held at the headquarters of the IAEA in Vienna, Austria from 4 to 14 April 2011,

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* Legal Adviser and Director, IAEA Office of Legal Affairs The contribution of Ms. Isabelle Robin, Legal Associate, to this Article is acknowledged.

1. IAEA (2012), "Nuclear Safety Review for the Year 2012", IAEA Doc. GC(56)/INF/2, para. 16.
2. IAEA (2011), "IAEA Annual Report 2011", IAEA Doc. GC(56)2, p. 17.
3. Op. cit. (fn. 1) para. 21.
4. The contracting parties to the CNS are Albania, Argentina, Armenia, Australia, Austria, Bahrain, Bangladesh, Belarus, Belgium, Bosnia and Herzegovina, Brazil, Bulgaria, Cambodia, Canada, Chile, People's Republic of China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Ghana, Greece, Hungary, Iceland, India, Indonesia, Ireland, Italy, Japan, Jordan, Kazakhstan, Republic of Korea, Kuwait, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Mali, Malta, Mexico, Netherlands, Nigeria, Norway, Oman, Pakistan, Peru, Poland, Portugal, Republic of Moldova, Romania, the Russian Federation, Saudi Arabia, Senegal, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, former Yugoslav Republic of Macedonia, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Vietnam, EURATOM.
5. Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 317, available at: www.iaea.org/Publications/Documents/Infcircs/Others/inf449.shtml. The Convention on Nuclear Safety was adopted on 17 June 1994, opened for signature on 20 September 1994 and entered into force on 24 October 1996. There are currently 76 states parties. The contracting parties hold meetings every three years for the purpose of reviewing the reports submitted on the measures countries have taken to implement each of the obligations of this convention.

which initiated an ongoing process to review the effectiveness of the CNS, the basic treaty on nuclear safety of nuclear power plants.

A cornerstone of the current international legal framework for nuclear safety, the CNS was drafted in response to the 1986 Chernobyl accident, in order to achieve and maintain a high level of nuclear safety worldwide through the enhancement of national measures and international co-operation; to establish and maintain effective defences in nuclear installations against potential radiological hazards; and to prevent accidents with radiological consequences and mitigate such consequences.[6] The Fukushima Daiichi accident has raised questions about the continuing effectiveness of the CNS.

This article explores action taken to date following the Fukushima Daiichi accident to strengthen nuclear safety within the context of the CNS.

Drawing and acting upon the lessons of the Fukushima Daiichi accident: The Fifth Review Meeting of the Contracting Parties to the CNS

As the consequences of the accident were continuing to unfold, discussions around this issue influenced the Fifth Review Meeting of the CNS Contracting Parties.[7]

The CNS establishes a set of obligations covering the safety requirements of civilian nuclear power plants. Each party is required, under Article 5, to provide a detailed report on the measures taken domestically to fulfil its obligations under the CNS, in order to allow peer review. The review process, in which contracting parties submit and mutually assess their national reports, is the core of this incentive-based convention. All decisions are taken by consensus, except for decisions on matters of procedure and decisions in the context of elections, taken by a majority of delegates present and voting.[8]

In preparation for the 5th Review Meeting, the President, Mr Li Ganjie of the People's Republic of China, identified several topics pertinent to the Fukushima Daiichi accident. The contracting parties agreed to adjust the agenda so as to address these issues as part of the presentations of their national reports in country groups.[9] The additional topics were: nuclear power plant design against external events, offsite response to emergency situations, emergency management and preparedness, safety considerations for operation of multi-units at the same nuclear power plant site, cooling of spent fuel storage in severe accident scenarios, training

6. Ibid. Article 1.
7. Prior to the Fukushima Daiichi accident, there had been four review meetings of the contracting parties to the CNS (April 1999; April 2002; April 2005; April 2008). There had also been one Extraordinary Meeting (held in September 2009) to discuss and agree on changes to the Guidelines regarding national reports under the CNS (INFCIRC/572/Rev.3) in order to increase transparency, improve the independence of the regulatory body and clarify the responsibilities of the licence holder. During the 5th Review Meeting, the contracting parties also agreed to modify the guidelines regarding the review process under the CNS (INFCIRC/571) to introduce a new method for forming country groups and to enhance the continuity of knowledge of the convention process.
8. IAEA (2011), "Convention on Nuclear Safety Rules of Procedure and Financial Rules", IAEA Doc. INFCIRC/573/Rev4, 4 April, available at: www.iaea.org/Publications/Documents/Infcircs/2011/infcirc573r4.pdf.
9. Contracting parties are divided into country groups, each including up to seven or eight contracting parties with nuclear installations. Each group considers in detail the national report of each member of that group, discussing all the subject areas covered by the national reports, "Rules of Procedure and Financial Rules", (2013) IAEA Doc. INFCIRC/573/rev5, Rule 17.

of operators for severe accident scenarios, radiological monitoring following a nuclear accident involving radiological release, public protection emergency actions; and communications in emergency situations.[10]

For the purpose of the review meeting, the contracting parties were organised into predetermined country groups. During the 5th Review Meeting, these country groups met to discuss each national report within that group and to review nuclear safety matters relevant to each contracting party. This was done by considering the steps and measures taken by contracting parties-both those that were in progress and those that were planned - to implement their obligations. Each contracting party was obliged to provide answers to the questions raised in the discussion from both the contracting parties within that group and from other interested contracting parties.[11]

The contracting parties drew and acted upon the lessons of the Fukushima Daiichi accident, reported on their plans and initial actions based on the available information from Japan on the accident's progression, radiological measurements and environmental data. In their statement at the 5th Review Meeting (excerpt reprinted at the end of this article in Annex I), the contracting parties reaffirmed their commitment to the objectives of the CNS.[12] The contracting parties initiated, and expressed their commitment to actively contribute to, the process to strengthen global nuclear safety and consider ways to further strengthen the response to nuclear accidents and emergencies. The contracting parties underlined the need for a continuous process and, in this context, announced "a dedicated meeting in 2012 on the Fukushima Daiichi accident," in order to "enhance safety through reviewing and sharing lessons learned and actions taken by Contracting Parties in response to events of Fukushima and to reviewing the effectiveness and, if necessary, the continued suitability of the provisions of the Convention on Nuclear Safety."[13]

Following the 5th Review Meeting, the IAEA Director General convened a Ministerial Conference on Nuclear Safety in Vienna, from 20 to 24 June 2011, to draw on the lessons from the Fukushima Daiichi accident in order to strengthen nuclear safety throughout the world. The conference unanimously adopted a Ministerial Declaration, which, *inter alia*, requested the IAEA Director General to prepare a draft Action Plan on Nuclear Safety.

The Action Plan on Nuclear Safety was adopted by the Board of Governors and subsequently endorsed by member states at the 55th Regular Session of the General Conference in September 2011.[14] The focus of the Action Plan on Nuclear Safety is on 12 main actions with 39 corresponding sub-actions. One of the 12 main actions of the action plan is entitled the "International Legal Framework". This action encourages states parties to explore mechanisms to enhance the effectiveness of the CNS and to consider proposals made to amend it. This is consistent with the

10. "Summary Report of the 5th Review Meeting of the Contracting Parties to the Convention on Nuclear Safety, 4-14 April 2011, Vienna, Austria", (2011) IAEA Doc. CNS/RM/2011/6/Final, para. 12, adopted by consensus and published pursuant to Article 25 of the CNS, available at: www-ns.iaea.org/downloads/ni/safety_convention/cns-summaryreport0411.pdf.
11. Ibid. paras. 19 and 21.
12. Ibid. para. 10.
13. Ibid. para. 10.
14. IAEA (2011), "Draft IAEA Action Plan on Nuclear Safety, Report by the Director General", IAEA Doc. GOV/2011/59-GC(55)/14, 5 September, available at: www.iaea.org/About/Policy/GC/GC55/Documents/gc55-14.pdf; IAEA (2011), General Conference Resolution "Measures to Strengthen International Cooperation in Nuclear, Radiation, Transport and Waste Safety, Resolution adopted on 22 September 2011 during the seventh plenary meeting", IAEA Doc. GC(55)/RES/9, p. 4, available at: www.iaea.org/About/Policy/GC/GC55/GC55Resolutions/English/gc55res-9_en.pdf.

purpose of the Second Extraordinary Meeting, convened by the contracting parties of the CNS.[15]

Reviewing the effectiveness of the provisions of the Convention: The Second Extraordinary Meeting of the Contracting Parties to the CNS

The Second Extraordinary Meeting of the Contracting Parties was held pursuant to Article 23 of the CNS[16] at the headquarters of the IAEA in Vienna, Austria from 27 to 31 August 2012, as was agreed by consensus at the 5th Review Meeting.

The objectives of the extraordinary meeting were to review and discuss lessons learnt, which were known at that time, from the accident at the Fukushima Daiichi nuclear power plant,[17] and to review the effectiveness of the provisions of the CNS.[18] In particular, the extraordinary meeting focused on sharing the actions completed or planned by each contracting party. To support this meeting, a focused short and concise national report was developed by each contracting party. This report had to be submitted three months prior to the meeting to the secretariat for peer review of the lessons identified from the Fukushima Daiichi accident by other contracting parties. However, the national reports to be submitted for the 2nd Extraordinary Meeting focused on a list of six topics (external events, design issues, severe accident management, national organisations, emergency preparedness and response and post-accident management, international co-operation). Similarly, the structure of the extraordinary meeting did not follow the same procedure as for regular review meetings.[19] All officers from the 5th Review Meeting were to serve in this same capacity for the extraordinary meeting, during the discussions held in each of the six working sessions.

15. However, not only the Convention on Nuclear Safety is mentioned. The action plan also addresses under this action the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management (Joint Convention) (1997), the Convention on the Early Notification of a Nuclear Accident (1986) and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986). For instance, the 4th Review Meeting of the Joint Convention held in May 2012 considered in the light of the Nuclear Safety Action Plan nine proposals to enhance its effective implementation, including the creation of a mechanism to ensure coherence and benchmark between the rules governing the review process of the Joint Convention and those of the Convention on Nuclear Safety. See "Final Summary Report of the Fourth Review Meeting of the Contracting Parties of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management", JC/RM4/04/Rev.2, paras. 53 and 57, proposal 8, annex, available at: www-ns.iaea.org/downloads/rw/conventions/fourth-review-meeting/summary-report-english.pdf.
16. Article 23 reads, "An extraordinary meeting of the Contracting Parties shall be held if so agreed by a majority of the Contracting Parties present and voting at a meeting, abstentions being considered as voting; or at the written request of a Contracting Party, within six months of this request having been communicated to the Contracting Parties and notification having been received by the Secretariat referred to in Article 28, that the request has been supported by a majority of the Contracting Parties".
17. IAEA (2012), "Main Conclusions of the Second Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety", IAEA, Vienna, 31 August, press release statement available at: www.iaea.org/newscenter/pressreleases/2012/cns-prstatement310812.pdf and reprinted as Annex 2 to this article.
18. "Final Summary Report of the Second Extraordinary Meeting of the Contracting Parties to the Convention of Nuclear Safety", 27 to 31 August 2012, Vienna, Austria, IAEA Doc. CNS/ExM/2012/04/Rev.2, para. 2, available at: www.iaea.org/Publications/Documents/Conventions/cns-summaryreport310812.pdf.
19. Ibid. para. 3.

The contracting parties participated in several plenary sessions to discuss proposals for enhancing the effectiveness of the convention, following proposals to amend the Guidelines regarding the Review Process under the CNS[20] (hereinafter INFCIRC/571), the Guidelines regarding National Reports under the CNS[21] (INFCIRC/572) and the Rules of Procedures and Financial Rules[22] (INFCIRC/573), and to amend the text of the CNS, referred to as CNS "guidance documents".

Amendments to the CNS guidance documents

Based on Article 22.1.i. of the CNS, the contracting parties are required to establish guidelines regarding the form and structure of the reports to be submitted pursuant to Article 5. These guidance documents ensure coherent implementation of the CNS.

Eleven contracting parties submitted proposals to "improve the CNS guidance documents."[23] These contracting parties worked together to develop a first draft of the revised guidance documents in order to facilitate discussions with all the contracting parties at the 2nd Extraordinary Meeting. During the extraordinary meeting, the proposed changes were discussed section by section. Revised versions of the guidance documents were agreed upon by consensus at the 2nd Extraordinary Meeting. Each contracting party is expected to reflect the elements of the revised guidance documents and to cover areas addressed in the 2nd Extraordinary Meeting in their national reports for the 6th Review Meeting.[24]

The contracting parties aimed to enhance the effectiveness of the CNS through improvements to the review process itself in INFCIRC/571 and to the comprehensiveness of the national reports in INFCIRC/572, as demonstrated below.[25] Amending the guidance documents, rather than the CNS, was preferred by the contracting parties so that enhancements could be agreed and implemented more quickly.[26]

Enhancing the review process

Amendments to INFCIRC/571 deepen and broaden the scope of the review by effectively providing to contracting parties more information for a more accurate assessment of nuclear safety measures. For example, contracting parties can now request the IAEA Secretariat "to prepare, in time for the Organizational Meeting of the next Review Meeting, a report presenting observations on significant issues related to the safety of nuclear installations based on all information available to the

20. IAEA (2012), "Guidelines Regarding the Review Process Under the Convention on Nuclear Safety", IAEA Doc. INFCIRC/571/Rev.5, 5 April, available at: www.iaea.org/Publications/Documents/Infcircs/2012/infcirc571r5.pdf.
21. IAEA (2011), "Guidelines Regarding National Reports Under the Convention on Nuclear Safety", IAEA Doc. INFCIRC/572/Rev.3, 4 April, available at: www.iaea.org/Publications/Documents/Infcircs/2011/infcirc572r3.pdf.
22. IAEA (2011), "Convention on Nuclear Safety Rules of Procedure and Financial Rules", IAEA Doc. INFCIRC/573, 4 April, available at: www.iaea.org/Publications/Documents/Infcircs/2011/infcirc573r4.pdf.
23. Australia, Canada, France, Germany, the Republic of Korea, the Russian Federation, Spain, Switzerland, the United Arab Emirates, the United Kingdom and the United States.
24. The 6th Review Meeting is scheduled to take place in March 2014.
25. The modifications to INFCIRC/573 are minor edits and are not relevant for the scope of this article.
26. Amendments to the CNS itself is a more lengthy process, see infra "Formal proposals to amend the CNS" and footnote 43.

IAEA during the period since the last Organizational Meeting".[27] Furthermore, the review in each country group also now addresses "any selected topics […] which will be related to broad issues, such as those included in the summary of the National Report that have emerged or are affecting many nuclear programmes".[28] This approach allows the review meeting to focus on common issues and challenges relating to nuclear safety and to share experience and responses to those common issues and challenges. Accordingly, the content and methodology of the Rapporteur Working Document[29] were also adjusted to include challenges, suggestions, good practices identified during the previous review meeting and actions taken by contracting parties to address those challenges and suggestions. In addition, the Rapporteur Working Document will now be elaborated with "appropriate depth, if necessary and according to the discussion results, including specific information."[30]

Time constraints for presentations and in-depth discussion of national reports were also removed, which will lead to a more flexible and efficient review process.[31]

Additionally, the review mechanism will have greater transparency by identifying in the summary report of the review meeting the contracting parties that submitted national reports prior to the review meeting in accordance with Article 5 of the CNS and those that presented their national reports during the review meeting in accordance with Article 20.3 of the CNS.[32]

Enhancing national reports

While contracting parties can ultimately draft their national reports as they wish, INFCIRC/572 provides guidance.[33] The modifications required to the content of the national reports as provided in INFCIRC/572 aim at making national reports more comprehensive, both in the summary section of the national report as well as in the article-by-article reporting sections of the national report, in accordance with the provisions of the CNS.

The summary of the national report should now include the description of "significant changes to the Contracting Party's national nuclear energy and regulatory programs and measures taken to comply with the Convention's obligations", "the results of international peer review missions including the IAEA

27. INFCIRC/571/Rev.6, para. 6. This is not an entirely new process, as it was the case in the past when the IAEA Secretariat, for example, did so at the request of the contracting parties for the 4th Review Meeting. It is just now written into the guidance document.
28. INFCIRC/571/Rev.6, para. 16.
29. The Rapporteur's Working Document is prepared at the end of the discussion in the country group on a national report. A first version is agreed by all members of the country group at the end of each day's country group sessions and is provided to the review meeting president at the earliest possible time to permit review and preparation of the overall summary report of the review meeting. Annex 1, para. (5) of INFCIRC/571/Rev.6.
30. INFCIRC/571/Rev.6, para. 20 and Annex 1, para. 5.
31. INFCIRC/571/Rev.6, paras. 32 (the time for making presentations was previously allocated by taking into consideration the specific composition of each country group) and 23 e) (discussions on national reports were allocated one full day for contracting parties with nuclear installations and less time for those without nuclear installations). As the number of contracting parties increases, these constraints have been removed and the schedule of the review meeting is now more flexible.
32. INFCIRC/571/Rev.6, para. 38.
33. Based on Article 22.1.i of the CNS, INFCIRC/572/Rev.4, para. 1, provides that "these Guidelines, established by the Contracting Parties pursuant to Article 22 of the [CNS], are intended to be read in conjunction with the text of the Convention. Their purpose is to provide guidance to the Contracting Parties regarding material that may be useful to include in the National Reports required under Article 5 of the Convention and thereby to facilitate the most efficient review of implementation by the Contracting Parties of their obligations under the Convention".

missions conducted in the Contracting Party during the review period, progress made by the Contracting Party in implementing any findings, and plans for follow-up,"[34] "operating experience, lessons learned and corrective actions taken in response to accidents and events having significance for the safety of nuclear installations", "lessons learned from emergency drills and exercises" and "actions taken to improve transparency and communication with the public".[35] The content of the summary report as extended by these modifications allows the contracting parties to focus the peer review in the country group discussions on developments since the last review and to provide in-depth information on issues related to lessons learnt from the Fukushima-Daiichi accident.

In addition, the national report should now address in its main body:

- means by which the independence of the regulatory body is assured;
- the description of the mechanisms whereby the licence holder maintains open and transparent communication with the public;
- methods used for the analysis of competence, availability and sufficiency of additional staff required for severe accident management;
- the reference to appropriate standards and practices to report on periodic safety assessments of nuclear installations;
- the summary of significant results for individual nuclear installations in overviews of safety assessments;
- availability of adequate resources and the authority to effectively manage and mitigate the consequences of a nuclear accident in emergency plans for nuclear installations;
- international arrangements regarding emergency preparedness; and
- multi-unit failure, loss of infrastructure, and site access following an event when reporting on assessments made and criteria applied for evaluating all site-related factors and the impact of related sequential natural external events when reporting on design provisions used against external events and on implementation of defence-in-depth (DiD).[36]

All of these elements that are now to be reported in national reports are also issues addressed by the IAEA Action Plan on Nuclear Safety to maximise the benefit of the lessons learnt from the Fukushima Daiichi accident. They are broadly consistent with the findings of the IAEA International Fact Finding Expert Mission of the Fukushima Daiichi NPP Accident Following the Great East Japan Earthquake and Tsunami, undertaken in Tokyo, Fukushima Daiichi NPP, Fukushima Daini NPP and Tokai Daini NPP, Japan from 24 May to 2 June 2011, which identified 16 lessons to be drawn from the accident.[37]

34. IAEA peer review missions are one of the priorities highlighted by the IAEA Action Plan on Nuclear Safety, p. 3, "Strengthen IAEA peer reviews in order to maximize the benefits to Member States".
35. INFCIRC/572/Rev.4, para. 30.
36. INFCIRC/572/Rev.4, para. 32 et seq.
37. IAEA Division of Nuclear Installation Safety, Department of Nuclear Safety and Security (2011), "The Great East Japan Earthquake Expert Mission, IAEA International Fact Finding Expert Mission of the Fukushima Daiichi NPP Accident Following the Great East Japan Earthquake and Tsunami, Report to the IAEA Member States", IAEA Mission Report, Vienna, 16 June, pp. 47-57, available at: www-pub.iaea.org/MTCD/Meetings/PDFplus/2011/cn200/documentation/cn200_Final-Fukushima-Mission_Report.pdf.

An additional requirement for national reports was also added for a contracting party planning construction of its first nuclear installation. Such countries must now report on all necessary steps taken prior to the commencement of construction of the installation with regard to long-term planning and establishment of the requisite infrastructure.[38]

Finally, although Article III A. 6. of the Statute of the IAEA[39] states that international safety standards are not binding on member states, the contracting parties have recognised that these standards provide valuable guidance on how to meet the obligations of the CNS. The explicit use of IAEA safety standards in the framework of the CNS (notably when reporting on meeting the obligations of the CNS) was introduced as follows: "IAEA Safety Standards, in particular Safety Fundamentals and Requirements, provide a basis for what constitutes a high level of safety and are objective, transparent and technologically neutral, which gives valuable guidance on how to meet the obligations of the CNS. Reference to the IAEA Safety Fundamentals and Requirements, could be made when reporting on the obligations of the Convention".[40]

Action-oriented objectives

Another achievement of the 2nd Extraordinary Meeting was that the contracting parties considered a set of action-oriented objectives for strengthening nuclear safety concerning the use of IAEA safety standards, the enhancement of transparency, the regulatory effectiveness as well as the use of international peer review missions.[41] These objectives are consistent with the adjustments discussed above to the guidance documents. For example, each contracting party is encouraged to take the IAEA Safety Standards into account in enhancing nuclear safety or to ensure that its regulatory body is effectively independent.[42]

Formal proposals to amend the CNS

Lessons learnt from the Fukushima Daiichi accident were also reflected in formal proposals to amend the text of the CNS. Two contracting parties, the Russian Federation and Switzerland, proposed amendments to strengthen the CNS for consideration at the 2nd Extraordinary Meeting.[43] Pursuant to Article 32 of the CNS, proposed amendments to the CNS shall be considered at a review meeting or an extraordinary meeting. The contracting parties can either adopt such amendments by consensus or, or in the absence of consensus, submit the proposed amendment to a Diplomatic Conference. Submission to a diplomatic conference requires a two-third majority vote of the contracting parties present and voting, provided that at least one half of the contracting parties are present at the time of voting.[44]

38. INFCIRC/572/Rev.4, para. 26.
39. "The Agency is authorized […] to establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property."
40. INFCIRC/572/Rev.4, para. 19.
41. "Final summary report of the Second Extraordinary Meeting of the Contracting Parties to the Convention of Nuclear Safety", op. cit. (fn. 18), para.32 and Annex.
42. All 15 objectives are reproduced in Annex 3 to this article.
43. In accordance with Article 32 of the CNS. Spain had also formally submitted a proposal but withdrew it before the 2nd Extraordinary Meeting.
44. The diplomatic conference is held within a year of the decision. Contracting parties shall make every effort for the amendment to be adopted by consensus, if not possible, with a two-third majority of all contracting parties. See Article 32.4 of the CNS.

The proposal submitted by the Russian Federation introduced the reference to IAEA safety standards and recommendations in the CNS.[45] With respect to accident management, the Russian Federation stressed the need to co-ordinate actions among state bodies and organisations operating nuclear installations.[46] The proposal also sought more efficient safety assessments, held regularly and resulting in positive steps to upgrade the safety of nuclear installations.[47] Finally, under Article 18 of the CNS relating to design and construction, the Russian Federation proposed a requirement that unfavourable external factors be taken into account for site location.

Switzerland's proposal focused on transparency, the international peer review process and periodic safety assessments. Regarding transparency, the Swiss proposals included the publication of (i) the regulatory body's findings and decision on the safety of nuclear installations[48] and (ii) the reports submitted by the contracting parties pursuant to Article 5 and the questions and comments received from other contracting parties during the review process pursuant to Article 20.3. The proposal also advocated the suppression of the confidentiality attached to the debates during the review of the reports by the contracting parties.[49]

Through international peer review, Switzerland also proposed to ensure that the regulatory body and the operational safety of nuclear installations are in compliance with the requirements of the IAEA.[50]

Finally, the proposal emphasised the need for state-of-the-art re-evaluations of the site-related factors likely to affect the safety of a nuclear installation and of the likely safety impact of a proposed nuclear installation on individuals, society and the environment.[51]

Both contracting parties had the opportunity to present their proposed changes to the CNS during the 2nd Extraordinary Meeting. During the meeting, the contracting parties decided to establish an Effectiveness and Transparency Working Group open to all contracting parties and tasked with "reporting to the next review meeting on a list of actions to strengthen the CNS and on proposals to amend, where necessary, the Convention."[52] Following this decision, the Russian Federation and Switzerland decided to have their formal proposals examined in that working group.[53] The working group established at the 2nd Extraordinary Meeting is convening during 2013 and will submit a final report identifying and proposing actions for the Sixth Review Meeting of the contracting parties in March 2014. Thus, the CNS strengthening process continues.

45. "Final summary report of the Second Extraordinary Meeting of the Contracting Parties to the Convention of Nuclear Safety", op. cit. (fn. 18), Annex, "Proposals of the Russian Federation for amendments to the Convention on Nuclear Safety" (proposed changes to Articles 6.2 and 14 of the CNS).
46. Ibid. (proposed changes to Articles 7.1 and 16 of the CNS).
47. Ibid. (proposed changes to Article 6.1 of the CNS).
48. "Final summary report of the Second Extraordinary Meeting of the Contracting Parties to the Convention of Nuclear Safety", op. cit. (fn. 18), Annex "Proposal for Amendments by the Swiss Confederation" (proposed changes to Article 8.4 of the CNS).
49. Ibid. (proposed changes to Article 27 of the CNS). The content of the debates during the reviewing of the reports by the contracting parties at each meeting are confidential. Only a document addressing issues discussed and conclusions reached during a meeting is made available for the public.
50. Ibid. (proposed changes to Articles 8.3 and 18.iv of the CNS).
51. Ibid. (proposed changes to Article 17.iii of the CNS).
52. "Final summary report of the Second Extraordinary Meeting of the Contracting Parties to the Convention of Nuclear Safety", op. cit. (fn. 18), para. 33.
53. The consideration of those proposals in the working group is without prejudice to Article 32 of the CNS.

Conclusion

Although experts are continuing to study the lessons from the Fukushima Daiichi accident, contracting parties to the CNS took immediate steps to review initial lessons during the 5th Review Meeting. The CNS contracting parties continued to explore lessons learnt and strengthen the CNS during the 2nd Extraordinary Meeting where a number of concrete steps to strengthen both the review process and the national reports were agreed by consensus. Notwithstanding, the contracting parties continue to seek further strengthening of the CNS and, in this context, will consider proposals from the working group at the 6th CNS Review Meeting.

The contracting parties to the CNS are responding the call of the IAEA Action Plan to make international instruments more effective. As the guidance documents implementing the CNS are revised, and the CNS itself possibly amended, international law and practice relating to the safety of nuclear power plants will continue to unfold.

The impact of these initiatives and efforts will be seen in the years to come. In the context of the development of international nuclear law, what is noted is probably no different to other fields of law, in that while progressive developments may take place, the majority of such developments have occurred in response to an initiating event such as the 1986 Chernobyl accident, or the tragic events on 11 September 2011 in the United States with its implications for nuclear security. In a similar way, the Fukushima Daiichi accident is playing an important catalytic role in the further development of international nuclear law.

Annex 1:

Statement of the contracting parties at the 5th Review Meeting

(Excerpt from the Summary Report of the Fifth Review Meeting of the Contracting Parties to the Convention on Nuclear Safety [April 2011], CNS/RM/2011/6/Final, para. 10)

The Contracting Parties expressed their deepest condolences to the Japanese people for the losses they have suffered as a result of the devastating earthquake and tsunami. The Contracting Parties pay tribute to the countless acts of heroism and selflessness of the Japanese people in addressing the consequences of the Fukushima Daiichi nuclear accident.

Japan is not alone in its hour of need. The Contracting Parties affirm their solidarity with the Japanese people and continue to offer support to the Japanese in their efforts to respond to the nuclear accident at the Fukushima Daiichi power plant.

The international community recognizes the significance of the Fukushima nuclear accident, which highlights the need to consider new challenges and underlines the paramount importance of safety in the use of nuclear energy.

The Contracting Parties reaffirm their commitment to the objectives of the Convention on Nuclear Safety: to achieve and maintain a high level of nuclear safety worldwide through the enhancement of national measures and international co-operation; to establish and maintain effective defences in nuclear installations against potential radiological hazards; and to prevent accidents with radiological consequences and to mitigate such consequences should they occur.

The Contracting Parties are committed to draw and act upon the lessons of the Fukushima accident. In line with their national responsibilities, all Contracting Parties are already carrying out reviews to ensure the continued safety of their existing and planned nuclear power plants and are committed to taking prompt actions as lessons are learned. It is understood that the lessons learned process cannot be completed until sufficient additional information is known and fully analysed. Japan has committed to provide this information as soon as possible.

The IAEA has a statutory function to establish safety standards. Upon request, the IAEA also facilitates the provision of international assistance to a State facing a nuclear or radiological emergency. While recognizing their national responsibilities, the Contracting Parties are committed to the continuing important role of the IAEA in the area of nuclear safety. The Contracting Parties welcome the initiative by the Director General of the IAEA to convene a Ministerial Conference on Nuclear Safety from June 20 to 24 2011 in Vienna. The Contracting Parties support the Director General's aims of the conference that "will provide an opportunity to make an initial assessment of the Fukushima accident, consider lessons that need to be learned, help launch a process to strengthen global nuclear safety and consider ways to further strengthen the response to nuclear accidents and emergencies." The Contracting Parties are committed to actively contribute to this process.

The Contracting Parties will hold a dedicated meeting in 2012 on the Fukushima accident. The aim of the meeting is to enhance safety through reviewing and sharing lessons learned and actions taken by Contracting Parties in response to events of Fukushima and to reviewing the effectiveness and, if necessary, the continued suitability of the provisions of the Convention on Nuclear Safety.

Annex 2:

IAEA Press Release Statement (31 August 2012)

Extract from the Main conclusions of the Second Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety

Nuclear regulators and operators reaffirmed their commitment to nuclear safety at the Second Extraordinary Meeting of the CPs to the Convention on Nuclear Safety. We must ensure that operators, who have the primary responsibility for safe operation of nuclear power plants, make needed safety improvements to address and draw the lessons learned from the Fukushima Daiichi accident.

1. Nuclear power plants are robust facilities designed to withstand a wide range of natural hazards. Nonetheless, the Contracting Parties have undertaken comprehensive reassessments (e.g. stress tests) of natural hazards, including earthquake and floods, to identify measures to improve nuclear safety based on the lessons learned from the Fukushima Daiichi accident. Improvements to the plant design, procedures and processes have been implemented or are in progress and as further information and analysis on the accident emerges, which will take several years, the Contracting Parties remain committed to take any follow-up and additional actions needed, to enhance the ability of nuclear power plants to withstand natural hazards.

2. The Contracting Parties agreed that nuclear power plants should be designed, constructed and operated with the objectives of preventing accidents and, should an accident occur, mitigating its effects and avoiding off-site contamination. The Contracting Parties also noted that regulatory authorities should ensure that these objectives are applied in order to identify and implement appropriate safety improvements at existing plants.

3. The regulator's top priority must be to protect public health and safety. The Contracting Parties will ensure that regulatory bodies have sufficient resources to undertake their duties and are effectively independent from entities having responsibilities or interests in the promotion or utilization of nuclear energy that could conflict or unduly influence the regulator's decision making.

Annex 3:

Action-oriented objectives for strengthening nuclear safety

(From Annex to Final Summary Report of the Second Extraordinary Meeting of the Contracting Parties to the Convention on Nuclear Safety [CNS/ExM/2012/04/Rev.2][31 August 2012])

Recognizing the importance of achieving the objectives of the International Atomic Energy Agency (IAEA) Action Plan on Nuclear Safety, which was endorsed at the IAEA General Conference in 2011;

Recognizing that strong and effective national regulation and independent regulatory bodies are critical to the safety of nuclear installations (that is any land-based civil nuclear power plant);

Affirming that the operator has the primary responsibility for the safety of the nuclear installation that it operates;

Recognizing the importance of openness and transparency as vital elements of a national framework regarding the safety of nuclear installations;

Noting that confidence in and acceptability of decisions concerning the safety of nuclear installations increase if the relevant parties are engaged in the decision-making process based on scientific and technical knowledge and if the process proceeds in an open manner;

Recognizing that it is essential to draw all possible lessons learned from the accident which occurred in Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company (Fukushima accident) and that the comprehensive analysis of the feedback could take up to 10 years;

Noting that the Fukushima accident emphasized the importance of evaluating the likelihood and potential consequences of external events and taking the results of such evaluations into account in the design, siting, construction and operation of nuclear installations, as well as the development of procedures and implementation plans, including containment, for responding to any accident in an effective and coordinated manner and mitigating its consequences;

Recognizing that the IAEA Safety Standards can be used in conjunction with the adoption of best practices and the promotion of continuous improvement with respect to nuclear safety;

Acknowledging that IAEA Safety Standards are not legally binding on a Contracting Party, except to the extent that the Contracting Party has made specific provisions of the Standards legally binding under its national law;

Welcoming that the IAEA Safety Standards are being reviewed and revised especially in the light of the Fukushima accident and stressing the need for the Standards to be reviewed and revised as necessary in a continuous manner;

Recognizing that international peer review missions involving experts from other Contracting Parties can play an important role in achieving and maintaining a high level of safety with respect to nuclear installations;

Recognizing that fora of regulatory bodies, technical and scientific support organizations, and licensees can play an important role in advancing the culture of safety in countries by providing a forum for sharing best practices, and recognizing that these networks need to be strengthened;

Each Contracting Party is encouraged to:

1. Take the IAEA Safety Standards into account in enhancing nuclear safety.

2. Include information in its report under the Convention on Nuclear Safety (National Report) about how it has taken or intends to take the IAEA Safety Standards (including, in particular, the Safety Fundamentals and Requirements) into account in implementing its obligations under the Convention on Nuclear Safety.

3. Ensure that its regulatory body is effectively independent in making regulatory judgments based on scientific and technological grounds and taking enforcement actions and that it has functional separation from entities having responsibilities or interests, such as the promotion or utilisation of nuclear energy (including electricity production), that could conflict with safety or other important regulatory objectives or otherwise unduly influence the decision making of the regulatory body.

4. Ensure the effectiveness of its regulatory body by providing for adequate legal authority, sufficient human and financial resources, staff competence, access to necessary external expertise for its decision-making based on adequate scientific and technical knowledge, access to international cooperation, and other matters needed for fulfilling its responsibilities for the safety of nuclear installations.

5. Ensure that its regulatory body requires a licensee for a nuclear installation to have adequate expertise and resources to fulfill its responsibility for the safe operation of the nuclear installation, including effective response to any accident and mitigation of its consequences.

6. Ensure that its regulatory body operates in a transparent and open manner, taking into account legitimate concerns over security and other sensitive interests that might be adversely affected by the public disclosure of particular information.

7. Include information in its National Report on its efforts to ensure the independence, effectiveness and transparency of its regulatory body.

8. Host, as appropriate, an international peer review mission of its regulatory framework governing the safety of nuclear installations, if the Contracting Party has an operating nuclear installation.

9. Host regularly, as appropriate for the size and number of the nuclear installations within that Contracting Party, international peer review missions of the operational safety of its nuclear installations, if the Contracting Party has an operating nuclear installation.

10. Host international peer review missions on integrated nuclear infrastructure and other relevant matters, including site and design safety reviews prior to commissioning its first nuclear installation.

11. Include information in its National Report on any international peer review missions under paragraph 1, 2 or 3 of this section that the Contracting Party has hosted in the period between two review meetings of the Contracting Parties including a summary of the findings, recommendations and other results of the missions, actions taken to address these results, and plans for follow-up missions.

12. Make its National Report and any written questions and responses relating to that report publicly available, with the exception of any particular item of information that would adversely affect security or other sensitive interests if publicly disclosed and request the IAEA to maintain this information, other than any information covered by the above exception, on a website open to the public.

13. Make any international peer review mission reports, any follow-up reports or any national responses to such reports publicly available, with the exception of any particular items of information that would adversely affect security or other sensitive interests if publicly disclosed and request the IAEA to maintain this information, other than any information covered by the above exception, on a website open to the public.

14. Include information in its National Report on its efforts to enhance openness and transparency in the implementation of its obligations under the Convention on Nuclear Safety.

15. Enhance the robustness of the peer review of national reports submitted under the CNS through the preparation and submission of thorough reports that present successes and challenges and the frank discussion of these reports.

Adequate protection after the Fukushima Daiichi accident: A constant in a world of change

By Commissioner William C. Ostendorff and Kimberly A. Sexton[*]

Introduction

The tragic accident at the Fukushima Daiichi nuclear power plant (NPP) will long be seen as a seminal event in the history of commercial nuclear power. Within the United States, not since the accident at Three Mile Island in 1979 has the US Nuclear Regulatory Commission (NRC) been confronted with as many important issues, so central to the core of its mission, as have arisen following the Fukushima Daiichi accident. While much of the agency's attention has rightfully been on the technical merits of the NRC's Near-Term Task Force (NTTF)[1] Report recommendations, the long-term regulatory implications of our post-Fukushima Daiichi actions have not always received similar scrutiny. Now that sufficient time has passed, I believe it is appropriate to take a step back and at a high level see what impact implementation of all these actions will have on our regulatory framework and our approach to adequate protection.

I have borne witness to the practical application of the NRC's "adequate protection" standard over my three years of NRC decision making. From my perspective as an individual Commissioner, I strongly believe that the NRC's long-standing framework and regulatory approach has served the American public well, should be faithfully adhered to, and does not need to be changed in light of the

* The Honourable William C. Ostendorff was sworn in for a second term as a Commissioner of the US Nuclear Regulatory Commission (NRC) on 7 July 2011, to a term ending on 30 June 2016. His first term began on 1 April 2010, and ended on 30 June 2011. Mr. Ostendorff served as Principal Deputy Administrator at the US National Nuclear Security Administration from 2007 until 2009. From 2003 to 2007, he was a member of the staff of the House Armed Services Committee. Mr. Ostendorff was an officer in the United States Navy from 1976 until he retired in 2002 in the grade of Captain. During his naval career, he commanded an attack submarine and an attack submarine squadron. Mr. Ostendorff earned a bachelor's degree in systems engineering from the United States Naval Academy and law degrees from the University of Texas and Georgetown University. Mr. Ostendorff would like to acknowledge the hard work and dedication of the many employees at the NRC, all of whom have performed a tremendous service to the agency in the wake of Fukushima. Mr. Ostendorff would particularly like to acknowledge his personal staff as well as his former Legal Counsel, Jason Zorn. The views in this article are those of the author and do not necessarily represent the official position of the US Nuclear Regulatory Commission. Kimberly A. Sexton serves as Legal Counsel to Commissioner William C. Ostendorff. Ms. Sexton earned bachelor's degrees with distinction from the University of North Carolina at Chapel Hill. She received her law degree, *cum laude*, from Boston University School of Law.

1. The NTTF was a body of senior agency experts assembled in short order following the Fukushima Daiichi accident to determine lessons learnt and initiate a review of NRC regulations to determine if additional measures needed to be taken immediately to ensure the safety of US plants. Their resultant report, issued on 12 July 2011, is known as the NTTF Report and the recommendations contained therein are known as the NTTF recommendations. The NTTF, its report, and recommendations will be discussed further throughout this article.

Fukushima Daiichi accident (or other foreseeable future events). The adequate protection standard, however, is not always perfectly understood by all. To help shed light on this important concept, this article will discuss the history of the adequate protection standard, its ties to the Fukushima Daiichi events, and its relationship to the critical decisions before the Commission. By the end of this article, I hope to have demonstrated how the adequate protection standard ensures public health and safety as well as provides for regulatory stability, even amidst great change.

Adequate protection

America's regulatory standard

The NRC is an independent federal regulatory agency responsible for licensing and overseeing the safe operation of civilian nuclear installations and the safe use of specified radioactive materials in the United States.[2] The NRC does not report to any other agency within the executive branch, but it is subject to oversight by the US Congress. In the United States, independent federal agencies operate only within the limits of the authority given to them by Congress. For the NRC, this authority primarily derives from its enabling statute, the Atomic Energy Act of 1954, as amended (AEA).[3] One of the most important aspects of the substance of the AEA is the adequate protection mission entrusted to the NRC. Specifically, applicants for licences must provide information deemed necessary by the NRC so that it is enabled:

> to find that the utilization or production of special nuclear material will be in accord with the common defense and security and *will provide adequate protection to the health and safety of the public*.[4]

Adequate protection is the statutory minimum safety standard – the floor below which safety standards may not fall – to be ensured by the NRC before allowing licensed activities to take place. The NRC has stated that adequate protection is provided presumptively through compliance with the NRC's regulations.[5]

Not all matters within the NRC's purview, however, have adequate protection implications. Section 161b of the AEA gives the Commission authority to "establish by rule, regulation, or order, such standards and instructions ... as the Commission *may deem necessary or desirable* to promote the common defense and security or to protect public health or to minimize danger to life or property."[6] Section 161i(3) provides a similar authority. Two federal appellate cases speak directly to this issue, describing the AEA's radiological protection system as a "two-tier structure": the first tier – the Section 182 mandatory tier – provides assurance of adequate protection

2. The NRC was created under the Energy Reorganization Act of 1974, 42 USC §§ 201-209, when Congress abolished the Atomic Energy Commission (AEC) and split its regulatory, development, and promotional functions between the newly-created NRC and the Energy Research Development Agency (ERDA), the predecessor to today's US Department of Energy (DOE). The AEC's regulatory functions were transferred to the NRC while the development and promotional functions were transferred to the ERDA, and now lie with DOE. The NRC is headed by a five-member commission, the members of which are appointed by the President of the United States and confirmed by the US Senate for staggered five-year terms. The commissioners are responsible for policy, rulemaking, and adjudication, and are supported in this regard by a staff of about 3800 employees.
3. Atomic Energy Act of 1954, 42 USC §§ 2011 et seq.
4. Atomic Energy Act of 1954, sec. 182a., 42 USC § 2232(a) (emphasis added).
5. See e.g. Revision of Backfitting Process for Power Reactors, Final Rule, 53 Fed. Reg. 20603, 20606 (1988).
6. Atomic Energy Act of 1954, sec. 161b., 42 USC § 2201(b) (emphasis added).

without regard to cost while the second tier – the Section 161 discretionary tier – provides "'extra-adequate' protection," based upon consideration of costs to licensees and societal benefits.[7] Thus, while the NRC *must* provide adequate protection of public health and safety, the NRC *may* provide protection above and beyond adequate protection, if certain conditions are met.

The NRC has interpreted this to mean that in order to promulgate requirements for measures that go beyond adequate protection, the NRC must find that such a requirement would provide "a *substantial increase in the overall protection* of the public health and safety or common defense and security" that satisfies a cost-benefit analysis.[8] The NRC has defined "substantial" as "important or significant in a large amount, extent, or degree."[9] To clarify the matter even further, the "Regulatory Analysis Guidelines," which outlines the NRC's policy for the preparation and the contents of its regulatory analyses, provides that:

> Applying such a standard, the Commission would not ordinarily expect that safety-applying improvements would be required as backfits that result in *an insignificant or small benefit to the public health and safety, regardless of costs*.[10]

Although there are alternatives to imposing requirements when neither of those standards is met, the agency does not often make use of such alternatives. One of those alternatives, to be discussed later in the article, is the use of an administrative exemption, which the Commission can employ to exclude a regulatory action from the requirements of the backfit rule.

The Atomic Energy Act does not define the term "adequate protection" nor does it clarify the concept of "adequacy." Similarly, the NRC and the courts have repeatedly abstained from defining "adequate protection" in concrete terms. The NRC does, however, frame adequate protection as a requirement that the agency provide *reasonable assurance* of adequate protection.[11] This interpretation was affirmed over 50 years ago in a landmark 1961 US Supreme Court decision.[12]

There are, however, four generally accepted principles that provide guidance as to how the concept of "adequate protection" is understood. First, the NRC's authority under the adequate protection mandate is extremely broad, and the NRC has significant discretion in determining whether the adequate protection standard has been met. In fact, over the years, the courts have been consistent in holding that defining "adequate protection" is almost entirely left to the expert scientific judgment of the NRC, and therefore have generally deferred to the Commission's decisions. One of the strongest endorsements of deferential review of the NRC's adequate protection determinations came in 1989 when the DC Circuit Court noted that "the determination of what constitutes 'adequate protection' under the [AEA],

7. Union of Concerned Scientists v. NRC, 824 F.2d 108, 114, 118 (DC Cir. 1987) (UCSI); Union of Concerned Scientists v. NRC, 880 F.2d 552, 556-557 (DC Cir. 1989) (UCSII).
8. 10 CFR § 50.109(a)(3), Backfitting (emphasis added). This requirement is the basis of the NRC's so-called "backfit rule". 10 CFR § 50.109. The "backfit rule" forces the agency to undertake a reasoned and informed decision-making process, and ensures stability and transparency, in the event of a change in a prior Commission or NRC staff position on a measure to improve the safety of the applicable licensed facility. The new or amended provision or change in NRC staff position is termed a "backfit".
9. See e.g. NRC (2004), "Regulatory Analysis Guidelines of the US Nuclear Regulatory Commission", NUREG/BR-0058, Rev. 4, September, p. 4 n. 3, available at: www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0058/br0058r4.pdf.
10. Ibid. (emphasis added).
11. See e.g. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities", (emphasis added).
12. Power Reactor Development Co. v. International Union of Electrical, Radio and Machine -Workers, 367 US 396, 408 (1961).

absent specific guidance from Congress, is just such a situation where the Commission should be permitted to have discretion to make case-by-case judgments based on its technical expertise and on all the relevant information."[13] That same year, the First Circuit noted that its appellate review of NRC actions was "'at its most deferential' when it involves scientific or technical issues."[14]

The second principle is that the NRC's authority over adequate protection is bound to matters that have a reasonable nexus to radiological health and safety. This was affirmed over 40 years ago in another First Circuit decision, where the court concluded that "the responsibility of the [NRC's predecessor, the AEC] [is] confined to scrutiny of and protection against hazards from radiation."[15] Therefore, a mere nexus to health and safety is not enough; there must be a radiological aspect to the public health and safety concern.

The third principle is that the NRC has the ability to determine if adequate protection has been achieved on a case-by-case basis. Courts have refused to require the NRC to employ "a set of objective criteria for determining what level of protection is adequate."[16] Thus, in practice, there are no universal tests, checklists or quantitative data that a Commissioner uses to decide this question in the rulemaking, licensing, or policy decisions that come before the Commission. And rightfully so: aside from being nearly impossible to do generically, creating set criteria for adequate protection determinations would significantly diminish the responsibilities of the Commission by making such decision making automated. It would not allow us, as individual Commissioners, to use our own significant experiences to help guide our decisions if such a process were already so rigidly decided based on a set of pre-established criteria.

The final, and perhaps the most important principle, is that adequate protection does *not* mean zero risk. From a legal perspective, the "no risk" issue is also well-settled: the 1987 Union of Concerned Scientists decision, for instance, noted that "'[a]dequate protection,' however, is not absolute protection."[17] Many, if not all, of the issues that come before the Commission can be distilled to a determination of how much risk we are willing to accept. The risk can be from a safety, security, or even from a legal perspective. In all of these situations, the adequate protection standard puts the responsibility on Commissioners to decide how much risk is acceptable. Another way to look at this is: how much regulation is enough? Or the never-ending question for regulators: how safe is safe enough?

One commissioner's adequate protection framework

In the seminal DC Circuit case for nuclear regulation, Siegel v. Atomic Energy Commission, the court remarked that the regulatory scheme in the Atomic Energy Act is "virtually unique in the degree to which broad responsibility is reposed in the administering agency, free of close prescription in its charter as to how it shall proceed in achieving the statutory objectives."[18] The Commission has an important duty to use its "broad responsibility" judiciously, while also respecting the significant trust emplaced in it by Congress and the American public to ensure adequate protection. To strike this balance, the NRC must take a hard look at proposed regulatory actions to ensure that any new requirement has a clear nexus to the agency's goals and that any such requirement is truly necessary to achieve

13. UCSII, 880 F.2d at 558.
14. Massachusetts v. NRC, 878 F.2d 1516, 1523 (1st Cir. 1989).
15. New Hampshire v. AEC, 406 F.2d 170, 175 (1st Cir. 1969).
16. UCSII, 880 F.2d at 558.
17. UCSI, 824 F.2d at 114.
18. Siegel v. AEC, 400 F.2d 778, 783 (DC Cir. 1968).

those goals. One way that I do this is by asking one simple question: what, if anything, is broken? Similarly one can also ask: is this a solution looking for a problem? I have found these questions to be remarkably useful in my post-Fukushima Daiichi decision making.

If there is in fact something broken, or an actual problem exists, it is essential that the Commission has a clear understanding of the exact nature of the problem that is being addressed, as well as of any risks associated with not addressing the problem. Identification and understanding of these risks is critical to making a final decision on adequate protection. As previously stated, it is well established that the adequate protection standard does not mean "zero risk." The NRC does not have a technical or legal basis to try to achieve zero risk, nor would it be a prudent use of government resources. Therefore, determining how much risk is acceptable is part of the critical function of this agency. And, because that determination inevitably requires a fair amount of judgment, it is one that I take very seriously as a Commissioner.

The NRC generally defines risk as the product of the probability and consequences of a given event. In the NRC's regulatory arena, the probabilities are almost always low, the consequences are often high, and there are inherent uncertainties in risk estimates. Thus, as a regulator, one must also take a hard look at whether concerns are based on realistic assumptions, as well as real world safety, security, and legal practices. The Commission should never consider these issues in a vacuum, outside the realm of real life and actual operating experience. For instance, when I visit nuclear power plants, I always seek to understand, and if possible view the actual impacts of proposed or existing regulatory requirements. To maintain situational awareness of regulatory challenges, I often ask: how will this be implemented; what will be the impact of the new regulation; how will this affect other processes; and are there any unintended negative safety (or security) consequences? Similarly, I often reach out to members of the public for their input on regulatory changes and any potential impacts those regulatory actions may have on the subject facility as well as the surrounding community. By including all perspectives, the Commission can guard against insulated or isolated regulatory decision making, which is both ineffective and inefficient.

Once the NRC has determined that there is a problem, the exact nature of the problem, and the risks associated with the problem, there is still a great deal of difficult work to be done. It is imperative that the NRC evaluate these regulatory issues in a structured manner within the boundaries of our framework. That framework has a built-in check and balance – the regulatory combination of adequate protection determinations and cost-benefit analyses – that ensures our regulations are neither too lax nor excessively burdensome. I firmly believe that if the NRC has determined that adequate protection has already been achieved, we have a duty as a reliable and consistent regulator to ensure that we make this perfectly clear to our licensees and stakeholders. Thus, we must ensure that we have effectively evaluated questions of adequate protection at the outset. By adhering to our adequate protection standard, the NRC is able to maintain its position as a predictable and stable regulator. It serves no interest – not ours, not the regulated industry's, and not the public's – to have regulatory uncertainty.

Of course, to be clear, this approach does not mean that we should not consider new information or new insights. To the contrary, the NRC must always remain vigilant in ensuring that adequate protection is being achieved. A stable regulatory structure does not mean a static regulatory structure. Operating experiences and new information can and should lead to appropriate changes. I consider our ability to be self-critical and learn lessons to be significant strengths of our regulatory framework. The NRC must, however, ensure that additional requirements are

imposed only after clearing the appropriate regulatory bar, and are not simply a result of "we can do better."

NRC response to the Fukushima Daiichi accident

Fukushima Daiichi and the NRC's Near-Term Task Force

On Friday, 11 March 2011, a 9.0-magnitude earthquake struck Japan and was soon followed by a tsunami, estimated to have exceeded fourteen meters (45 feet) in height. The Great Tohoku Earthquake caused the immediate automatic safe shutdown of eleven nuclear power plants at four sites along the northeast coast of Japan. The resultant giant tsunami waves caused extensive damage to several nuclear power reactors operated by the Tokyo Electric Power Company at the Fukushima Daiichi nuclear power plant. The estimated height of the tsunami exceeded the site design protection from tsunamis by approximately eight meters (27 feet).

Less than two weeks after the accident at Fukushima Daiichi, the NRC staff was directed to establish a senior-level agency task force to conduct a systematic and methodical review of NRC processes and regulations to determine whether the agency should make additional improvements to its regulatory system and to make recommendations to the Commission for its policy direction.[19] The NRC's Near-Term Task Force released their report on 12 July 2011, making a number of conclusions and recommendations for enhancements.[20] One of their conclusions helped anchor my views on how to responsibly move forward in assessing the NTTF recommendations:

> The current regulatory approach, and more importantly, the resultant plant capabilities allow the Task Force to conclude that a *sequence of events like the Fukushima accident is unlikely to occur in the United States* and some appropriate mitigation measures have been implemented, reducing the likelihood of core damage and radiological releases. *Therefore, continued operation and continued licensing activities do not pose an imminent risk to public health and safety*.[21]

One month after the Fukushima Daiichi accident, members of the public, as well as the State of Massachusetts, petitioned the Commission to essentially suspend all licensing and adjudications until the completion of the Fukushima Daiichi lessons learnt process. In a September 2011 adjudicatory order addressing the petition, the Commission determined that there was no need to suspend licensing and adjudications because nothing learnt to date put the continued safety of the currently operating regulated facilities, including reactors and spent fuel pools, into question.[22] Thus, it was determined that adjudications and licensing reviews could continue while the Fukushima Daiichi lessons learnt process moved along in parallel.[23]

19. NRC (2011), "Tasking Memorandum – COMGBJ-11-0002 – NRC Actions Following the Events in Japan", 23 March, available at: www.nrc.gov/reading-rm/doc-collections/commission/comm-secy/2011/2011-0002comgbj-srm.pdf.
20. NRC (2011), "Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident" (hereafter NTTF Report), 12 July, available at: http://pbadupws.nrc.gov/docs/ML1118/ML111861807.pdf.
21. Ibid., p. vii (emphasis added).
22. Union Electric Co. d/b/a/ Ameren Missouri (Callaway Plant, Unit 2), CLI-11-5, 74 NRC (9 Sept. 2011) (slip op. at 22).
23. Ibid. (slip op. at 25).

Although not necessarily a part of the NTTF Report, other observations helped inform my decision making on the Commission's many post-Fukushima Daiichi actions. For example, the International Atomic Energy Agency (IAEA) released its final report on the Integrated Regulatory Review Service (IRRS) Mission to the US in October 2010, which assessed the NRC's regulatory programme. The IRRS review found that "the NRC has a comprehensive and consistent regulatory system that has been developed in a determined manner"[24] and that "the NRC has a strong drive for continuous improvement in its own performance and has well achieved its goals."[25] Another factor is an observation Commissioner Apostolakis has repeated, and one that I fully endorse: "The accident [at Fukushima] was not of extremely low probability, i.e. it was not 'unthinkable' or 'unforeseen.'"[26]

A final factor that I believe has always been important to keep in mind is that the Fukushima Daiichi tragedy occurred in another country whose regulatory structure is quite different from that established in the US. While I have long maintained this as an element of my decision making,[27] this fact was underscored by the July 2012 Official Report of the Fukushima Nuclear Accident Independent Investigation Commission (NAIIC), an independent investigative commission empowered by the Japanese legislature. Kiyoshi Kurokawa, Chairman of the NAIIC, candidly stated that the Fukushima Daiichi disaster was "made in Japan." That is, the fundamental causes of the accident flowed from "the ingrained conventions of Japanese culture."[28]

The NTTF, however, did not focus on these differences, and instead concentrated on the technical lessons that they believed should be learnt for US reactors. Their stated focus was on "key areas most relevant to the safety of US reactors, such as external events that could damage large areas of the plant, protection against and mitigation of a prolonged station blackout, and management of severe accidents."[29] Thus, the NTTF Report began the discussion of whether reliable, hardened vents were needed on the boiling water reactors (BWRs) using the Mark I and Mark II containment designs in the United States, whether the assumption of single-unit events (as opposed to multi-unit events at sites with more than one reactor) should be reconsidered, and what, if any, instrumentation should be placed in spent fuel storage pools. They also provided insights into a number of areas, such as the need to make sure that risks from events such as earthquakes and tsunamis were appropriately understood.

After reading the NTTF Report, I formed my own opinion about which NTTF recommendations should be given high priority status for short-term regulatory

24. IAEA (2010) "Integrated Regulatory Review Service Mission to the United States of America, 17 to 29 October 2010", p. 7, available at: www.nrc.gov/public-involve/conference-symposia/irrs-mission-review/irrs-mission-report.pdf.
25. Ibid., p. 8.
26. See e.g. Apostolakis, G. (2011),"Statement of George Apostolakis, Commissioner, United States Nuclear Regulatory Commission before the Committee on Environment and Public Works and the Clean Air and Nuclear Safety Subcommittee United States Senate", 2 August, p. 1, available at: www.nrc.gov/about-nrc/organization/commission/comm-george-aposto lakis/apostolakis-08-02-2011-senate-epw.pdf.
27. See Ostendorff, W. (2011), Vote on SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan," 27 July, p. 2, available at: www.nrc.gov/reading-rm/doc-collections/commission/cvr/2011/2011-0093vtr-wco.pdf. ("The Fukushima tragedy occurred in another country whose regulatory structure is quite different from that found in the U.S.")
28. The National Diet of Japan (2012), "The Official Report of the Fukushima Nuclear Accident Independent Investigation Commission", Executive Summary, p. 9, available at: www.nirs.org/fukushima/naiic_report.pdf
29. NTTF Report, supra note 20, p. 1.

action.[30] But, I firmly believed it was essential for the NRC to have an integrated, prioritised approach – based on recommendations from the NRC staff as a whole – to the many NTTF recommendations.[31] The failure to have such an approach was a key lesson learnt from the NRC's response to the events at Three Mile Island in 1979[32] and was stated as a key concern by the Executive Director for Operations (EDO) at our first meeting on the Fukushima Daiichi events in March 2011.[33] Because of concerns such as these, the Commission directed the NRC staff to recommend a prioritisation of the NTTF recommendations.[34]

In October 2011, the NRC staff provided the Commission with their proposed prioritisation of the NTTF recommendations.[35] The NRC staff first agreed with the NTTF that none of the findings represented an immediate hazard to public health and safety. The NRC staff then recommended breaking up the rest of the recommendations into three tiers, with tier 1 consisting of those NTTF recommendations that should be started without unnecessary delay. The tier 1 recommendations had the greatest potential for safety improvement in the near term and had sufficient resource flexibility for implementation. The rest of the recommendations were divided into tiers 2 and 3. Tier 2 actions were those that could not be instituted in the near term, but did not require long-term study and

30. See Ostendorff, W. (2011), Vote on SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan", 27 July, p. 4, available at: www.nrc.gov/reading-rm/doc-collections/commission/cvr/2011/2011-0093vtr-wco.pdf (listing six discrete actions that should be given high priority for short-term regulatory action: the re-evaluation of seismic and flooding hazards, performance of seismic and flood protection physical verification walkdowns, strengthening station blackout capability, additional equipment needs for multi-unit events, review of venting capability for Mark I and Mark II containments, and maintenance of severe accident management guidelines). These largely fit with the NRC staff's later recommendations for tier 1 actions.
31. Ibid., p. 5(calling for the EDO to provide the Commission with its recommendations for a draft charter for the NRC staff's longer-term review of the NTTF Report that incorporates senior-level NRC managers on a steering committee, with an internal advisory committee, and provides an "integrated, prioritized assessment of the Task Force recommendations along with its recommendations and bases for further regulatory actions").
32. Following the accident at Three Mile Island, the NRC created what was called the "TMI Action Plan". See NRC (1980), "NRC Action Plan Developed as a Result of the TMI-2 Accident", vols. 1 & 2, May, available at: http://pbadupws.nrc.gov/docs/ML0724/ML072470526.pdf andhttp://pbadupws.nrc.gov/docs/ML0724/ML072470524.pdf; NRC (1980), "Clarification of TMI Action Plan Requirements", NUREG-0737, November, available at: www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0737/final/sr0737.pdf; NRC (1983), "Clarification of TMI Action Plan Requirements: Requirements for Emergency Response Capability", NUREG-0737, Supp. 1, January, available at: www.nrc.gov/reading-rm/doc-collections/nuregs/staff/ sr0737/sup1/sr0737sup1.pdf. The TMI Action Plan included approximately 371 individual requirements, which resulted in 13863 applicable action plan items.
33. The NRC's EDO stated in the March 2011 meeting that some of the TMI Action Plan items "were absolutely instrumental in improving the safety in this country", while others "might have actually been counterproductive in a way." NRC (2011), "Briefing on NRC Response to Recent Nuclear Events in Japan", Transcript, 21 March, p. 40 (remarks of R.W. Borchardt), available at: www.nrc.gov/reading-rm/doc-collections/commission/tr/2011/20110321.pdf.
34. NRC (2011), "Staff Requirements – SECY-11-0093 – Near-Term Report and Recommendations for Agency Actions Following the Events in Japan", 19 August, p. 1, available at: www.nrc.gov/reading-rm/doc-collections/commission/srm/2011/2011-0093srm.pdf.
35. NRC (2011), "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned", SECY-11-0137, 3 October, available at: www.nrc.gov/reading-rm/doc-collections/commission/secys/ 2011/2011-0137scy.pdf.

could be initiated when sufficient information and resources became available. These actions consisted of activities to address: spent fuel pool makeup capability, emergency preparedness regulatory actions, and a recommendation that licensees perform another external-hazards evaluation (i.e. hazards other than seismic and flooding). Although implementation of tier 1 and tier 2 actions is underway, the tier 3 recommendations will require further staff study to support a regulatory action, have an associated shorter-term action that needs to be completed to inform the longer-term action, or are dependent on the availability of critical skill sets.[36]

I fully supported the NRC staff's three-tiered prioritisation.[37] In my personal opinion, not all of the twelve NTTF recommendations (with 35 subparts) are equal from either a safety enhancement or urgency perspective. Every post-Fukushima Daiichi action cannot be considered high priority. Thus, the NRC had to focus on the most safety-significant actions first. And that is exactly what the NRC has done.

First post-Fukushima Daiichi orders

Focus on safety significance in the evaluation of post-Fukushima Daiichi actions resulted in an NRC staff proposal to issue three sets of orders on tier 1 items: (1) installation of reliable, hardened containment vents for BWRs with Mark I and Mark II containments; (2) development of strategies to mitigate beyond-design-basis natural phenomena, which addresses both multi-unit events and reasonable protection of equipment identified under such strategies; and (3) installation of enhanced spent fuel pool instrumentation.[38] According to the NRC staff, the events at Fukushima Daiichi highlighted the possibility that extreme natural phenomena could challenge the prevention, mitigation, and emergency preparedness layers of defence-in-depth.[39] Thus, the staff proposed issuing the orders based upon a redefinition of the level of protection regarded as adequate pursuant to our backfit rule. This would have, in essence, "raised the bar" for adequate protection, which is quite a weighty decision for the Commission to make. Decisions on adequate protection are among the most significant policy decisions entrusted to the Commission and are not impulsive "go or no-go" choices. The decision-making

36. Some examples of tier 3 actions are: a ten-year confirmation of seismic and flooding hazards, potential enhancements to the capability to prevent or mitigate seismically-induced fires and floods, and hydrogen control and mitigation inside containment or other buildings. See ibid. at 4. Additional items with a nexus to the Fukushima Daiichi accident were later added to tier 3, beyond what was initially recommended in the NTTF Report.
37. Ostendorff, W. (2011), Vote on SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned", 31 October, p. 17, available at: www.nrc.gov/reading-rm/doc-collections/commission/cvr/2011/2011-0137vtr.pdf.
38. In accordance with the procedures in 10 CFR § 2.202, the NRC may issue orders to modify, suspend, or revoke a licence on the basis of violations of NRC requirements or on "potentially hazardous conditions or other facts deemed to be sufficient ground for the proposed action." The NRC staff presented the commission its proposal to issue the three orders discussed in this section in NRC (2012), "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami", SECY-12-0025, 17 February, available at: www.nrc.gov/reading-rm/doc-collections/ commission/secys/2012/2012-0025scy.pdf.
39. At a high level, the NRC defines "defense-in-depth" as: "An approach to designing and operating nuclear facilities that prevents and mitigates accidents that release radiation or hazardous materials. The key is creating multiple independent and redundant layers of defense to compensate for potential human and mechanical failures so that no single layer, no matter how robust, is exclusively relied upon. Defence-in-depth includes the use of access controls, physical barriers, redundant and diverse key safety functions, and emergency response measures." NRC (n.d.) "NRC: Glossary – Defense-in-Depth", www.nrc.gov/reading-rm/basic-ref/glossary/defense-in-depth.html (accessed 9 July 2013).

process for these orders demonstrated just how seriously the Commission took its responsibility in evaluating the orders.

While I agreed that the requirements in the hardened vents and mitigation strategies orders should be grounded in adequate protection, I could not conclude that the NRC was "defining or redefining" the level of protection regarded as adequate. The NRC has generally "defined or redefined" adequate protection by implementing generic requirements that establish a new minimum level of protection through the rulemaking process. In these two orders, however, the NRC was not raising the bar on the level of adequate protection; instead, the orders supplemented existing requirements and codified current regulatory expectations. Thus, the NRC was responding to operating experience from the Fukushima Daiichi accident and ensuring, rather than redefining, adequate protection.

To help illustrate, after 11 September 2001, the NRC required all US plants to have mitigation strategies and extra equipment such as portable generators, water pumps, hoses, and batteries to provide reactor safety capability under the extreme circumstances associated with loss of large areas of the plant due to fires or explosions.[40] This work stemmed from concerns over the effects of a potential aircraft attack on nuclear power plants. The mitigation strategies order called for upgrades to this portable equipment to handle extreme natural phenomena, including events at multiple nuclear reactors at a single site. The mitigation strategies order, therefore, expanded upon the post-9/11 framework by incorporating operating experience and lessons learnt from the Fukushima Daiichi accident. It did not, however, redefine the level of protection the NRC regards as adequate.

Similarly, the hardened vents order clarified current regulatory expectations by incorporating lessons learnt from the Fukushima Daiichi accident. The accident vividly illustrated the consequences of both unreliable vents and overly restrictive operational limits,[41] which prevented earlier venting during an accident, contrary to US practices. Further, the hardened vent order codified current regulatory expectations by incorporating the extensive operating experience and risk insights with BWR Mark I and Mark II containment integrity over the past three decades. Again, this is an example of the NRC ensuring adequate protection through normal regulatory measures rather than raising the bar on the adequate protection standard.

The spent fuel pool instrumentation order was a different story. The staff also proposed using the "defining or redefining" adequate protection exception to the backfit rule to implement this new requirement. In my opinion, however, this action did not rise to the level of an adequate protection measure. While the operating experience at Fukushima Daiichi demonstrated that reliable and available instrumentation is important for plant personnel to effectively prioritise emergency actions, it did not show that the absence of spent fuel pool instrumentation resulted in radiological consequences. But, based upon my many years of nuclear propulsion plant operations, I know that a lack of reliable instrumentation can cause operator confusion and can be a significant distraction that may adversely impact safe

40. These requirements, called "interim compensatory measures," were originally issued as immediately effective orders. All Operating Power Reactor Licensees: Order Modifying Licenses (Effective Immediately), 67 Fed. Reg. 9792 (4 March 2002). These requirements were later largely codified as 10 CFR § 50.54 (hh).
41. See e.g. Institute of Nuclear Power Operations (2011), "Special Report on the Nuclear Accident at the Fukushima Daiichi Nuclear Power Station," INPO 11-005, November, p. 10, available at: www.nei.org/corporatesite/media/filefolder/11_005_Special_Report_on_Fukushima_Daiichi_MASTER_11_08_11_1.pdf.

operations. Given the significant radiological inventory in a typical spent fuel pool, I believed that spent fuel pools should have reliable instrumentation.

Without an adequate protection basis to impose the spent fuel pool instrumentation requirement, and in the absence of a cost-benefit analysis, the Commission needed some way to impose this important safety measure. In this instance, the Commission turned to the administrative exemption. Commission action exempting itself from its own binding regulations should be a rare occurrence that takes place only in special circumstances or when the underlying NRC action to be exempted is necessary. In the only previous use of the administrative exemption, the Commission stated that it "will continue to be an extremely rare action to be taken only if regulatory considerations strongly favor taking such administrative exemption."[42] Personally, I was able to determine that the order for enhanced spent fuel instrumentation was necessary and the events at Fukushima Daiichi demonstrated the type of rare underlying occurrence where an administrative exemption is acceptable. Therefore, I approved the use of an administrative exemption to the backfit rule.

Ultimately, the Commission approved issuing hardened vents and mitigation strategies orders as necessary for continuing adequate protection and approved the spent fuel pool instrumentation order as an administrative exception to the backfit rule.[43] From this experience, one point should be evident: our regulatory standard has *not* changed since Fukushima Daiichi. The NRC *still* regulates based upon reasonable assurance of adequate protection of public health and safety. And the Commission's existing framework was robust and flexible enough to disposition the most safety-significant post-Fukushima Daiichi actions.

NTTF Recommendation 1

The NTTF found that "[a]lthough complex, the current regulatory approach has served the Commission and the public well."[44] But, the NTTF nevertheless began its recommendations with this proposal:

> The Task Force recommends establishing a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations.[45]

This recommendation, which is referred to at the NRC as "Recommendation 1," also had sub-recommendations that called for "enhanc[ing] the NRC regulatory framework to encompass beyond-design-basis events and their oversight through,"

42. Consideration of Aircraft Impacts for New Nuclear Power Reactors, Final Rule, 74 Fed. Reg. 28112, 28144 (12 June 2009).
43. NRC (2012), "Staff Requirements – SECY-12-0025 – Proposed Orders and Requests For Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami", 9 March, available at: www.nrc.gov/reading-rm/doc-collections/commission/srm/2012/2012-0025srm.pdf. The orders were thereafter issued by the NRC staff. See All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status: Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation (Effective Immediately), 77 Fed. Reg. 16082 (19 March 2012); Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Effective Immediately), 77 Fed. Reg. 16091 (19 March 2012); All Operating Boiling Water Reactor Licensees with Mark I and Mark II Containments: Order Modifying Licenses with Regard to Reliable Hardened Containment Vents (Effective Immediately), 77 Fed. Reg. 16098 (19 March 2012).
44. NTTF Report, supra note 20, p. 18.
45. Ibid., p. 22.

among other actions, "inclu[sion of] extended design-basis requirements in the NRC's regulations as essential elements for ensuring adequate protection."[46]

One word used only three times throughout the almost 100 page NTTF Report seems to have shaped much of the debate on Recommendation 1: patchwork. The NTTF first referenced a supposed regulatory "patchwork" by saying:

> [The NRC's] regulatory approach, established and supplemented piece-by-piece over the decades, has addressed many safety concerns and issues, using the best information and techniques available at the time. *The result is a patchwork of regulatory requirements and other safety initiatives*, all important, but not all given equivalent consideration and treatment by licensees or during NRC technical review and inspection. Consistent with the NRC's organizational value of excellence, the Task Force believes that improving the NRC's regulatory framework is an appropriate, realistic, and achievable goal.[47]

My personal opinion is that the NRC's regulatory framework is not broken, however, and calling it a "patchwork" unfairly paints it in a negative light. As I stated in my first vote on the NTTF Report, the "use of the word 'patchwork' diminishes the dynamic, evolving nature of the NRC's regulatory framework."[48] The NRC is a continuously learning organisation, which should be viewed as a strength. With the benefit of hindsight, one can usually suggest better ways to approach past issues. But, I am not a critic of actions this agency took in response to major events like Three Mile Island or September 11th. Rather, previous NRC staff and Commissioners used their best judgment to appropriately address the problems they faced. Those judgments have generally stood the test of time. As I said then, and continue to believe now, "[w]hile the NRC's regulatory approach…may not have the coherence of a framework that might be developed with the luxury of being done in a closed room at one static point in time, it does not mean that the framework is not effective."[49]

While there is no AEA mandate to formally reconsider or reconfirm original findings of adequate protection, the NRC must always ensure that NRC-regulated activity is conducted in a manner that provides for adequate protection. Learning from operating experience has been a cornerstone of the NRC's regulatory process since its inception and is central to this continuous assurance of adequate protection. The NRC has a formal Reactor Operating Experience (OpE) Programme that "provides means for assessing the significance of OpE Information, providing timely and effective communication to stakeholders, and applying the lessons learned to regulatory decisions and programs affecting nuclear reactors."[50] The Fukushima Daiichi Lessons Learnt initiative fits within this OpE Programme, as have a number of other initiatives undertaken by the NRC over the years.[51] Hundreds, if not thousands, of Information Notices[52] have been issued over the years sharing OpE

46. Ibid.
47. Ibid., p. vii. (emphasis added).
48. Ostendorff, W (2011), Vote on SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan", 27 July, p. 2, available at: www.nrc.gov/reading-rm/doc-collections/commission/cvr/2011/2011-0093vtr-wco.pdf.
49. Ibid., p. 3.
50. NRC (2012), "Management Directive 8.7, Reactor Operating Experience Program", 27 September, p. 2, available at: http://pbadupws.nrc.gov/docs/ML1227/ML122750292.pdf.
51. Other examples of longer-term reactor safety focus areas arising from OpE are groundwater contamination (tritium), concrete degradation, and corrosion and leaking issues found in some buried pipes.
52. Information Notices are the NRC's vehicle for communicating generic operating or analytical experience to the nuclear industry. Information Notices may also communicate the results of newly completed research. The NRC expects the industry to review the information for applicability and consider appropriate actions to avoid similar problems.

on issues such as failed components, degradation mechanisms, and design errors. More significant events such as the Browns Ferry fire, Salem anticipated transient without scram, and Three Mile Island accident all resulted in more substantive regulatory changes. Thus, the NRC is not "patching" its regulations; rather, it is continuously strengthening its regulations as appropriate.

The Commission has yet to receive the NRC staff's analysis and options for addressing NTTF Recommendation 1, but the Commissioners have been periodically briefed on the working group's progress. Because the NRC staff's final paper is not yet finished, I cannot say with certainty how I will vote on this issue. In the briefings I have had, I have consistently asked the same question: what is the problem we are trying to solve? And, I have yet to hear what safety issues exist, but cannot be remedied, through our current regulatory process. Everything that I have seen during my time as a Commissioner has suggested that our current regulatory process has served us well. In fact, one very apt example stands out: just as the Commission has already dispositioned the most safety-significant post-Fukushima Daiichi actions under our current regulatory framework, so too does it appear that the Commission will likewise be able to disposition *all* Fukushima Daiichi tier 1, 2, and 3 actions under that same regulatory framework.

This opinion should not be taken, however, as any indication that I do not believe this approach to be a worthwhile effort. As a continuously learning organisation, it is helpful to stop sometimes and take a retrospective, historical look at where we came from and how we got here. This exercise is certainly helpful to me as a Commissioner since it continues to give me great confidence that our regulatory structure is fundamentally strong.

Moving forward in the wake of the Fukushima Daiichi accident

New reactor licensing

The Commission's handling of new reactor licensing demonstrates the agency's ability to successfully perform its licensing functions while also effectively moving forward in its post-Fukushima Daiichi actions. In September and October of 2011, six months after the Fukushima Daiichi accident, the Commission held mandatory hearings[53] for the Vogtle (Georgia) and Summer (South Carolina) combined licence (COL) applications, which would eventually become the first new nuclear power plant construction authorisations by the US government in over thirty years. After

Information Notices, do not, however, impose new requirements. NRC Information Notices from 1979 to the present may be found at: www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/.

53. The United States Congress, through the AEA, requires that a hearing be held for those proceedings that involve the granting of a construction permit for a nuclear power plant, even if the proceeding is uncontested, AEA § 189a.(1)(A), 42 USC § 2239(a)(1)(A). This requirement dates back to 1957, in part to address a perceived lack of transparency in the AEC's handling of early plant applications, when construction permits were issued largely without prior notice or hearing and without public dissemination of the AEC's safety evaluation. See Pub. L. 85-256 § 7, 71 Stat. 576 (1957). Therefore, before every construction permit is granted for new reactors, the commission itself holds a public hearing prior to making a decision to grant or deny the application. The "mandatory" hearing generally refers to the uncontested portion of the proceeding and the commission itself has decided it will hold those hearings for combined licences. In these uncontested hearings, which are generally held in public session, the commission typically receives presentations from the NRC staff and the license applicant and may hear from interested state or local governments or Indian tribes. See NRC (2012), "Internal Commission Procedures", 12 June, chap. IV, pp. IV-12-21, available at: www.nrc.gov/about-nrc/policy-making/icp-chapter-4-2012.pdf#page=12.

the hearings, and while the Commission was weighing its ultimate decision on the COL applications, the agency was also considering the three Fukushima Daiichi orders previously discussed. The Commission had to make certain determinations regarding the proper sequencing of those actions and whether those post-Fukushima Daiichi orders had to be issued prior to licensing the new reactors.

A majority of the Commissioners strongly believed that the agency need not depart from its rigorous, well-established licensing process to deal with post-Fukushima Daiichi actions in new reactor licensing. For the majority, the Commission could assure timely implementation of any new requirements and ensure adequate protection of public health and safety without departing from the existing regulatory process. I was in absolute agreement. To me, four main considerations informed this determination: (1) that the Task Force concluded "continued operation and continued licensing activities do not pose an imminent risk to public health and safety"; (2) that the NRC has "in place well-established regulatory processes by which to impose any new requirements or other enhancements that may be needed"; (3) that the "applicability of any new requirement will be determined when the justification is fully developed and we evaluate the Staff's bases [for their recommendations]"; and (4) that "all affected nuclear plants will be required to comply with NRC direction resulting from lessons learned from the Fukushima accident, regardless of the timing of issuance of the affected licenses."[54] Thus, our regulatory structure was already flexible and robust enough to deal with these issues.

Holding the mandatory hearings for new reactor licensing was a major signal that although the NRC was seriously studying and considering lessons learnt from the Fukushima Daiichi accident, the normal licensing processes were going to be followed, and there was no need to suspend regulatory decision-making. Further, from the Commission's decisions to issue the licences for the Vogtle and Summer new reactors, it should be clear that while Fukushima Daiichi made us take a harder look at many things at the NRC, our regulatory structure remains sound. Although our framework is stable and predictable, it is also flexible enough to incorporate enhanced requirements when appropriate.

Offsite consequences

While there was no health risk associated with the radiation from the Fukushima Daiichi accident to those in the United States,[55] the large amount of

54. See Southern Nuclear Operating Co. (Vogtle Electric Generating Plant, Units 3 and 4), CLI-12-02, 75 NRC __ (slip op.)(9 February 2012); South Carolina Electric Gas Co. and South Carolina Public Service Authority (also referred to as Santee Cooper) (Virgil C. Summer Nuclear Station, Units 2 and 3), CLI-12-09, 75 NRC __ (slip op.) (30 March 2012). In the end, due to issues related to timing, the commission did not include any licence conditions related to the Fukushima Daiichi lessons learnt in the Vogtle COL, and instead issued the post-Fukushima Daiichi requirements through orders. Regarding the Summer COL, however, the mitigation strategies requirement was included as a licence condition, but the spent fuel pool instrumentation requirement was imposed through an order.

55. Only extremely low levels (barely above background radiation) of short-lived radioactive iodine and longer-lived cesium were detected by US nuclear power plant monitors and the US EPA's RadNet system. See e.g. EPA, "Monitoring Radiological Incidents," www.epa.gov/radnet/radiation-monitoring/ (accessed 21 February 2013). The EPA describes RadNet as a system that "monitors the nation's air, precipitation, drinking water, and pasteurized milk to track radiation in the environment." RadNet comprises more than 100 fixed radiation air monitors in 48 states as well as another 40 portable air monitors that can be sent anywhere in the United States if needed. RadNet runs continuously while computers also continuously review the data. EPA states that "If there is a meaningful

radioactive material released to the environment in Japan[56] has initiated a discussion within the NRC about how our framework considers the offsite consequences of accidental radiological releases. I was able to observe some of those offsite consequences when I visited Fukushima Daiichi on 19 January 2012. The impact of the tsunami on structures and equipment at the site was overwhelming. I was similarly overcome by the barren landscape in the drive to the facility through the Fukushima prefecture. But, as affected as one might be by such sites, as regulators in the United States, we must not lose sight of the fact that no power generating technology comes without risks. We should be vigilant in mitigating those risks, though it will never be feasible to completely eliminate them.

Consideration of offsite economic consequences

The AEA does not require that the NRC protect against the offsite economic consequences associated with the unintended release of licensed nuclear material to the environment (or simply, "economic consequences") in its determinations of adequate protection standards. The NRC's long-standing regulatory philosophy, however, does provide that regulatory actions that are protective of public health and safety also afford protection of the environment.[57] As it specifically relates here, the NRC's reliance on prevention and mitigation of severe accidents provides ancillary protection to offsite property, thus minimizing potential economic consequences. Accordingly, the NTTF concluded that the NRC's "current approach to the issue of land contamination from reactor accidents is sound."[58] But, due to the continued interest in land contamination following the Fukushima Daiichi accident, the NRC staff re-examined whether any changes were necessary or desirable to the way the Commission considers economic consequences.[59]

The NRC currently considers economic consequences through our regulatory analysis process. That means that for all the regulatory actions where we perform regulatory analyses (for most rules, orders, bulletins, regulatory guides, and for all actions involving a backfit or the imposition of generic requirements), we evaluate the costs and benefits of the issue at hand. The benefit of some regulatory actions can include a reduction in the costs associated with land contamination. The possibility of offsite property damage, however, must be weighed against other costs and benefits, like severe accident prevention or mitigation.

The NRC staff concluded that our regulatory framework for considering offsite property damage is sound and affords sufficient flexibility to account for economic consequences. Regardless, the NRC staff presented the Commission an option, although not the recommended one, to add licensing requirements addressing offsite property damage and potentially adding a new exception to the backfit rule that would treat economic consequences as equivalent in regulatory character to

increase in radiation levels, laboratory staff immediately investigate." EPA, "About RadNet", www.epa.gov/radnet/about-radnet/index.html (accessed 9 July 2013).

56. Although there was a large release of radiation in Japan, multiple governmental and nongovernmental reports suggest that radiation risks to people living in Japan are very low due to evacuation measures and control of food and that health effects to the Japanese public will be minimal. See e.g. IAEA (2011), "Final Report of the International Mission on Remediation of Large Contaminated Areas Off-site the Fukushima Daiichi NPP", 15 November, pp. 4, 14, available at: www.iaea.org/newscenter/focus/fukushima/final_report151111.pdf; American Nuclear Society Special Committee on Fukushima (2012), "Fukushima Daiichi: ANS Committee Report", June, pp. 15-18, available at: http://fukushima.ans.org/report/Fukushima_report.pdf.
57. See e.g. NRC (2012), "Consideration of Economic Consequences within the U.S. Nuclear Regulatory Commission's Regulatory Framework", SECY-12-0110, 14 August (hereafter SECY-12-0110), p. 4, available at: www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0110scy.pdf.
58. NTTF Report, supra note 20, pp. 21-22.
59. NRC, SECY-12-0110, supra note 57, p. 4.

matters of adequate protection or compliance. Another alternative mentioned was modifying the backfit analysis threshold to require a showing of either a substantial increase in protection to public health and safety, which is the current approach, or a substantial reduction in adverse offsite economic consequences, which as the staff explained, would treat "economic consequences as equivalent in regulatory character to 'safety enhancements.'"[60] The NRC staff stated that pursuing this approach "could signal the Commission's intent to change the regulatory framework, which could increase regulatory uncertainty."[61]

Not only is that statement true, but it is an understatement of the outcome of adopting that path. By affording equal regulatory treatment to an issue that has no nexus to radiological public health and safety with one that does, the NRC would be opening the door to a potentially never-ending stream of new regulatory requirements. I do not want to diminish the serious nature of possible radiation contamination following a severe accident. The possibility of severe accidents has been acknowledged since the initial development of nuclear power. But, our job as regulators is to manage the risks of severe accidents, not to prevent the possibility of an accident ever occurring.

In its final determination on this issue, the Commission approved the NRC staff's recommendation to "enhance the currency and consistency of the existing framework through updates to guidance documents integral to performing cost-benefit analyses in support of regulatory, backfit, and environmental analysis."[62] I firmly agree with this approach.[63] Our Principles of Good Regulation[64] state that once established, regulations should be perceived as reliable and not unjustifiably in a state of transition. This approach does not mean that our processes and policies should be static and immune from self-assessment. Rather, the NRC should pursue justifiable improvements based on domestic and international operating experience. Therefore, although the NRC's defence-in-depth philosophy and risk considerations for adequate protection of public health and safety have provided substantial ancillary protection of offsite property, we should take action to refine our regulatory analysis tools to account for new information.[65] Such action is appropriate for any organisation that values operating experience. That approach, however, does not mean that broader changes need to be made. Our existing regulatory structure is flexible and robust enough to appropriately appreciate economic considerations. And our current treatment of economic consequences is fundamentally sound.

60. Ibid., p. 8.
61. Ibid.
62. NRC (2013), "Staff Requirements – Consideration of Economic Consequences within the U.S. Nuclear Regulatory Commission's Regulatory Framework", SECY-12-0110, 20 March, p. 1, available at: www.nrc.gov/reading-rm/doc-collections/commission/srm/2012/2012-0110srm.pdf.
63. Ostendorff, W. (2013), Vote on SECY-12-0110, "Consideration of Economic Consequences within the U.S. Nuclear Regulatory Commission's Regulatory Framework", 10 January, p. 17, available at: www.nrc.gov/reading-rm/doc-collections/commission/cvr/2012/2012-0110vtr.pdf.
64. NRC (n.d.), "Principles of Good Regulation" available at: www.nrc.gov/about-nrc/values.html#principles (accessed 9 July 2013).
65. An example of that refinement is the inclusion of the State-of-the-Art Reactor Consequence Analysis study insights (which estimated consequences in terms of early fatality risk and latent cancer fatality risk) into agency guidance for estimating offsite economic costs.

Reducing offsite releases: filtered containment venting

While the NRC staff was prioritising the NTTF recommendations, they determined that an issue that has been considered by the Commission in the past, but that was not included in the NTTF recommendations – whether the NRC should require installation of engineered filtered containment venting systems for BWRs with Mark I and Mark II containments – warranted further consideration and potential prioritisation.[66] Engineered filtered containment venting systems would prevent the release of significant amounts of radioactive material following most severe accident scenarios at BWRs with Mark I and Mark II containments. They would not, however, prevent a Fukushima Daiichi-type hydrogen explosion.

When the NRC staff evaluated the issue this time around, they presented the Commission with four potential options: (1) continue with the reliable hardened vents order, but pursue no further requirements; (2) upgrade or replace the reliable hardened vents with a severe accident capable containment venting system; (3) require installation of an engineered filtered containment venting system; or (4) pursue a performance-based approach to filtering whereby several site-specific strategies, including potentially a filter, could be used to reduce contamination in the event of a severe accident.[67] Some of these options could be pursued independently or in conjunction with each other. For example, requiring that vents be strengthened so that they will remain functional during severe accident conditions (Option 2) could be implemented in parallel with either Option 3 (engineered filtered vents) or Option 4 (performance-based approach).

Our Deputy Executive Director for Operations and Chairman of the Japan Lessons-Learned Steering Committee observed at the Commission's 9 January 2013 briefing on this issue, "There were *no* stakeholders who argued for the status quo."[68] Public interest groups, individual members of the public, the Nuclear Energy Institute (NEI),[69] utilities, Congress, and the Advisory Committee on Reactor Safeguards (ACRS)[70] all believed that there needed to be *some* type of filtering strategy to enhance defence-in-depth for these types of containments. There was a vigorous public debate about which of the other options should be the preferred

66. NRC (2011), "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned", SECY-11-0137, 3 October, available at: www.nrc.gov/reading-rm/doc-collections/commission/secys/2011/2011-0137scy.pdf. Subsequently, the Commission determined that the filtered containment vents issue should be moved from an "additional issues" category into tier 1. NRC (2011), "Staff Requirements – SECY-11-0137 – Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned", 15 December, available at: www.nrc.gov/reading-rm/doc-collections/commission/srm/2011/2011-0137srm.pdf. This was not, however, due to safety or urgency reasons. Rather, concurrent consideration of this issue with the hardened vents for Mark I and Mark II containments, a tier 1 action was the most practical path forward.
67. NRC (2012), "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments", SECY-12-0157, 26 November, p. 7, available at: www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0157scy.pdf.
68. NRC (2013), "Briefing on Venting Systems for Mark I and II Containments", transcript, p. 65, (remarks of M. Johnson) (emphasis added), 9 January, available at: www.nrc.gov/reading-rm /doc-collections/commission/tr/2013/20130109b.pdf.
69. NEI is the US policy organisation for the nuclear energy and technologies industry. See NEI (n.d.), "About NEI", available at: www.nei.org/aboutnei (accessed 9 July 2013).
70. The ACRS is a body of technical experts that provides independent advice on a range of issues, such as the safety of reactor facility licence applications and licence renewals, specific generic matters or nuclear facility safety-related items, and health physics and radiation protection. The ACRS is statutorily mandated by the AEA and reports directly to the Commission (AEA § 29, 42 USC § 2039).

path forward. While the NRC staff recommended Option 3,[71] many, including NEI,[72] utilities,[73] and the ACRS,[74] the NRC's legislatively-mandated independent, expert safety body, supported Option 4. And the discussion did not end there. Because the NRC staff did not recommend that the addition of engineered filters to the hardened vents be considered a matter of adequate protection, implementation would require either a satisfactory backfit analysis or some alternative regulatory method.

In the late 1980s, when the NRC previously evaluated whether to require filtered vents, it found "that the low probability of such events resulted in the costs of design improvements exceeding the calculated benefits."[75] Thus, no new requirements were then imposed. Unlike the last time the NRC staff considered this matter, this time they were able to satisfy the cost-benefit analysis. The NRC staff found that although the quantitative costs did not justify the benefits, when qualitative factors are considered, the direct and indirect costs associated with filtered containment vents were cost justified.[76]

My colleagues and I unanimously supported modifying our earlier reliable hardened vents order to require that those vents also be severe accident capable.[77] This measure is important because these vents can help reduce pressure inside a reactor and safely release built-up hydrogen to prevent explosions. In my visit to Fukushima Daiichi last year, I saw all too clearly what the after effects of a hydrogen explosion look like. This new requirement for severe accident capable vents is a pragmatic and sensible defence-in-depth measure to address those issues promptly.[78]

The Commission also approved a filtering strategies rulemaking process that considers engineered filters, as well as other severe accident confinement strategies.[79] I firmly agree with this hybrid approach based on Options 3 and 4.[80] Use of a performance-based approach is consistent with 25 years of Commission policy and past treatment of severe accidents. It is being successfully employed by our Canadian colleagues and I was able to see first-hand one possible approach to US

71. NRC, SECY-12-0157, supra note 67, p. 10, available at: www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0157scy.pdf.
72. Pietrangelo, A. R. (2013), "Filtering Strategies and Filtered Vents", 25 January, available at: http://pbadupws.nrc.gov/docs/ML1303/ML13030A145.pdf.
73. See e.g. Korsnick, M. G. (2013), "Severe Accident Management and Filtering Strategies", 9 January, available at: www.nrc.gov/reading-rm/doc-collections/commission/slides/2013/20130109/korsnick-ceng-20130109.pdf.
74. ACRS (2012), "ACRS Review of Staff's Draft SECY Paper on Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containment Designs", 8 November, available at: http://pbadupws.nrc.gov/docs/ML1231/ML12312A099.pdf.
75. NRC, SECY-12-0157, supra note 67, p. 5, available at: www.nrc.gov/reading-rm/doc-collections/commission/secys/2012/2012-0157scy.pdf.
76. Ibid., p. 9.
77. NRC (2013), "Staff Requirements – SECY-12-0157 – Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments", 19 March, p. 1, available at: www.nrc.gov/reading-rm/doc-collections/commission/srm/2012/2012-0157srm.pdf.
78. Ostendorff, W. (2013), Vote on SECY-12-0157, "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments", 2 February, p. 26, available at: www.nrc.gov/reading-rm/doc-collections/commission/cvr/2012/2012-0157vtr.pdf.
79. NRC (2013), "Staff Requirements – SECY-12-0157 – Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments", 19 March, p. 1, available at: www.nrc.gov/reading-rm/doc-collections/commission/srm/2012/2012-0157srm.pdf.
80. Ostendorff, W., Vote on SECY-12-0157, supra note 78, p. 26.

implementation in a visit to Nine Mile Point in New York. Further, the rulemaking process will facilitate valuable stakeholder engagement in the development of a performance-based approach. Finally, although there has been considerable debate about the use of qualitative factors in this cost-benefit analysis,[81] I believe the staff's consideration of defence-in-depth as one of the principal qualitative factors was both appropriate and consistent with agency guidance.[82] That being said, the final decision on this type of cost-benefit analysis is a matter of judgment best left to Commission determination.

When I was considering this issue, I was struck by the almost universal consensus that existed among our diverse stakeholders for taking some action in this area. This general agreement confirmed that the Commission's decision is a logical outcome of the operating experience the nuclear industry gained as a result of the Fukushima Daiichi accident. It also demonstrated just how robust and flexible our current regulatory structure is to enable the Commission to move forward in a logical manner on an issue that, while important, no one argued was a matter of adequate protection.

Conclusion: Maintaining our adequate protection framework

On even some of the least controversial post-Fukushima Daiichi actions, some critics in the nuclear industry were already asking whether "the agency's proposed course of action undermines the integrity of the regulatory process" and, if the backfit rule is inconsistently applied, whether "the rule retain[s] any practical value in the future."[83] Although the criticisms were wrongly targeted, the overarching concerns were valid. This agency must vigilantly ensure that the memory of Fukushima Daiichi does not result in loose interpretations of our adequate protection mandate. Fukushima Daiichi was a terrible accident, and that should never be forgotten. But what also should not be forgotten is that it was an accident that occurred in another country – a country with a different regulatory structure and a different regulatory culture. I have not seen any evidence that suggests our current regulatory structure in the United States is broken or that there is any need to divert from the stable, predictable way that the NRC evaluates issues. The NRC must adhere to its well-proven approach to regulation. If we do not, the regulations will be only as predictable as the five individuals carrying the title "Commissioner."

81. See e.g. Stenger, D. F. (2013), "Backfitting Analysis for Filtered Vents for Mark I and II BWRs", 6 February, available at: http://pbadupws.nrc.gov/docs/ML1303/ML13039A139.pdf.
82. Ostendorff, W., Vote on SECY-12-0157, supra note 78, p. 26.
83. Ginsberg, E. and J. Zorn (2012), "Application of the NRC's Regulatory Framework for Imposing New Requirements in a Post-Fukushima Era", *American Bar Association Energy Committees Newsletter*, June, Vol. 9, No. 3, p. 11, available at: www.americanbar.org/content/dam/aba/publications/nr_newsletters/energy/20120 6_energy.authcheckdam.pdf.

Safer nuclear energy through a higher degree of internationalisation? International involvement versus national sovereignty

By Norbert Pelzer[*]

1. The use of nuclear energy – an international challenge

1.1. International accident response

On 11 March 2011, the Fukushima Daiichi nuclear accident occurred.[1] In responding to this accident, the Director General of the International Atomic Energy Agency (IAEA) on 30 March 2011, with broad support by the IAEA Member States, called for a Ministerial Conference on Nuclear Safety which took place in Vienna from 20–24 June 2011.[2] On 20 June 2011, the Conference adopted a Declaration on Nuclear Safety, which, *inter alia*, expresses sympathy and solidarity with Japan and emphasises "the importance of implementing enhanced national and international measures to ensure that the highest and most robust levels of nuclear safety are in place, based on the IAEA safety standards, which should be continuously reviewed, strengthened and implemented as broadly and effectively as possible and commit to increase bilateral, regional and international cooperation to that effect."[3] The declaration furthermore requested the Director General of the IAEA to prepare a report and to draft an action plan building on the declaration and on the outcome of the ministerial conference.[4]

In implementing this declaration, the IAEA Board of Governors approved an Action Plan on Nuclear Safety on 13 September 2011, which the 55th General Conference of the IAEA on 22 September 2011 endorsed.[5] The action plan addresses

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1. An earthquake cut off the supply of off-site power to the Fukushima nuclear power plant, and flooding caused by a tsunami disabled diesel generators intended to provide back-up electricity to the plant's cooling system. For more details on the facts of the accident see the Fukushima Nuclear Accident Update Log, www.iaea.org/newscenter/news/ tsunamiupdate01.html; Health Physics Society Fukushima News, www.hps.org/fukushima/. See also National Diet of Japan (2012), "Report of the Fukushima Nuclear Accident Independent Investigation Commission", available at: http://warp.da.ndl.go.jp/info:ndljp/pid/3856371/naiic.go.jp/en/report/.
2. IAEA (2011), Ministerial Conference on Nuclear Safety Announcement, Programme and Conference Documentation, available at: www-pub.iaea.org/iaeameetings/42466/IAEA-Ministerial-Conference-on-Nuclear-Safety.
3. IAEA (2011), "Declaration by the IAEA Ministerial Conference on Nuclear Safety in Vienna on 20 June 2011", IAEA Doc. INFCIRC/821, paragraphs 1, 6, available at: www.iaea.org/Publications/Documents/Infcircs/2011/infcirc821.pdf.
4. See Declaration (fn. 3), paragraphs 23 – 25.
5. IAEA (2011), "Draft IAEA Action Plan on Nuclear Safety, Report by the Director General", IAEA Doc. GOV/2011/59-GC(55)/14, 5 September, available at: http://iaea.org/About/Policy/GC/GC55/Documents/gc55-14.pdf. See also the information on the history of the document available at: http://iaea.org/newscenter/news/2011/actionplanns.html. Furthermore see the "General Conference Resolution", IAEA Doc. GC(55)/RES/9, 22 September 2011.

twelve fields of safety issues where actions are needed or ongoing actions need to be intensified. Progress in implementing the action plan is described in various IAEA documents of the years 2011/2012.[6] Based on the lessons learnt, the government of Japan, in co-sponsorship with the IAEA, convened a Ministerial Conference on Nuclear Safety from 15 to 17 December 2012 in Fukushima.[7] The IAEA organised and will continue organising international experts' meetings on issues where the action plan requires actions to be taken.[8]

The accident at the Fukushima Daiichi nuclear power plant apparently did not cause significant transboundary damage in the territory of other states. Nevertheless, the immediate international response triggered by the accident provides evidence that nuclear safety is a matter of great international concern even if the vast majority of the resulting contamination is limited to the territory of the accident state. United States President Barack Obama requested a "comprehensive safety review by the Nuclear Regulatory Commission" to make sure that all US plants are safe.[9] The European Union (EU) launched "stress tests" of all nuclear power plants located within the EU member states.[10]

The 1986 Chernobyl nuclear accident[11] not only caused devastating nuclear damage in the territory of the Ukraine but also had a far-reaching significant and detrimental

6. Information on the progress in the implementation of the action plan is provided in IAEA (2011), "Initial Progress in the Implementation of the IAEA Action Plan on Nuclear Safety", IAEA Doc. GOV/INF/2011/15, 10 November; IAEA (2012), "Progress in the Implementation of the IAEA Action Plan on Nuclear Safety", IAEA Doc. GOV/INF/2012/2, 17 February; IAEA (2012), "Progress in the Implementation of the IAEA Action Plan on Nuclear Safety", IAEA Doc. GOV/INF/2012/10, 11 May; and most recently, IAEA (2012), "Progress in the Implementation of the IAEA Action Plan on Nuclear Safety – Supplementary Information", IAEA Doc. GOV/INF/2012/11-GC(56)/INF/5, 15 August.
7. Information about this conference is available at: www-pub.iaea.org/iaeameetings/20120216/-The-Fukushima-Ministerial-Conference-on-Nuclear-Safety.
8. The meetings are listed on the website of the IAEA. At the time of the drafting of this article, the latest meeting to have taken place is the International Experts' Meeting on Decommissioning and Remediation after a Nuclear Accident which took place from 28 January to 1 February 2013 in Vienna, see: www-pub.iaea.org/iaeameetings/44453/International-Experts-Meeting-on-Decommissioning-and-Remediation-after-a-Nuclear-Accident.
9. Obama, B. (2011), "Remarks by the President on America's Energy Security", Georgetown University, Washington, DC, 30 March, available at: www.whitehouse.gov/the-press-office/2011/03/30/remarks-president-americas-energy-security. See also NRC (2011), *Recommendations for Enhancing Reactor Safety in the 21st Century: The Near Term Task Force Review of Insights from the Fukushima Daiichi Accident*, 12 July, available at: www.pbadupws.nrc. gov/docs/ML1118/ML111861807.pdf.
10. Communication from the Commission to the Council and the European Parliament on the interim report on the comprehensive risk and safety assessments ("stress tests") of nuclear power plants in the European Union, SEC(2011) 1395 final, (Brussels, 24.11.2011 COM(2011) 784 final). On the EU "stress tests" specification see Annex I to the "Declaration of the European Nuclear Safety Regulators Group" (ENSREG), available at: www.ec.europa.eu/energy/nuclear/safety/doc/20110525_eu_stress_tests_specifications.pdf. On the results of the EU "stress tests" see: "Communication from the Commission to the Council and the European Parliament on the comprehensive risk and safety assessments ("stress tests") of nuclear power plants in the European Union and related activities", SWD(2012) 287 final, (Brussels, 4.10.2012 COM(2012) 571 final), available at: www.ec.europa.eu/energy/nuclear/safety/ doc/com_2012_0571_en.pdf.
11. The accident took place on 26 April 1986 at the Chernobyl Nuclear Power Plant in Ukraine, which was at that time the Ukrainian Soviet Socialist Republic within the Soviet Union. There is ample documentation online and otherwise, as well as technical and other literature on the accident and its consequences along with relevant bibliographies. As for early assessments, see International Nuclear Safety Advisory Group/IAEA (1986), *A Report by the International Nuclear Safety Advisory Group, Post-Accident Review Meeting on the*

impact on other countries. This is well and comprehensively documented and does not need further detailed description and references in this article.[12] As compared to the current status of the international Fukushima response, the Chernobyl accident resulted in more intense action on the part of the international community, involving both states and competent intergovernmental organisations. The Chernobyl accident initiated comprehensive nuclear lawmaking at both the national and the international level, which will be looked at more closely later in this article.[13]

1.2. Internationalisation – a basic feature of the use of nuclear energy

The joint response of the community of states to Chernobyl and to Fukushima nuclear accidents is not surprising. In cases of major detrimental events, humankind joins forces to fight danger and risk. Nuclear accidents form a threat of international significance. It is logical that such incidents lead to an international response, even if states other than the incident state are not directly affected. It is an experience of daily life that people affected by a risky situation seek the involvement and support of others. They quite correctly assume that the involvement of others ensures a more effective way to cope with the situation.

Because the use of nuclear energy is a potentially risky and dangerous activity and requires robust preventive regimes to ensure safe operation, normal operation also benefits from international co-operation. The involvement of other states and of international organisations provides assurance that the international state of the art in the field of nuclear safety will be applied. This means that the use of nuclear energy must not solely build on national technical, scientific, economic, legal and social capacities and experience. International co-operation is needed with a view to achieving, and participating in, international capacities and worldwide experience in this field. "Internationalising" the use of nuclear energy in this way is a guarantee that internationally agreed standards and international good practice will govern the use of nuclear energy and thus adequately protect against nuclear risks, and at the same time foster its benefits.

When the international community addresses the issue of nuclear safety, quantitatively more, and perhaps qualitatively exhaustive, expertise is gathered. Thus it becomes more probable that the result of these joint efforts guaranties that the management of nuclear energy is safer than if safety were built on the isolated efforts of one single state with more limited expertise and resources.

When it comes to establishing binding international agreements on safety requirements, however, it cannot be excluded that they may be based on the lowest common denominator, which could, as the case may be, lead to a deterioration of

Chernobyl Accident, IAEA Safety Series No. 75-INSAG-1, IAEA, Vienna and International Nuclear Safety Advisory Group/IAEA (1992), *The Chernobyl Accident: Updating of INSAG-1: INSAG-7/A Report by the International Nuclear Safety Advisory Group*, IAEA Safety Series No.75-INSAG-7, IAEA, Vienna. See also the " Statement Issued on 5 May 1986 by the Heads of State or Government of Seven Major Industrial Nations and the Representatives of the European Community on the Implications of the Chernobyl Nuclear Accident", IAEA Doc. INFCIRC/333 and the "Special Session of the IAEA General Conference 24–26 September 1986", IAEA Doc. GC(SPL.I)RES.1 and RES.2.

12. On the economic damage caused in territories other than the Ukraine see in particular: OECD/NEA (1987), "The Accident at Chernobyl – Economic Damage and its Compensation in Western Europe", *Nuclear Law Bulletin,* No. 39, (1987/1), OECD/NEA, Paris, pp. 58–65. For the radiation effects see the summarised United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) reports and other information available at: www.unscear.org/unscear/en/chernobyl.html.
13. For an overview see Handl, G. (1988), "Transboundary Nuclear Accidents: The Post-Chernobyl Multilateral Legislative Agenda", *Ecology Law Quarterly, Vol.* 15, No. 1, pp. 203-248.

national safety levels. In order to avoid such a result, international agreements need a flexible approach to achieving appropriate levels of safety. As will be shown later in this article, adequate legal techniques to cope with the problem have been developed.

Yet, in light of the severe nuclear accidents at Chernobyl and Fukushima, it has to be asked whether a higher degree of internationalisation of nuclear energy would have fostered a higher degree of nuclear safety which might have prevented the occurrence of the nuclear accident, or might at least have mitigated its consequences? Should international involvement prevail over national sovereignty?

The answer to this question can neither be given in the positive nor in the negative. We are not living in a perfect world. The possibility of accidents can never be completely excluded. Internationalisation only establishes a very high degree of probability that the use of nuclear energy is safe.

As a matter of fact, international involvement in nuclear energy matters can be traced back to, and understood by recalling, the roots of the use of nuclear energy. It started with the nuclear bomb. Understandably enough, states approached the new technology, also in the civilian sector, with care. The combination of exceptional advantages and the potential for exceptionally harmful effects attracted states, and at the same time underlined the importance of establishing severe control mechanisms in the use of nuclear energy. Early international efforts to control the use of nuclear energy were primarily restricted to preventing the spread of nuclear weapons; later they were extended to other fields where international control was deemed necessary, such as radiation protection and the transport of nuclear material. Eisenhower's Atoms for Peace Speech in 1953 ushered in a period of worldwide international co-operation with a view to promoting and benefiting from the peaceful use of nuclear energy.[14]

Over the years, a network of international treaties and other international arrangements covering both the control and the promotion of nuclear energy was established. Almost all possible uses of nuclear energy and ionising radiation were made subject to international co-operation.[15] The International Atomic Energy Agency (IAEA), the European Atomic Energy Community (EURATOM), and the Nuclear Energy Agency (NEA) of the OECD[16] were founded, and working programmes including legislative assistance and harmonisation of legal provisions were developed. In most countries, national legislation relating to the use of nuclear energy was, to a considerable extent, based on international recommendations, standards and best practices. Hence, internationalisation of issues and problems connected with the use of nuclear energy has been, from its very beginning, a "trademark" of this type of energy and of the legal framework governing its use.[17]

14. US Senate Doc. No. 55, 84th Cong., 1st Sess. (1955), *Atoms for Peace Manual: A Compilation of Official Materials on International Cooperation for Peaceful Uses of Atomic Energy, December 1953-July 1955*, US Government Printing Office, Washington, DC, pp. 1 - 7.
15. For example, the Federal Republic of Germany published 132 multilateral and bilateral agreements dealing with the use of atomic energy either exclusively or along with other issues in its Official Gazette in the period between 1956 and 1980. Pelzer, N. (1981), "The Nature and Scope of International Co-operation in Connection with the Peaceful Uses of Nuclear Energy and its Limits – An Assessment", *Nuclear Law Bulletin,* No. 27, (1981/1), OECD/NEA, Paris, pp. 34-49 at 34.
16. The Nuclear Energy Agency was founded in 1958 as the European Nuclear Energy Agency (ENEA) of the Organisation for European Economic Co-operation (OEEC) and given its current name in 1972.
17. For earlier discussion of the international character of nuclear law, see Erler, G. (1963), *Die Rechtsentwicklung der internationalenZusammenarbeitimAtombereich*, Göttingen; Yager, J.A. and R.T. Mabry (1981), *International Cooperation in Nuclear Energy*, The Brookings Institution,

It has been noted earlier that the international impact of nuclear risks requires, and usually receives, an international response. It has to be added that the promotion of the peaceful use of nuclear energy warrants international co-operation to adequately cope with complex nuclear technology. Moreover, co-operation agreements may be used to oblige parties to prevent the proliferation of weapons technology and the misuse of nuclear material. However, the legal issues involved in nuclear weapons' proliferation, and in other forms of misuse of nuclear energy, for example by terrorists, are not a subject of this article.

As has been explained, internationalisation is expected to produce a safer use of nuclear energy. The first issue to be determined is what is deemed to be "safe". What does nuclear safety mean, and which level of safety shall be achieved or what are the objectives of safety? In a second step, if and to what extent the technical prerequisites of nuclear safety are internationalised will be discussed. If there is technical harmonisation at the international level, can it be made legally binding upon states? The final question reads: Is internationalisation apt to enhance the level of nuclear safety as compared to that level which can be granted through national safety measures alone?

2. Nuclear safety

2.1. Definition and concept

Webster's Encyclopaedic Dictionary defines "safety" as "the state of being safe", "freedom from the occurrence or risk of injury, danger, or loss" and "the quality of averting or not causing injury, danger, or loss."[18] The adjective "safe" means "secure from liability to harm, injury, danger, or risk; free from hurt, injury, danger, or risk; involving little or no risk of mishap, error, etc.; dependable or trustworthy; careful to avoid danger or controversy; denied the chance to do harm."[19] These definitions may also be used in the legal context. Black's Law Dictionary defines the adjective "safe" as "not exposed to danger; not causing danger <driving at a safe limit of speed>".[20] However, additional elements have to be available in order to determine whether something is safe, particularly for legal purposes. It would also need to be clarified that safety must not be confused with security, which deals with the prevention of

Washington DC; Lamm, V. (1984), *The Utilization of Nuclear Energy and International Law*, AkademiaiKiado, Budapest, pp. 11 et seq. and passim; Pelzer, N., op. cit. (fn. 15); Pelzer, N. (1993), *The Hazards Arising out of the Peaceful Uses of Nuclear Energy*, The Hague Academy of International Law, Centre for Studies and Research in International Law and International Relations, Dordrecht, pp. 207 – 300 at 220 et seq.; Molodstova, E. (1994), "Nuclear Energy and Environmental Protection: Responses of International Law", *Pace Environmental Law Review*, Vol. 12, Pace University School of Law, White Plains, New York, pp. 185–267; El Baradei, M., et al. (1995), "International Law and Nuclear Energy: Overview of the Legal Framework", *IAEA Bulletin*, Vol. 37, (1995/3), IAEA, Vienna, pp. 16–25.

18. *Webster's Encyclopedic Unabridged Dictionary of the English Language (1994)*, Gramercy Books, Avenel, New York, p. 1260. See also *The New Shorter Oxford English Dictionary on Historical Principles (1993)*, Vol. 2, Oxford, p. 2666; *Oxford Dictionary of English* (2005), 2nd ed. (rev.), Oxford, p. 1552.
19. *Webster's Encyclopedic Unabridged Dictionary of the English Language* (fn. 18), p. 1259. See also *The New Shorter Oxford English Dictionary on Historical Principles* (fn. 18), vol. 2, Oxford, p. 2665; *Oxford Dictionary of English* (fn. 18), p. 1552. See online Oxford Online Dictionary: "protected from or not exposed to danger or risk; not likely to be harmed or lost", at: www.oxforddictionaries.com/us/definition/american_english/safe; the Wiktionary at: http://en.wiktionary.org/wiki/safetyand http://en.wiktionary.org/wiki/safe.
20. Garner, B.A. (ed.) (2009), *Black's Law Dictionary*, 9th ed., p. 1452.

misuse of nuclear energy,[21] nor with safeguarding, which aims at preventing nuclear weapons' proliferation.[22]

The definitions of safety and of safe describe an ideal situation that can never be reached. In real life, there is no situation which is totally free from risk and, consequently, safe. If we refer to safety, we refer to a construct or, legally speaking, to the result of an agreement.

Safety is relative and safety depends on what is to be protected. A path in the mountains may be safe for adult hikers but not for small children or disabled persons. The concept of safety, including nuclear safety, can only be applied if we agree on safety objectives. Without such agreement, the concept is an empty shell left open for any interpretation. Defining nuclear safety objectives, moreover, may be a matter of dispute among persons and even more so among states. In the end, who is making the safety determination is the decisive issue. A nuclear installation that is deemed to be safe by the installation state may in fact present a risk and consequently be unsafe for neighbouring states because, for example, prevailing winds could blow emissions from the nuclear installation exclusively into their territories.

The construct of "nuclear safety" therefore is composed of a number of elements. The overall objective is to avert and exclude, to the greatest extent possible, risks and dangers as defined by the aforementioned dictionaries. But this objective competes with other objectives, such as social and economic considerations. This tension is exemplified by utilisation of the so-called ALARA principle, which is generally used in radiation protection to define the amount of radiation exposure which is considered acceptable. ALARA is the acronym for "as low as reasonably achievable", a concept developed by the International Commission on Radiological Protection (ICRP)[23] that expressly includes cost-benefit deliberations.[24] The door for using such analysis is the use of the term "reasonably". Nuclear safety may be interpreted likewise by considering and taking into account "reasonable" objectives other than risk prevention, in particular for social and for economic reasons. As a rule, the installation state, based on its sovereign rights, decides if and to what extent those deliberations influence the concept of nuclear safety. "Regulating safety is a national responsibility."[25] Within the legal framework applicable, the state also decides which level of safety is safe enough.

At this stage, it is clear that tackling the task of defining the concept of nuclear safety from an international angle would not be limited to the knowledge, capabilities, possibilities, and interests of the installation state but would take into account the summary of knowledge, capabilities, experience and interests of the community of states. It would take into account in particular the international state

21. The main international instruments on guaranteeing nuclear security are the Convention on the Physical Protection of Nuclear Material (1980), IAEA Doc. INFCIRC/274/Rev.1, 1456 UNTS 246, and the Amendment to the Convention on the Physical Protection of Nuclear Material (2005), IAEA Doc. GOV/INF/2005/10 GC(49)/INF/6.
22. The main international instrument is the Treaty on the Non-Proliferation of Nuclear Weapons (1 July 1968), IAEA Doc. INFCIRC/140, 729 UNTS 161, entered into force 5 March 1970.
23. ICRP (1966), *Recommendations of the International Commission on Radiological Protection, (Adopted September 17, 1963),ICRP Publication 9*, Pergamon Press, Oxford, superseded by ICRP (2007), *The 2007Recommendations of the International Commission on Radiological Protection, ICRP Publication 103*. Ann. ICRP 37 (2 - 4).
24. ICRP (1983), *Cost-Benefit Analysis in the Optimization of Radiation Protection, ICRP Publication 37*. Ann. ICRP 10 (2-3).
25. IAEA (2006), *Fundamental Safety Principles: Safety Fundamentals*, IAEA Safety Standards Series No. SF-1, IAEA, Vienna, p. 1 at paragraph 1.2.

of the art regarding nuclear safety, which is not necessarily guaranteed if a national concept of safety is applied. If an acceptable level of nuclear safety is merely based on national standards, national pride may also influence the level and types of safety precautions taken.[26]

An international approach could change the balance among the elements forming nuclear safety, in particular by giving higher priority to those objectives less or insufficiently considered by an installation state. Irrespective of the fact that ensuring safety is a national responsibility, "radiation risks may transcend national borders, and international co-operation serves to promote and enhance safety globally by exchanging experience and by improving capabilities to control hazards, to prevent accidents, to respond to emergencies and to mitigate any harmful consequences."[27] The risk of transboundary nuclear damage not only justifies international involvement in determining the concept of nuclear safety but, moreover, principles of public international law oblige the installation state to accept the international concept provided it prevents or significantly mitigates transboundary damage better than its own national approach to nuclear safety.

Such an obligation to mitigate any harmful consequences in the territory of another state originates from principles of international law which were first expressly established in the Trail Smelter Arbitration (1938, 1941)[28] and which today are generally accepted as international customary law.[29] The Arbitration Tribunal ruled:

> "The Tribunal, therefore, finds that the above decisions, taken as a whole, constitute an adequate basis for its conclusions, namely, that, under the principles of international law…no State has the right to use or permit the use of its territory in such a manner as to cause injury in or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by clear and convincing evidence."[30]

States having nuclear installations in their territory have a legal obligation to ensure that these installations do not cause injury to other states. Each state must apply a concept of nuclear safety which complies with that obligation. Such

26. After the Fukushima nuclear incident, it was stated that Japan was not well prepared to respond to the accident because there was a "safety myth" regarding Japanese reactors. See Onishi, N. (2011), "'Safety Myth' Left Japan Ripe for Nuclear Crisis", *The New York Times*, Asia Pacific, 24 June, available at: www.nytimes.com/2011/06/25/world/asia/25myth.html?page wanted=all.
27. *Fundamental Safety Principles* (fn. 25), p. 1.
28. United Nations (2006), *Reports of International Arbitral Awards*, Vol. 3, United Nations, New York, pp. 1905-1982, available at: http://untreaty.un.org/cod/riaa/cases/vol_iii/1905-1982.pdf.
29. See, for example, Bratspies, R.M. and R.A. Miller (eds.) (2006), *Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration*, Cambridge University Press, New York, and the review of this book: Wood, S. (2007), "Review of Rebecca Bratspies and Russell Miller, eds., Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration (New York: Cambridge, 2006)", *Osgoode Hall Law Journal*, Vol. 45, pp. 637-645. See also Principle 21 of the 1972 Declaration of the United Nations Conference on the Human Environment (also known as the Stockholm Declaration), UN Doc. A/Conf.48/14/Rev. 1(1973), 11 ILM 1416 (1972), available at: www.unep.org/documents.Multilingual/Default.asp?DocumentID=97&ArticleID=1503&l=en: "States have, in accordance with the Charter of the United Nations and the principles of international lawthe responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."
30. *Reports of International Arbitral Awards* (fn. 28), p. 1965.

compliance appears best to be secured if nuclear safety is based on internationally accepted elements and standards.

International nuclear safety standards may originate from various sources: states or private organisations and other persons may co-operate at the international level. Research, including nuclear safety research per se, is often of an international nature.[31] In the field of radiation protection, the most renowned international organisation is the private ICRP. Established in 1928, it has developed into the leading authority in its field of activities.[32] As its direct counterpart among governmental organisations, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)[33] may be mentioned. The task of UNSCEAR is to collect and assess relevant information on radiation levels and effects.[34] However, the IAEA, of course, plays the key role in the field of international radiation protection and nuclear safety standards.

According to Article III.A.6.of the IAEA Statute, the Agency is authorised:

> "to establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property (including such standards for labour conditions), and to provide for the application of these standards to its own operations as well as to the operations making use of materials, services, equipment, facilities, and information made available by the Agency or at its request or under its control or supervision; and to provide for the application of these standards, at the request of the parties, to operations under any bilateral or multilateral arrangements, or, at the request of a State, to any of that State's activities in the field of atomic energy…"[35]

The IAEA's entrustment with the establishment and adoption of "standards for safety" is granted under the proviso that it is implemented "in consultation and, where appropriate, in collaboration with competent organs of the United Nations and with the specialised agencies concerned". The international character of the IAEA alone does not seem to be sufficient to guarantee a truly international basis for safety standards to be established. The IAEA Statute additionally obliges the agency to base its safety standards on the accumulated expertise of all relevant organisations of the UN family plus other relevant organisations. The significant broadening of the scientific and practical background of IAEA safety standards not only increases their credibility but also facilitates their political acceptance. For example, in 2006, the IAEA published Fundamental Safety Principles which were jointly sponsored by EURATOM, the Food and Agriculture Organization (FAO), the IAEA, International Labour Organization (ILO), the International Maritime Organization (IMO), the OECD/NEA, the Pan American Health Organization (PAHO), the United Nations Environment Programme (UNEP), and the World Health Organization (WHO).[36] It would be difficult to challenge the appropriateness of those safety principles. Because of the breadth and depth of the expertise of the

31. Refer, for example, to the work of the International Radiation Protection Association (IRPA) (www.irpa.net) and the American Nuclear Society (www.new.ans.org/about/).
32. See ICRP website at: www.icrp.org, and particularly ICRP (2011), "ICRP Strategic Plan 2011-2017", available at: www.icrp.org/docs/ICRP%20Strategic%20Plan%202011-2017.pdf.
33. See UNSCEAR website at: www.unscear.org/unscear/en/index.html.
34. See UNSCEAR (2011), "Fukushima Daiichi Assessment Update", 26 September, available at: www.unis. unvienna.org/unis/pressrels/2011/unisous102.html.
35. The latest text of the IAEA Statute is reproduced at: www.iaea.org/About/statute.html.
36. IAEA (2006), *Fundamental Safety Principles: Safety Fundamentals*, IAEA Safety Standards Series No. SF-1, IAEA, Vienna.

organisations involved, these principles represent the international state of the art and at the same time take into account practical requirements.

The IAEA started its comprehensive programme of developing an international nuclear safety regime in the early 1960s and has published standards and recommendations covering nearly all areas of nuclear and radiation safety.[37] "The IAEA safety standards are developed by means of an open and transparent process for gathering, synthesising and integrating the knowledge and experience gained from the actual use of nuclear energy technologies and from the application of the safety standards, including knowledge of emerging trends and issues of regulatory importance."[38]

The IAEA nuclear safety standards and other relevant recommendations of the IAEA shall therefore be deemed to be the scientific basis of the internationalisation which is referred to in the title of this article. In other words, if the safety regime of a national nuclear programme is based upon and subject to IAEA standards, an assumption of adequate nuclear safety exists. However, this approach does not necessarily exclude the possibility that nuclear safety based on principles not established by the IAEA could also achieve the same safety objectives. Moreover, it has to be stressed that the IAEA safety regime is not a legally binding regime. It is a set of recommendations only, unless it is applied to the Agency's own operations or unless a State requests its application.[39] The IAEA has no right to control the safety regime of a sovereign State's nuclear activities, and it is not an international regulatory body.

2.2. Nuclear safety objectives

As noted above, the concept of safety needs an agreement about its objective. The IAEA developed the concept of nuclear safety standards", including its objectives, in a step-by-step approach.

The IAEA "Nuclear Safety Standards (NUSS) Programme" launched in 1974 and completed in the second half of the 1980s contains various definitions with changing objectives of nuclear safety. In a Safety Guide published in 1982 the definition is subject to the reservation that it is intended for use in the NUSS Programme "and may not necessarily conform to definitions adopted elsewhere for international use". It reads:

"Protection of all persons from undue radiological hazard."[40]

37. The IAEA established a Commission on Safety Standards (CSS) and the following committees: Nuclear Safety Standards Committee (NUSSC), Radiation Safety Standards Committee (RASSC), Transport Safety Standards Committee (TRANSSC) and Waste Safety Standards Committee (WASSC). For a brief overview of the IAEA nuclear safety programme pursued in the last century see Iansiti, E. (1983), "The Development and Implementation of International Nuclear Safety Standards", *IAEA Bulletin*, Vol. 25, (1983/3), pp. 34-38; Timerbaev, R. and A. Ioirysh (1999/2000), "International Co-operation in Nuclear Safety", in *Yearbook of International Co-operation on Environment and Development (YBICED) 1999/2000,* Earthscan Publications, London, pp. 49-53. The latest status of relevant IAEA publications can be viewed at the IAEA website at: www-ns.iaea.org/standards. A list of currently valid safety standards is available at: www-ns.iaea.org/standards/documents/pubdoc-list.asp.
38. IAEA safety standards, at: www-ns.iaea.org/standards/default.asp?s=11&l=90&w=2, (accessed9 July 2013).
39. IAEA Statute (fn. 35), Article III. A. 6.
40. IAEA (1982), *Licences for Nuclear Power Plants: Content, Format and Legal Considerations. A Safety Guide*, IAEA Safety Series No. 50-SG-G8, Vienna, p. 63. See identical definition in IAEA (2004), *Regulations and Guides for Nuclear Power Plants. A Safety Guide*. IAEA Safety Series No. 50-SG-G9, IAEA, Vienna, p. 24.

In the five so-called NUSS Codes and in the IAEA Safety Glossary 2007 the following definition is suggested:

> "The achievement of proper operating conditions, prevention of accidents or mitigation of accident consequences, resulting in protection of site personnel, the public and the environment from undue hazards."[41]

The goal is the protection of site personnel, the public and the environment. It has to be noted that the inclusion of the environment is not explicitly provided for by the authorisation in the IAEA Statute.

While these descriptions of nuclear safety include the safety objective into the safety definition of the IAEA Safety Glossary 2007, in other IAEA publications, the safety objective is defined independently of the safety definition:

> "General Nuclear Safety Objective: To protect individuals, society and the environment from harm by establishing and maintaining in nuclear installations effective defences against radiological hazards."[42]

The IAEA Fundamental Safety Principles 2006 draft the objective as follows:

> "The fundamental safety objective is to protect people and the environment from harmful effects of ionizing radiation."[43]

Obviously, the IAEA does not use one single definition of the term "nuclear safety objective" for all purposes. From a legal point of view, that variety is not satisfactory and may contribute to confusion. Moreover, the language of the definitions lacks clarity because some of it refers to legally vague concepts, such as "the public", "society", and "environment". More specifically, does the term "individuals" include legal persons? Does the term "people" include the property of the people? Nevertheless, a proper teleological interpretation of the terms with a view to making the terms usable also for lawyers may help identifying the goal of nuclear safety. Expressed in terms of tort law or rather in terms of the international nuclear liability conventions,[44] nuclear safety aims at protecting human health and life, property, and the environment as far as there is the threat of a concrete risk or harm. At least for the purposes of this article, the IAEA definitions are sufficiently clear.

Further clarification of other international approaches to the concept of nuclear safety, including its objectives, may be achieved from other international instruments.

41. IAEA (1988), *Code on the Safety of Nuclear Power Plants: Governmental Organization*, IAEA Safety Series No. 50-C G (Rev.1), IAEA, Vienna, p. 4; identical definitions are contained in the other Codes of the NUSS Programme: Siting, Design, Operation, and Quality Assurance; IAEA (2007), *IAEA Safety Glossary, Terminology Used in Nuclear Safety and Radiation Protection*, IAEA, Vienna, p. 133.
42. IAEA (1993), *The Safety of Nuclear Installations, Safety Fundamentals*, IAEA Safety Series No. 110, Vienna, p. 2; IAEA (1999), *Basic Safety Principles for Nuclear Power Plants*, 75-INSAG-3, (Rev.1. INSAG-12), IAEA, Vienna, p. 8.
43. *Fundamental Safety Principles* (fn. 36), p. 4.
44. Vienna Convention on Civil Liability for Nuclear Damage (1997), Article I (1) (k), IAEA Doc. INFCIRC/566, annex available at: www.iaea.org/Publications/Documents/Infcircs/1998/infcirc566.pdf; Convention on Supplementary Compensation for Nuclear Damage (1997) Article I (f), IAEA Doc. INFCIRC/567, available at: www.iaea.org/Publications/Documents/Infcircs/1998/infcirc567.pdf; Paris Convention on Third Party Liability in the Field of Nuclear Energy (2004), Article 1 (a) (vii), available at: www.oecd-nea.org/law/UnofficialconsolidatedParisConvention.pdf.

The 1994 Convention on Nuclear Safety[45] describes in its Article 1 the objectives of the Convention as follows:

> "i) to achieve and maintain a high level of nuclear safety worldwide through the enhancement of national measures and international co-operation including, where appropriate, safety-related technical co-operation;
>
> ii) to establish and maintain effective defences in nuclear installations against potential radiological hazards in order to protect individuals, society and the environment from harmful effects of ionising radiation from such installations;
>
> iii) to prevent accidents with radiological consequences and to mitigate such consequences should they occur."

Article 1 (ii) of the Convention apparently borrows language from IAEA technical standards, namely from the General Nuclear Safety Objective as contained in the Safety Fundamentals.[46] There will be a closer look at this definition below in Section 4.3. Language, which in substance is nearly identical to that of the Nuclear Safety Convention, can also be identified in Article 1 on the objectives of the 1997 Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.[47]

Finally, reference may be made to the 2009 EU Directive on Nuclear Safety. Its definition reads:

> "'nuclear safety' means the achievement of proper operating conditions, prevention of accidents and mitigation of accident consequences, resulting in protection of workers and the general public from dangers arising from ionizing radiations from nuclear installations…"[48]

This definition is close to that of the NUSS Codes and to that of the IAEA Glossary 2007 referred to above. But it lacks any explicit reference to the protection of property and the environment and is limited to the protection of physical persons which apparently is the consequence of the restricted competence of the EU in this field.[49]

In summary, the references looked at in supplement to the IAEA concepts neither add additional elements to the IAEA concepts nor do they contribute to further clarifying nuclear safety objectives.

45. IAEA Doc. INFCIRC/449, available at: www.iaea.org/Publications/Documents/Infcircs/Others/inf449.shtml.
46. *Fundamental Safety Principles* (fn. 36).
47. IAEA Doc. INFCIRC/546, available at: www.iaea.org/Publications/Documents/Infcircs/1997/infcirc546.pdf.
48. Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, Official Journal of the European Union (OJ) L 172, 2.07.2009, p. 18, article 3, No. 2.
49. According to Article 30 of the EURATOM Treaty (Treaty Establishing the European Atomic Energy Community of 25 March 1957 (consolidated version), OJ C 84, 30.03.2010, p. 1, full text reproduced at: www.eur-lex.europa.eu/en/treaties/dat/12006A/12006A.htm), the competence of the Community is limited to the protection of the "health of workers and the general public against the dangers arising from ionizing radiations", but see the extensive interpretation by the European Court of Justice in its Judgment of 10 December 2002 *Commission vs. Council*, Case C-29/99, [2002] European Court Reports I-11221. See also Pouleur, Y. and P. Krs (2010), "The Momentum of the European Directive on Nuclear Safety – From the Complexity of Nuclear Safety to Key Messages Addressed to European Citizens", *Nuclear Law Bulletin,* No. 85, (2010/1), OECD, Paris, pp. 5-33 at 14.

2.3. Safety culture

The Chernobyl nuclear accident taught the lesson that nuclear safety can only be achieved if there is assurance of full and permanent compliance with robust nuclear safety standards. This obvious conclusion is self-explanatory and does not need further justification. However, this conclusion focuses attention on those who implement the safety standards. The International Nuclear Safety Advisory Group, (now called the International Nuclear Safety Group [INSAG] of the IAEA)[50] stated in 1986: "The root cause of the Chernobyl accident, it is concluded, is to be found in the so-called human element."[51] The group continued: "Formal procedures properly reviewed and approved must be supplemented by the creation and maintenance of a 'nuclear safety culture'. This is a reinforcement process which should be used in conjunction with the necessary disciplinary measures."[52]

Thus, the concept of "nuclear safety culture" was born. It is a concept which was welcomed in the international safety discussion[53] but which lawyers, because of its vagueness, have difficulties to categorise and to use. In 1991, INSAG elaborated on the concept and agreed to the following definition:

> "Safety culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance."[54]

The interpretation of the concept provided by its authors[55] and by later explanations refer to specific attitudes of the staff and of the organisations involved: "The phrase 'safety culture' refers to a very general matter, the personal dedication and accountability of all individuals engaged in any activity which has a bearing on the safety of nuclear power plants."[56] A "Policy Statement on the Conduct of Nuclear Power Plant Operations" of the US Nuclear Regulatory Commission (NRC)[57] emphasises: "Management has a duty and obligation to foster the development of a 'safety culture' at each facility and to provide a professional working environment, in the control room and throughout the facility that assures safe operation." The 2011 "Final Safety Culture Policy Statement" of the US NRC expects "a positive safety

50. For the mandate of INSAG see: www-ns.iaea.org/committees/insag.asp.
51. Summary Report No. 75-INSAG-1 (fn. 11), p. 76.
52. Summary Report No. 75-INSAG-1 (fn. 11), p. 77.
53. See US NRC website, Safety Culture, including a number of references to Federal Register Notices on nuclear safety culture policies and activities, at: www.nrc.gov/about-nrc/regulatory/enforcement/safety-culture.html. See also Institute of Nuclear Power Operations (INPO) (2004), "Principles for a Strong Nuclear Safety Culture" available at: www.nrc.gov/about-nrc/regulatory/enforcement/INPO_PrinciplesSafetyCulture.pdf. For critical commentary on the subject, see Guldenmund, F. (2006), "Much Ado about Safety Culture", Paper for the 3rd International Conference on Working on Safety, Netherlands, at the Eemhof, 12-14 September, available at: http://ssmon.chb.kth.se/vol11/issue3/7%20Guldenmund.pdf.
54. International Nuclear Safety Advisory Group (1991), *Safety Culture. A Report by the International Nuclear Safety Advisory Group*, IAEA Safety Series No. 75-INSAG-4, IAEA, Vienna, p. 4. See also, IAEA (1998), *Developing Safety Culture in Nuclear Activities, Practical Suggestions to Assist Progress*, Safety Reports Series No. 11, IAEA, Vienna, p. 3.
55. Op. cit. (fn. 54).
56. International Nuclear Safety Advisory Group (1999), *Basic Safety Principles for Nuclear Power Plants, A Report by the International Nuclear Advisory Group*, 75-INSAG-3 Rev. 1, INSAG-12, IAEA, Vienna, p. 12.
57. 54 Fed. Reg. 3424 (24 January 1989). See also Freedom of Employees in the Nuclear Industry to Raise Safety Concerns without Fear of Retaliation Policy Statement, 61 Fed. Reg. 24336 (14 May 1996), and Final Safety Culture Policy Statement, 76 Fed. Reg. 34773 (14 June 2011).

culture,"[58] which, by adding the adjective "positive", pretends to be an even stronger requirement than the original INSAG concept of safety culture.

If one reduces the concept of safety culture to its legally relevant core, it turns out that the wording as such appears to be bombast. Its substance simply means that every person involved in nuclear activities has to do his or her duty continuously and with full dedication and accountability, and that the overriding duty of such personnel is to ensure safe operation and handling of nuclear installations and materials.[59] This concept applies to both management and staff. Because nuclear energy is a highly sensitive technology which does not forgive mistakes, whistle-blowing also may be considered a duty.[60] Consequently, it has been stated "that safety culture is a concept that everyone – governments, regulators, NPP managements and staff at all levels – has a role to play in developing and maintaining."[61] Therefore, despite the lawyers' reservations regarding the exaggerated or even highbrow formulation of the "nuclear safety culture" concept, safety culture is not only a catchy term for public discussion but elegantly supports motivating the management, the staff, and also the regulatory body to give priority to safety. It pinpoints the all-important role of the human element in a nutshell. Hence, nuclear safety culture is a constitutive element of the internationally accepted principles of assuring the safe use of nuclear energy.[62] Vis-à-vis a safety culture so defined, lawyers will have to abandon their reservations.

2.4. Intermediate summary

The intermediate result of this article thus far may be summarised as follows: the IAEA provides a comprehensive international technical framework designed to ensure adequate nuclear and radiation safety. It reflects the international state of the art and the international consensus on which standards and rules are needed to assure a high level of safety for protecting people, property and the environment from the harmful effects of ionising radiation. A comprehensive set of globally harmonised technical safety standards exists and is available to be used by states with nuclear programmes.[63] If states base their domestic nuclear licensing and control regime on those standards, they provide evidence of the highest internationally agreed safety level. Such a level may be assumed to be higher than that which may be achieved on the grounds of merely domestic standards.

In order to assist in understanding the systematic approach of the IAEA Standards, reference shall be made to the IAEA publication "Long Term Structure of the IAEA Safety Standards and Current Status February 2013."[64] In that publication, the safety standards categories are presented as a pyramid. The "Safety

58. Op. cit. (fn. 57), in the summary and passim.
59. Two reports of the OECD Nuclear Energy Agency deal with the problems of how nuclear regulators should respond to a declining safety performance: OECD/NEA (1999), "The Role of the Nuclear Regulator in Promoting and Evaluating Safety Culture", OECD, Paris; OECD/NEA (2000), "Regulatory Response Strategies for Safety Culture Problems", OECD, Paris.
60. See, for example, the US Energy Reorganization Act of 1974, sec. 211, 42 USC 5851 (2006). The provision protects employees who raise concerns regarding nuclear safety. See also "Fukushima reactor designer turned whistleblower who says he knew reactor number 4 had been unsound for 40 years", at: www.bellona.org/articles/articles_2011/japan_whistleblower.
61. Carnino, A. (1993), "Achievements in Assessing Safety Culture", *Nuclear Law Bulletin,* No. 52, (1993/2), OECD/NEA, Paris, pp. 28-34 at 34.
62. See also Stoiber, C., et al. (2003), *Handbook on Nuclear Law*, IAEA, Vienna, pp. 22-23. See also the comment in fn. 157 below.
63. On the relevance and the size of the IAEA Safety Standards Programme, see supra section 2.1 and in particular the references in (fn. 36) and (fn. 37).
64. Available at: www-ns.iaea.org/committees/files/CSS/205/status.pdf.

Fundamentals" sit at the top of it. They are followed at successively lower levels by the "General Safety Requirements" (applicable to all facilities and activities), by the "Specific Safety Requirements" (applicable to specified facilities and activities), by the "General Safety Guides" (applicable to all facilities and activities), and by the "Specific Safety Guides" (applicable to specified facilities and activities).[65] A pyramid is a graphic means to explain the hierarchy of the standards. Perhaps it could also be constructed the other way round, namely the safety fundamentals as the base and the specific safety guides at the top of the pyramid. However, as was mentioned earlier, the standards are not legally binding upon states unless they request their application. The technical categorisation is therefore of less legal relevance, if relevant at all.

3. Developing an international legal regime of radiation protection and nuclear safety

3.1. General

The international technical regime safety standards only come to life if states pursuing nuclear power programmes make use of it. This can be done either by a sovereign voluntary decision of states or on the grounds of a general or specific obligation under public international law.

It would be beyond the limits of this article to investigate if and to which extent states implement IAEA technical standards in their domestic licensing and control procedures, either without being obliged to do so or in implementing international obligations. Tackling that goal would require a state by state comparative study. One may, however, even without embarking on such a study, conclude that a majority of nuclear states, to a greater or lesser degree, base the safety framework for their nuclear programmes on international standards. This can easily be exemplified by looking at legislation of selected individual countries, such as the national legal framework for the use of nuclear energy in the United States. Based on the Atomic Energy Act of 1954,[66] details of the legal framework for the civilian use of nuclear energy are maintained primarily in the Code of Federal Regulations.[67] In studying the development of the relevant US regulations over the years, compatibility with IAEA technical standards can be identified to a large extent.[68] Legislation of other states will show similar pictures regarding the reference in substance to IAEA safety recommendations.

In this article, emphasis shall be placed on the way that an international legal regime of binding or quasi-binding obligations in the field of nuclear and radiation safety emerged, is being established or was established.

3.2. Internationalising radiation protection requirements

3.2.1. Recommendations

As mentioned earlier, the ICRP is the leading international scientific organisation dealing with radiation protection.[69] Its recommendations form the basis of all major

65 Op. cit. (fn. 64), p. 3.
66. Atomic Energy Act of 1954, 42 USC §§ 2011 et seq.
67. NRC Regulations, US Code of Federal Regulations (CFR), Title 10, Parts 1 to 199, available at: www.nrc.gov/reading-rm/doc-collections/cfr/.
68. See Compatibility with IAEA Transportation Safety Standards (TS-R-1) and Other Transportation Safety Amendments, 69 Fed. Reg. 3698 (26 Jan. 2004) (changes to NRC rules in 10 CFR Part 71); Hazardous Materials Regulations; Compatibility with the Regulations of the International Atomic Energy Agency (IAEA), 76 Fed.Reg. 50332 (12 Aug. 2012) (proposed regulations of the Pipeline and Hazardous Materials Safety Administration).
69. See reference fn. 32.

international radiation protection regulations.[70] In this context, the International Commission on Radiation Units and Measurements (ICRU) also has to be mentioned. The ICRU is a private international organisation as well, founded in 1925.[71] Of course, these private organisations cannot issue binding rules but only recommendations. However, the international and undisputed reputation of ICRP and ICRU makes it difficult if not impossible for legislators and other stakeholders to neglect their recommendations.[72] Early radiation protection legislation and recommendations were based in substance on the recommendations of these organisations.[73]

The IAEA transposed a number of ICRP recommendations into its own safety standards regime. When approving radiation standards for the first time in March 1960, the IAEA Board of Governors stated: "The Agency's basic safety standards ... will be based, to the extent possible, on the recommendations of the International Commission on Radiological Protection (ICRP)."[74] In the field of radiation protection, the "Basic Safety Standards for Radiation Protection (BSS)" play a key role. They were first published in March 1960,[75] and have been revised several times.[76] On 12 September 2011, the IAEA Board approved a new version of the BSS which was published as "General Safety Requirements Part 3 (Interim)".[77]

Transposing ICRP Recommendations into the IAEA Standards involves obvious advantages. Backed by the authority of an international governmental organisation, the substance of the recommendations gains political weight and, what is likewise important, its scientific authority also gains influence because the IAEA and its co-sponsors deploy a huge staff of experts to improve and draft the standards.[78]

70. A list of the ICRP recommendations is available at: www.icrp.org/publications.asp.
71. See www.icru.org. ICRU has the objective to develop internationally accepted recommendations on "(1) quantities and units of radiation and radioactivity; (2) procedures suitable for the measurement and application of these quantities in diagnostic radiology, radiation therapy, radiation biology, nuclear medicine, radiation protection, and industrial and environmental activities; and (3) physical data needed in the application of these procedures, the use of which assures uniformity in reporting", www.icru.org/images/pdf/icru_poster.pdf.
72. In this context, reference also has to be made to the work of the International Organization for Standardization (ISO), see: www.iso.org, and of the International Electrotechnical Commission (IEC), see: www.iec.ch.
73. For the early development, see Jacchia, E. (1965), *Atom – Sicherheit und Rechtsordnung,* Eurobuch-Verlag August. Lutzeyer, Freudenstadt, pp. 119 et seq. The book is a translation and a revised version of the author's original 1963 publication *Ilrischio da radiazioninell' era nucleare*, Giuffrè, Milano. There is also a 1964 French translation of *Atome et sécurité. Le risque des radiations à l'âge nucléaire,* Dalloz, Paris. From a German perspective, see Bischof, W. (1975), "*Internationale Rechtsgrundlagen des Entwurfs der Strahlenschutzverordnung*", in *ViertesDeutschesAtomrechts-Symposium* in Göttingen 1975, Köln, etc. 1976, pp. 39–59.
74. Quoted according to the Preface of IAEA Safety Series No. 115 (1996).
75. IAEA (1960), "The Agency's Health and Safety Measures", IAEA Doc. INFCIRC/18, IAEA, Vienna, revised version: IAEA (1976), "The Agency's Safety Standards and Measures", IAEA Doc. INFCIRC/18/Rev, IAEA, Vienna.
76. IAEA (1962), Safety Series No. 9, IAEA, Vienna. Revisions were made in 1967, 1982, 1990, and 1996. The 1996 version is IAEA (1996), *International Basic Safety Standards against Ionizing Radiation and for the Safety of Radioactive Sources*, Safety Series No. 115, IAEA, Vienna, (jointly sponsored by FAO, IAEA, ILO, OECD/NEA, PAHO, and WHO).
77. See information at: www-ns.iaea.org/standards/review-of-the-bss.asp (accessed 9 July 2013). The 2011 version of the *Basic Safety Standards* has two additional potential sponsors: UNEP and the European Commission. The interim version of the *Basic Safety Standards* is available at: www-pub.iaea.org/books/IAEABooks/8736/BSS.
78. In the review procedure of the 2011 *Basic Safety Standards* more than 1500 comments were received from 41 IAEA member states, see: www-ns.iaea.org/standards/bss-timelines.asp?s=11&l=88.

Nonetheless, as was repeatedly pointed out, even such scientific meticulousness does not make the standards legally binding per se upon states. But, there were early efforts to establish a legally binding international radiation protection regime at both a global and a regional level.

3.2.2. Binding global instruments

The first global international instrument making the application of radiation protection norms obligatory was the International Labour Organization (ILO) Convention No. 115 "Convention concerning the Protection of Workers against Ionizing Radiation" which was adopted on 22 June 1960.[79] It was supplemented by Recommendation No. 114 "Radiation Protection Recommendation, 1960".[80] The Convention and the Recommendation apply to all activities where workers are exposed to ionising radiation. They established a fundamental framework for radiation protection. Article 1 of the Convention stipulates the main obligations of the contracting parties as follows:

> "Each Member of the International Labour Organization which ratifies this Convention undertakes to give effect thereto by means of laws or regulations, codes of practice or other appropriate means. In applying the provisions of the Convention the competent authority shall consult with representatives of employers and workers."

The radiation protection framework provided by the Convention is thus made binding upon its Parties.[81] The Convention has 49 contracting parties, including major nuclear States with the exception, however, of Canada, China, Iran, North Korea, Pakistan, South Africa, and the US.[82] The ILO exercises effective controls if and to the extent that the convention and the recommendation are implemented by the contracting parties.[83] But the low number of contracting parties, which roughly represents one quarter of the states of the world, decreases the practical relevance of the convention as a truly global regime to protect workers against occupational exposure to ionising radiation.

3.2.3. Binding regional instruments

At a regional level, even at an earlier stage, binding international radiation protection norms were issued by the Organisation for European Economic Co-operation (OEEC)[84] and by the European Atomic Energy Community (EURATOM).

On 12 June 1959, the OEEC Council issued a Decision on the Adoption of Radiation Protection Norms.[85] Pursuant to No. I (1) of the Decision, the member countries of the European Nuclear Energy Agency:

79. Text reproduced at: www.ilo.org/ilolex/cgi-lex/convde.pl?C115.
80. Text reproduced at: www.ilo.org/ilolex/cgi-lex/convde.pl?R114.
81. On this convention and on ILO's other activities in the field of radiation protection, see Niu, S. (n.d.), "The role and activities of the ILO concerning the radiation protection of workers (Ionising radiation)", www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_110517.pdf.
82. See www.ilo.org/dyn/normlex/en/f?p=1000:11300:0::NO:11300:P11300_INSTRUMENT_ID: 312260.
83. See International Labour Office Committee of Experts (2011), *Report of the Committee of Experts on the Application of the Conventions and Recommendations*, International Labour Conference, 100th Sess. 2011, ILC.100/III/1A, International Labour Office, Geneva, pp. 43-49, 672-730, in particular the country reports pp. 674, 691, 694, 695, 697, 701, 704, 707, available at: www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_151556.pdf.
84. The OEEC in 1961 was renamed the Organisation for Economic Co-operation and Development (OECD).

> "shall take the necessary measures to ensure that adequate protection against the hazards of ionising radiation is provided and maintained for persons occupationally exposed and for the population wherever radioactive materials are produced, processed, handled, used, possessed, stored, transported or disposed of, or wherever any other activity involving hazards of ionising radiations is carried out, or wherever machines capable of producing hazards of ionising radiations are used."

The Annex to the Decision contains comprehensive radiation protection norms which member countries had to implement. They covered both occupational exposure to radiation and exposure of the general public to radiation, und thus went beyond the scope of application of the ILO Convention. The norms were revised in 1963 and in 1968, but then this specific activity of the OECD (the successor agency to the OEEC) was abandoned.[86] The OECD no longer provides a binding general radiation protection regime.

Based on article 30 of the EURATOM Treaty,[87] the Community issued "Basic Safety Standards for the Protection of the Health of Workers and the General Public against the Dangers Arising from Ionizing Radiation" on 2 February 1959.[88] These basic norms were repeatedly revised at intervals dependent particularly upon new versions of the ICRP Recommendations and of the IAEA Basic Safety Standards. Currently, the 1996 edition of the EURATOM Basic Safety Standards applies but it is under revision.[89] The basic safety standards have the legal form of a "directive" which is defined as follows.[90]

> "A directive shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods."

Hence, the 27 member states of the European Union are obliged to implement the substantive requirements of the directive but they have national discretion in which way and form they meet this obligation. The requirements include establishing a system of reporting and of authorisation, and implementing the radiation protection principles of justification, optimisation, and of dose limitation, which corresponds to the ICRP's "as low as reasonably achievable" or "ALARA" principle.[91]

85. *Bundesgesetzblatt* (BGBl.) (German Official Gazette) 1961, part II, p. 807. The OEEC Council decision as reproduced in the BGBl. is available at: www.bgbl.de/Xaver/start.xav?startbk=Bundesanzeiger_BGBl#__Bundesanzeiger_BGBl__%2F%2F*%5B%40attr_id%3D'bgbl261s0806.pdf'%5D__1373467213335.
86. Lazo, E.N. (2007), "Radiological Protection at the NEA: 50 Years and Thriving", *NEA News*, Vol. 25, No. 2, pp. 22 - 25 at 23.
87. Treaty Establishing the European Atomic Energy Community of 25 March 1957 (consolidated version), OJ C 84, 30.03.2010, p. 1.
88. OJ P 11, 20.02.1959, p. 221.
89. Council Directive 96/29/EURATOM of 13 May 1996 laying down Basic Safety Standards for the Protection of the Health of Workers and the General Public against the Dangers Arising from Ionizing Radiation, OJ L 159, 29.6.1996, p. 1 (Corr. OJ L 314, 4.12.1996, p. 20). On the revision process see, *inter alia*, the "Proposal for a Council Directive Laying down Basic Safety Standards for Protection against the Dangers Arising from Exposure to Ionising Radiation", in: European Commission Doc. Brussels, 29.9.2011, COM(2011) 593 final. The document is reproduced with an explanatory memorandum at: www.ec.europa.eu/energy/nuclear/radiation_protection/doc/com_2011_0593.pdf.
90. EURATOM Treaty (fn. 87), Article 288.
91. Directive 96/29/EURATOM (fn. 89), Articles 3, 4-5, and 6 et seq. For a brief technical definition of the concept, see Sherbini, S. answer to question #435 submitted to 'Ask the Experts' Health Physics Society website at www.hps.org/publicinformation/ate/q435.html. For a legal

3.2.4. Intermediate summary

It is safe to assume that the majority of states base their national radiation protection law on the ICRP Recommendations and the IAEA Basic Safety Standards without any express legal obligation to do so. The scientific authority of the international standards apparently justifies this approach. Moreover, most states are member states of the IAEA, ILO, WHO[92] and of other competent organisations and are thus directly and indirectly involved in the standard-making of the organisations. This may be an additional incentive to apply the IAEA basic safety standards. Only a minority of states additionally have accepted explicit international obligations: 49 states subjected occupational exposure to ionising radiation to the ILO Convention. The EU Basic Safety Standards must be applied in 27 EU member states. Because the EU Basic Safety Standards Directive is applicable to occupational and to general radioactive exposure, there is, with regard to occupational radiation, a partial overlap with the ILO Convention for those 18 EU members that are also party to the ILO Convention.

In brief, states refer to international standards in their national radiation protection legislation irrespective of whether they are legally obliged to do so or not. The field of radiation protection law therefore may be deemed to be internationally harmonised in substance.[93]

3.3. Internationalising transport regulations

The international and comparative regime of safe transport of nuclear material and radioactive substances is a rather complex combination of technical regulations and of national and international law. Different provisions apply to each of the various means of transport which, however, *mutatis mutandis*, are based on identical technical standards. The regime cannot be described and assessed in greater detail in this article; it would need an article of its own. Some additional information is, however, provided in Sections 4.4.1 and 4.4.2 below. Reference has also to be made to the special transport literature which is of both a technical[94] and a legal nature.[95] The technical conditions of the safe transport of nuclear material are particularly

assessment of the Directive 96/29/EURATOM see Courades, J.M. (1996), "The New 96/29/EURATOM Directive on Basic Safety Standards for the Protection of Workers and the General Public against Ionising Radiation", *Nuclear Law Bulletin*, (1996/2), No. 58, OECD/NEA, Paris pp. 49 – 53; Pelzer, N. (2003), "*Das Umweltschutzrecht der EuropäischenAtomgemeinschaft*" in Rengeling, H.W (ed.) *Handbuchzumeuropäischen und deutschenUmweltrecht*, 2nd ed., vol. II, Köln etc, pp. 389 – 444 at 393 – 412.

92. As of February 2013 these organisations have the following number of member states: IAEA – 158 Member States, IAEA (2012), "The Members of the Agency", Doc. INFCIRC/2/Rev. 74, 16 November; ILO – 185 member states, www.ilo.org/public/english/standards/relm/country.htm; WHO – 194 member states, www.who.int/countries/en/.
93. On the main legal elements of radiation protection legislation, see Stoiber, C, et al. (fn. 62), pp. 45 – 53. For a more comprehensive recent overview of the international radiation protection system, see Lazo, E.N. (2007), "The International Systems of Radiological Protection: Key Structures and Current Challenges", *Nuclear Law Bulletin*, No. 80, (2007/2), OECD/NEA, Paris, pp. 49 – 63; Lazo, E.N. (2010), "International System of Radiological Protection", OECD/NEA (ed.), in *International Nuclear Law: History, Evolution and Outlook*, OECD/NEA, Paris, pp. 105-120.
94. See Bersani, C. et al. (eds.) (2008), *Advanced Technologies and Methodologies for Risk Management in the Global Transport of Dangerous Goods*, IOS Press, Amsterdam.
95. For a general overview of the early development see Phuong, H.V. (1979), "Legal Aspects of the International Transport of Radioactive Materials", *IAEA Bulletin*, Vol. 21, (1979/6), IAEA, Vienna, pp. 13-18; Ost, W. (1975), "*InternationaleBestimmungenüber die Beförderungradioaktiver Stoffe*", in *ViertesDeutsches Atomrechts-Symposium* (fn. 73) pp. 203-224. More recently,seeJankowitsch-Prevor, O. "International Law of Transport of Nuclear and Radioactive Material", in OECD/NEA (ed.), *International Nuclear Law* (fn. 93), pp. 187-218.

focused on packaging and labelling and thus in principle are similar irrespective of whether the carriage takes place by road, by rail, by sea/inland waterways or by air. Major differences related to the mode of transportation exist with regard to the legal problems involved, especially if transboundary transport takes place.[96]

An informative and reliable overview of the international safety regulations covering the transport of nuclear material and radioactive substances is published by the World Nuclear Transport Institute (WNTI): *Radioactive Materials Transport – The International Safety Regime*.[97]

The law of transport of radioactive material is part of the law of transport of dangerous goods which covers nine classes of dangerous goods including radioactive material.[98] But nuclear transport is also covered by the general nuclear law, especially with regard to the licensing procedure and to liability.[99] The technical requirements of the transport of dangerous goods are based on UN recommendations which, regarding radioactive substances, are complemented by IAEA recommendations.

In the early 1950s, the UN Economic and Social Council (ECOSOC) recognised the necessity to establish internationally harmonised rules for the transport of dangerous goods. A subcommittee, called UN Committee of Experts on the Transport of Dangerous Goods (CETDG), was later entrusted with developing respective recommendations. In 1956 the first edition of the "UN Recommendations on the Transport of Dangerous Goods" (the so-called "Orange Book") was published.[100] Currently, the 17th revised edition dated 2011 is applicable.[101]

At the invitation of the ECOSOC, the IAEA commenced developing safety standards for the transport of radioactive substances in 1959.[102] It published its first recommendations "Regulations for the Safe Transport of Radioactive Material" in

96. As an example among many other titles on the legal issues connected with nuclear transport see Van Dyke, J.M. (2002), "The Legal Regime Governing Sea Transport of Ultrahazardous Radioactive Materials", *Ocean Development & International Law*, Vol. 33, pp. 77-108.
97. WNTI (2006), "Radioactive Materials Transport – The International Safety Regime: An overview of Safety Regulations and the Organisations Responsible for their Development", WNTI Review Series No. 1 (Rev. July 2006), London, p. 112. The booklet is complemented by WNTI (2010), "Radiation Protection Programmes for Road Carriers, Sea Carriers and Port Handlers", WNTI Information Paper No. 2. Both publications are available at: www.wnti.co.uk/media/31649/IP7_EN_MAR13_V1.pdf and at www.wnti.co.uk/media/31681/GPG2_EN_MAR13_V1.pdf respectively.
See also IAEA (ed.) (2003), "International Conference on the Safety of Transport of Radioactive Material, Vienna, 7-11 July 2003, Contributed Papers", IAEA-CN-101 available at: www- ns.iaea.org/downloads/rw/radiation-safety/512seiten Text.pdf.
98. The classes comprise: explosives, gases, flammable liquids, flammable solids, oxidising substances, toxic substances, radioactive substances, corrosive substances, and miscellaneous dangerous substances.
99. In EU member states the respective legislation of the European Union has also to be complied with. See European Commission, "Transport of Radioactive Materials", at: http://ec.europa.eu/energy/nuclear/transport/transport_radioact_en.htm-(accessed 9 July 2013).
100. United Nations Committee of Experts on the Transport of Dangerous Goods (1956), Transport of dangerous goods: recommendations concerning the classification, listing and labelling of dangerous goods and shipping papers for such goods, United Nations Doc. ST/ECA/43-E/CN.2/170, United Nations, New York.
101. United Nations (2011), Recommendations on the Transport of Dangerous Goods – Model Regulations 17th rev., United Nations Doc. ST/SG/AC.10/1/Rev17, United Nations, New York and Geneva, available at: www.unece.org/trans/danger/publi/unrec/rev17/17files_e.html.
102. See WNTI Series No. 1 (fn. 97), p. 4.

1961,[103] which since then have been updated regularly and are available now in their 2009 edition.[104] The regulations are complemented by advisory material.[105] As of the 11th edition of the UN Recommendations, the IAEA Regulations are fully integrated into the UN Recommendations and form the requirements for the transport of radioactive substances as laid down in class 7 of the recommendations.[106]

The UN Recommendations as complemented by the IAEA Regulations still are not of a binding nature; nevertheless, they enjoy nearly worldwide acceptance. The international treaties on the carriage of dangerous goods incorporated the recommendations and thus made them binding upon their contracting parties. This applies, for example, to the following international agreements: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways of 26 May 2000 (ADN),[107] European Agreement concerning the International Carriage of Dangerous Goods by Road of 30 September 1957 as revised (ADR),[108] IMO International Maritime Dangerous Goods (IMDG) Code[109] in supplement to Chapter VII of the 1974 International Convention for the Safety of Life at Sea (SOLAS),[110] Annex 18 to the 1944 Convention on International Civil Aviation (Chicago Convention) as revised.[111] Irrespective of obligations under international treaty law, a number of states, including Canada and the US, "have applied most of the UN Recommendations for many years and now through the NAFTA agreements are discussing common rules with Mexico on the basis of the UN Recommendations."[112]

It appears to be safe to summarise that the transportation of dangerous goods including radioactive material is governed worldwide by legal regimes based on the UN recommendations as supplemented by the IAEA transport regulations. The law of transport of dangerous goods is a globally internationalised field of law without prejudice, however, to the form and way in which national law implements the international rules.[113]

3.4. Internationalising nuclear safety

Radiation protection law and transport law are legal areas which to a high extent are designed to transform technical rules into legally binding norms; they are pieces of law of a technical nature. Preventing radioactive hazards is mainly a task of scientists and engineers. The law only provides the tools for applying the technical measures necessary to protect people, property and the environment in a way which is socially acceptable and does not provide unjust treatment. The substance of such

103. IAEA (1961), Regulations for the Safe Transport of Radioactive Material, IAEA Safety Series No. 6, IAEA, Vienna.
104. IAEA (2009), Regulations for the safe transport of radioactive material: safety requirements, IAEA Safety Standards Series No. TS-R-1, IAEA, Vienna, available at: www-pub.iaea.org/MTCD/publications/PDF/Pub1384_web.pdf.
105. IAEA (2005), Advisory Material for the Regulations for the Safe Transport of Radioactive Material, IAEA Safety Standards Series No. TS-G-1.1 (Rev.1), IAEA, Vienna, available at: www-pub.iaea.org/mtcd/publications/pdf/pub1325_web.pdf.
106. WNTI Series No. 1 (fn. 97), p. 11; UN Recommendations vol. I (fn. 101), pp. 129 et seq.
107. 2497 UNTS 3, entry into force 29 February 2008.
108. UNECE Doc. ECE/TRANS/215 (vol. I and II); reproduced at: www.unece.org/trans/danger/publi/adr/adr2011/11contentse.html.
109. See www.imo.org/ourwork/safety/cargoes/pages/dangerousgoods.aspx.
110. 1184 UNTS 3, 437. See also Van Dyke (fn. 96).
111. Annex 18 is complemented by ICAO (2011), "Technical Instructions for the Safe Transport of Dangerous Goods by Air", 2011-2012 ed., available at: http://legacy.icao.int/anb/fls/dangerousgoods/TechnicalInstructions/TechnicalInstructions9284_2011_2012_add_01_en.pdf.
112. WNTI Series No. 1 (fn. 97), p. 10. See also reference fn. 68.
113. See also Stoiber, C. et al. (fn. 62), pp. 89-95.

pieces of technical law is not heavily burdened with national legal traditions and dogmatic restrictions. Major friction between traditional administrative structures and international harmonising approaches are not to be expected. Internationalisation is more easily achievable.[114]

Law on nuclear safety governs activities directly connected with nuclear fission, including the entire nuclear fuel cycle; such activities may involve the risk of criticality and of extremely high radioactivity. Reactors and other nuclear installations such as, for example, reprocessing facilities or storage facilities, are addressed. Obviously the starting point is the same as for radiation protection and transport: nuclear safety is a matter for scientists and engineers, and the law is only a tool to adequately implement nuclear safety requirements. However, additional elements come into play here.

Planning, siting, constructing, operating, decommissioning and dismantling nuclear installations, particularly nuclear power plants, are the key activities of civilian nuclear programmes. Nuclear power plants and related nuclear installations are not only part of the national energy supply which is of elementary importance for every state. But they are also a proof of the high technical capabilities of a state. Nuclear installations support national pride. International interference with such activities of eminent national significance is not always welcome.[115] This reluctance applies particularly if international influence approximates international control or international licensing of national nuclear activities. National sovereignty is well guarded in this field. Moreover, licensing and control of industrial and potentially hazardous activities mostly is a field of constitutional and administrative law subject to longstanding national traditions which do not easily invite international approaches. Last but not least, national nuclear safety regimes have to deal with various nuclear technologies and are often governed by diverging safety philosophies. There is a risk that states are ready to agree to international obligations based only upon the lowest common denominator of nuclear safety. This situation does not facilitate a unifying international approach with a view to enhancing nuclear safety worldwide.

Nevertheless, at an early stage, the IAEA began to draft and publish standards and guides on nuclear safety. As of 1974, the Nuclear Safety Standards (NUSS) Programme for land-based stationary plants with thermal neutron reactors designed for the production of power was developed.[116] It covered five codes: governmental organisation for the regulation of nuclear power plants; safety in nuclear power plant siting; design for safety of nuclear power plants; safety in nuclear power plant operation; quality assurance for safety in nuclear power plants.[117] As was pointed out in Section 2 of this article, numerous other recommendations on nuclear safety were published by the IAEA.[118] Yet, unlike in the field of radiation protection and nuclear transport, IAEA activities did not entail legal consequences for the states concerned. The IAEA safety regime consisted of recommendations which states were free to accept on a voluntary basis. Unlike in the case of transport, there were

114. See Pelzer, N. (1986), "On Harmonizing Nuclear Energy Law", in Pelzer, N. (ed.), *International Harmonization in the Field of Nuclear Energy Law*, Proceedings of the Nuclear Inter Jura '85, Baden-Baden, pp. 39-45.

115. In this context, see the reference to the Japanese "safety myth" (fn. 26).

116. IAEA Nuclear Safety Standards (NUSS) Programme. See the early overview by Iansiti, E. and L. Konstantinow (1978), "Nuclear Safety Standards (NUSS) Programme – Progress Report", *IAEA Bulletin*, Vol. 20, (1978/5), IAEA, Vienna, pp. 46 – 55; IAEA (1979), An Overview of the Nuclear Safety Standards (NUSS) Programme, *IAEA Bulletin*, Vol. 21, (1979-2/3), IAEA, Vienna, pp. 13 – 17.

117. IAEA Safety Series Nos. 50-C-G, 50-C-S, 50-C-D, 50-C-O, 50-C-QA.

118. See the reference to the latest status in fn. 38.

no existing international instruments to incorporate the IAEA codes on the safety of nuclear installations and to make them binding upon contracting parties. Nor did the mere existence of the codes trigger considerations on how to make them binding because states obviously did not acknowledge the necessity fora binding international regime to improve nuclear safety. The IAEA codes remained recommendations, the application of which was left to the sovereign voluntary discretion of the states. The majority of states apparently deemed domestic safety rules safe enough. That does not mean that there was no international co-operation in the field of nuclear safety at all[119] but there was a lack of international obligations on applying the international standards. The network of international treaties to ensure the safe use of nuclear energy and ionising radiation was limited to the field of radiation protection in a rather narrow sense, and to nuclear transport. With regard to the safety of nuclear installations, there was a gap in the international binding legal framework.

It was the 1986 Chernobyl nuclear accident that changed this situation. "[F]rom a legal perspective the accident underlined some significant deficiencies and gaps in the international and regulatory norms that had been established to govern the safe and peaceful uses of nuclear energy. At the same time, it stressed the 'need for a collective international focus on [nuclear] safety' and, in its wake, prompted a call for 'the creation of an international regime for the safe development of [nuclear energy]' under the auspices of the IAEA."[120] The accident was a "wake-up call for the international nuclear community and led to a new era in international nuclear cooperation".[121] States embarked on exercises to negotiate international instruments on nuclear safety and adopted new conventions. But internationalising nuclear safety still remained a most sensitive task.

4. International nuclear safety instruments

4.1. General

International efforts to cope with the legal consequences of the Chernobyl nuclear accident resulted in ten binding international treaties. These treaties established a new international nuclear safety regime[122] and enhanced the existing international nuclear liability regime.[123] The instruments establishing the international nuclear safety regime

119. Regarding safety co-operation within the EU member states see e.g. AEA Technology plc et al. (2001)"Report for the European Commission, Nuclear Safety and the Environment", *25 Years of Community Activities towards Harmonisation of Nuclear Safety Criteria and Requirements – Achievements and Prospects*, EUR 20055, AEAT/R/PSEG/0404 Issue 4, October; available at: www.ec.europa.eu/energy/nuclear/studies/doc/other/eur20055.pdf.
120. Rautenbach, J. et al. (2006), "An Overview of the International Legal Framework Governing the Safe and Peaceful Uses of Nuclear Energy – Some Practical Steps", in OECD/NEA-IAEA (eds.)*International Nuclear Law in the Post-Chernobyl Period*, OECD, Paris, pp. 7-36 at 7 (with reference to statements made by US President R. Reagan and General Secretary of the Central Committee of the Communist Party of the USSR M. S. Gorbachev).
121. Ibid.
122. Convention on Early Notification of a Nuclear Accident (1986), IAEA Doc. INFCIRC/335, 1439 UNTS 275; Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986), IAEA Doc. INFCIRC/336, 1457 UNTS 133; Convention on Nuclear Safety (1994), IAEA Doc. INFCIRC/449, 1963 UNTS 293; Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997), IAEA Doc. INFCIRC/546, 2153 UNTS 357; Amendment to the Convention on Physical Protection of Nuclear Material (2005), IAEA Doc. GOV/INF/2005/10-GC(49)/INF/6; Convention on the Physical Protection of Nuclear Material, (1980), IAEA Doc. INFCIRC/274 Rev. 1, 1456 UNTS 125.
123. Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (1988), IAEA Doc. INFCIRC/402, 1672 UNTS 293; Protocol to Amend the Vienna

broke new ground: nuclear safety was no longer an exclusively national domain but, to a limited extent, though, it was made subject to express obligations under international treaty law. While responsibility for nuclear safety continued to rest with the installation state and with the operator of the nuclear installation, certain nuclear safety requirements had to conform to the obligations of the new conventions.

The new international safety regime became known as the "Family of Nuclear Safety Conventions". It consists of the 1986 Convention on Early Notification of a Nuclear Accident and its twin, the 1986 Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, the 1994 Convention on Nuclear Safety (CNS), the 1997 Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (JC), the 1980 Convention on Physical Protection of Nuclear Material (1980 CPPNM)[124] and the 2005 Amendment to the Convention on Physical Protection of Nuclear Material (2005 CPPNM). The creation of this "family" marks an important step in the path toward internationalising nuclear safety requirements.[125]

At the regional level, the European Union (EU) in 2009 and 2011 issued directives to establish a Community framework for the safety of nuclear installations and the safety of the management of spent fuel and radioactive waste.[126]

4.2. Notification and assistance in case of a nuclear accident

In the immediate aftermath of the Chernobyl accident, shortcomings in the international nuclear safety regime became evident. Although the former Soviet Union did not inform neighbouring states about the accident in a timely manner, there were no solid legal grounds to claim that this may have constituted a breach of an obligation under public international law. In addition, there was no sound legal

Convention on Civil Liability for Nuclear Damage (1997), IAEA Doc. INFCIRC/566, 2241 UNTS 302; Convention on Supplementary Compensation for Nuclear Damage (1997), IAEA Doc. INFCIRC/567, 36 I.L.M. 1473; Protocol to Amend the [Paris] Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960 (2004), as amended, available at: www.oecd-nea.org/law/paris_convention.pdf; Protocol to Amend the [Brussels] Convention of 31 January 1963 Supplementary to the Paris Convention of 29 July 1960 on Third Party Liability in the Field of Nuclear Energy (2004), as amended, available at: www.oecd-nea.org/law/brussels_supplementary_convention.pdf.

124. Full titles and sources of the Conventions are in fn. 122. The subject of the Convention on Physical Protection of Nuclear Material (CPPNM) is nuclear security and not nuclear safety. But since there is an interface between security and safety because security, as a side effect, supports safety, the CPPNM is part of the family. In this article, that Convention shall not be dealt with in more detail. See, for example, Levanon, I. (2006), "Synergies between Safety and Security", IAEA (ed.), *Effective Nuclear Regulatory Systems: Facing Safety and Security Challenges, proceedings of a conference in Moscow 27 February – 3 March 2006,* Vienna, IAEA, pp. 157-167, available at: www-pub.iaea.org/MTCD/publications/PDF/Pub1272_web.pdf#page=35; Vasmant, A. (2009), "International Legal Instruments Promoting Synergies in Nuclear Safety, Security and Safeguards", *Nuclear Law Bulletin*, No. 84, (2009/2), OECD/NEA, Paris, pp. 81-102.
125. For a brief overview of the "family" see Flakus, F-N. and L.D. Johnson, (1998), "Binding Agreements for Nuclear Safety: The Global Legal Framework", *IAEA Bulletin*, Vol. 40, (1998/2), pp. 21 – 26. See also Tonhauser, W and A. Wetherall (2010), "The International Legal Framework on Nuclear Safety: Developments, Challenges and Opportunities", in OECD/NEA (ed.), *International Nuclear Law* (fn. 93), pp. 157-169. See also the comprehensive study by Findlay, T. (2010), *The Future of Nuclear Energy to 2030 and its Implications for Safety, Security and Nonproliferation, Part 2 – Nuclear Safety*, Centre for International Governance Innovation, Waterloo, Ontario, available at: www2.carleton.ca/cctc/ccms/wp-content/ccms-files/nef_part2.pdf.
126. See Section 4.5 infra.

basis for providing international assistance if requested.[127] Efforts, particularly undertaken by the IAEA, to establish agreements covering early notification and assistance in the event of a nuclear accident had seemed to be futile for a long time. In the wake of the Chernobyl accident, states embarked instantly on that exercise. Based on the preparatory work of the IAEA, states succeeded in drafting and adopting the 1986 Early Notification Convention and the 1986 Assistance Convention within roughly one month.[128]

These conventions provide a legal framework for the close co-operation of the contracting parties in case of a nuclear accident. They shall ensure joint actions of the states affected by a nuclear accident, and provide that accident response shall be internationalised. But does an international response necessarily entail better protection against the consequences of the accident? Does internationalisation contribute to mitigating the consequences? Will a higher degree of nuclear safety be achieved? In principle, the answer is yes. Solid legal grounds for international accident response increase the effectiveness of the joint response measures. But there is a need to look more closely at the content of the two conventions. Do they address, or provide solutions for, all issues involved in effective early notification and assistance?

Scholars began to criticise these conventions[129] even prior to their formal adoption.[130] It is true that from a strictly legal point of view, neither convention is perfect. Their legal substance is vague rather than precise. There is no need to go into detail about the criticism; it is sufficient to mention the main targets of the critical assessment:[131] the Notification Convention leaves it to the incident state to determine whether the incident "has resulted or may result in an international transboundary release that could be of a radiological safety significance for another State" (Article 1 of the convention), which means that it is up to the incident state to decide whether the incident caused transboundary damage and has to be notified or not.[132] The Assistance Convention stipulates in its Article 2 that contracting parties "may" request assistance and that the requested party shall promptly decide

127. See Rautenbach, J., et al. (fn. 120), pp. 9 – 13; Pelzer, N. (2006), "Learning the Hard Way: Did the Lessons Taught by the Chernobyl Nuclear Accident Contribute to Improving Nuclear Law?", in OECD/NEA and IAEA (eds.), *International Nuclear Law* (fn. 120), pp. 73-118 at 78-83.
128. On the history see Adede, A.O. (1987), *The IAEA Notification and Assistance Conventions in Case of Nuclear Accidents – A Landmark in the Multilateral Treaty Making Process*, Springer, London; Rautenbach, J., et al. (fn. 120), p. 9; Pelzer, N. (fn. 127), pp. 78-79, 81 (with further references). The notification and assistance conventions entered into force on 26 October 1986 and 16 February 1987 respectively, and they currently have 114 and 108 contracting parties respectively (IAEA Registration Nos. 1532, 1534).
129. On the two conventions, see Cameron, P. (1988), "Nuclear Safety After Chernobyl: The Role of International Law", *Leiden Journal of International Law*, No. 1, pp. 121-135; Cameron, P. (1988), "The Vienna Conventions on Early Notification and Assistance", in Cameron, P. et al. (eds.), *Nuclear Law after Chernobyl*, Graham & Trotman, London, pp. 19-32; Moser, B. (1989), "The IAEA Conventions on Early Notification of a Nuclear Accident and on Assistance in the Case of Nuclear Accident or Radiological Emergency", *Nuclear Law Bulletin*, No. 44, (1989/2), OECD/NEA, Paris, pp. 10-23; OECD/NEA and IAEA (eds.), *International Nuclear Law* (fn. 120), pp. 119-128. For a comprehensive collection of relevant texts see Sands, P. (ed.) (1988), *Chernobyl: Law and Communication*, Cambridge.
130. See Zehetner, F. (1986), "*GrenzüberschreitendeHilfebeiStörfällen und Unfällen*" in Pelzer, N. (ed.) (1987),*FriedlicheKernenergienutzung und Staatsgrenzen, Mitteleuropa, Tagungsbericht der AIDN/INLA Regionaltagung* in Regensburg, Baden-Baden, pp. 118-149 (with further references); Silagi, M. (1987), *VölkerrechtlicheVerpflichtungen des GenehmigungsstaatesbeiStör und Unfällen*, ibid. pp. 150-165.
131. For more details, see particularly Zehetner, F. (fn. 130).
132. Convention on Early Notification of a Nuclear Accident (1986), IAEA Doc. INFCIRC/335, 1439 UNTS 275, Article 2 in conjunction with Article 1, paragraph 1.

whether it will render assistance.[133] There is no legal obligation to request or to grant assistance, a result, one may argue, which also can be achieved without a convention.

The approach of the conventions has been explained by referring to it as a "'piecemeal approach' to legal regulation" as opposed to the "framework convention and protocol approach".[134] This is a correct appraisal. The conventions do not aim at providing a comprehensive regime covering both basics and implementing details. They only establish a binding basic legal framework for notification and assistance which does not any longer have to be based on international custom. Both conventions invite contracting parties to conclude bilateral or regional complementing agreements with a view to closing gaps in the regime.[135] Hence, the Notification and the Assistance Conventions do not offer "bold steps".[136] They use soft legal techniques. The piecemeal approach reflects the high degree of sensitivity states attribute to nuclear safety matters in general. These conventions demonstrate that the international community's steps towards binding international regulations with respect to nuclear matters are reluctant and cautious rather than bold. Contracting parties shall feel encouraged to achieve the objectives of the conventions through initiatives and activities developed and implemented by the parties jointly and individually. Such procedure may be identified as a first step towards the so-called "incentive approach"[137] which will be dealt with later in connection with the safety of nuclear installations.

Despite their legal weakness the two conventions are not only essential elements of the emerging international safety regime but it is probably exactly their legal weakness due to their piecemeal nature which supports their success as expressed in the surprisingly high number of parties.[138] They deem the conventions' tools in principle adequate to govern nuclear accident response.

The Fukushima nuclear accident was the first test case of the appropriateness and workability of the conventions. An IAEA Report of 3 June 2011describes in detail the response of the IAEA and the assistance offered by the IAEA.[139] The report stressed that both conventions "are the primary legal instruments that establish an international framework to facilitate the exchange of information and the prompt provision of assistance in the event of a nuclear or radiological emergency, with the aim of mitigating any consequences."[140] The IAEA pursued additional activities to supplement the conventions, which altogether form "the IAEA emergency preparedness and response framework for nuclear and radiological incidents and emergencies";[141] the international community was particularly involved through Ministerial Conferences on Nuclear Safety organised in June 2011 in Vienna and in

133. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986), IAEA Doc. INFCIRC/336, 1457 UNTS 133, Article 2, paragraphs 1 and 3.
134. Matz-Lück, N. (2009), "Framework Conventions as Regulatory Tools", *Goettingen Journal.of International. Law*, Vol. 1, No. 3, pp. 439-458, section C II, available at: http://gojil.eu/.
135. Convention on Early Notification of a Nuclear Accident (1986), Article 9; Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986), Article 1.
136. Palmer, G. (1992), "New Ways to Make International Environmental Law", *American Journal of International Law*, Vol. 86, pp. 259-283 at 259.
137. On this concept see Pelzer, N. (fn. 127), pp. 82-83.
138. See fn. 128.
139. See IAEA (2011), "IAEA Activities in Response to the Fukushima Accident. Report by the Director General", IAEA Doc. GOV/INF/2011/8, available at: www.iaea.org/Publications/Documents/Board/2011/govinf2011-8.pdf. See in particular paragraph 17 of the report.
140. Ibid. at paragraph 3.
141. Ibid.

December 2012 in Fukushima.[142] The IAEA organised and will continue to organise international experts' meetings.[143]

Japan provided information in accordance with Article 3 of the Notification Convention but it did not invoke the Assistance Convention.[144] Nevertheless, Japan accepted international assistance. While the IAEA assistance framework is implemented irrespective of whether the incident state invokes the convention,[145] this does not automatically apply to assistance rendered by other contracting parties to the convention. With regard to assistance granted by the United States, it is rumoured that Japan and the United States agreed not to refer to, and to build upon, the assistance convention albeit both states are party to that convention. It was said that the United States expressed concern that the liability clause in Article 10 paragraph 3 of the assistance convention could encourage and facilitate legal action for compensation before US courts, in particular against US suppliers. If this scenario turned out to be true, we would have to face one of the not even rare discrepancies between the objectives of an international treaty on the one hand, and the reality of international relations, on the other hand. This situation teaches an additional lesson: an effective internationalised nuclear safety regime needs integrated and complementary international efforts and instruments; in this special case, it needs an internationalised nuclear liability regime among the parties to do away with liability ambiguities and concerns.

At a meeting of the IAEA Board of Governors on 7 June 2011, the US Ambassador to the International Organisations in Vienna proposed to "review and evaluate" the Notification and the Assistance Conventions.[146] Quite obviously, the Fukushima lessons merit a reconsideration of all legal instruments dealing with accident prevention and response. Currently there are no indications that coping with the Fukushima accident revealed shortcomings in either of the two assistance and notification conventions. In particular, the "soft" legal techniques of the conventions apparently did not damage their effectiveness. It is especially to be cautioned against review and evaluation that would suggest a "more legal" approach with strict obligations. Within these limits Fukushima warrants a review and an evaluation of all of the safety conventions.[147]

142. See fn. 2 and fn. 7.
143. See fn. 8.
144. "IAEA Activities" (fn. 139), at fn. 2. The reference to Article 3 rather than to Article 1 of the Convention confirms that, according to the Japanese assessment, the international transboundary release could not be of radiological safety significance for another state. See also ibid. paragraph 17.
145. "IAEA Activities" (fn. 139), at fn.2.
146. Davies, G.T. (2011), "US Statement to the IAEA Board of Governors, Issues Related to the Fukushima Daiichi Accident", 7 June, available at: www.vienna.usmission.gov/110607fukushima.html.
147. See Pelzer, N. (2013), "International Conventions and their Application to Remediation and Decommissioning after a Nuclear Accident – Is the Current System Adequate?", Paper presented at the IAEA International Experts' Meeting on Decommissioning and Remediation after a Nuclear Accident, Vienna, 28 January – 1 February; Pelzer, N. (2013), Opening Statement at a Panel during the same conference on "Fostering Greater International Cooperation in Preparing for and Responding to Large Accidents Including Sharing of Technical Resources (Knowledge and People), Need for an International Advisory Panel", available at: www-pub.iaea.org/iaeameetings/IEM4.aspx.

4.3. Safety of nuclear power plants

With the adoption of the Convention on Nuclear Safety (CNS) by a diplomatic conference on 17 June 1994 and its opening for signature on 20 September 1994,[148] for the first time a global international instrument was made available which was designed to subject the very core of national nuclear power programmes to express international requirements.[149] The author of this article, in a publication written during the year of the adoption of the convention, considered it a "milestone in the development of international nuclear energy law".[150] The convention entered into force on 24 October 1996 and currently has 75 contracting parties including all major nuclear states, such as Canada, China, France, India, Japan, the Russian Federation, the UK and the US[151] Pursuant to its Article 3, the convention applies to "nuclear installations" which are defined as "land-based civil nuclear power plants" under the jurisdiction of a contracting party and include certain directly related other installations on the same site (Article 2(i)).

Article 1 determines the objectives of the convention; its text is reproduced above in Section 2.2. Paragraph i thereof defines the general safety objective and provides the means to achieve it. In the context of the subject of this contribution, this paragraph deserves special attention: the convention aims at achieving and maintaining "a high level of nuclear safety worldwide". It is not national safety which the convention looks at first but it is worldwide nuclear safety of which national nuclear safety is only a substantive part; national safety is a summand of worldwide nuclear safety.[152] That means nuclear safety is understood as a global prerequisite for using civil nuclear power. Safety is basically made an internationalised objective of the convention which shall be achieved through both enhancing national measures and international co-operation. Thus nuclear safety is becoming a "collective responsibility".[153] The internationalisation of nuclear safety is underlined and supported by the preamble of the convention, especially by its

148. IAEA Doc. INFCIRC/449, 1963 UNTS 293, 33 ILM 1514. See also IAEA Doc. INFCIRC/449 Add. 1 (Final Act of the Diplomatic Conference and Annex to the Final Act).
149. For introductions to the Convention on Nuclear Safety, including its history, see Jankowitsch-Prevor, O. (1994), "The Convention on Nuclear Safety", *Nuclear Law Bulletin,* No. 54, (1994/2), OECD/NEA, Paris, pp. 9-22 and OECD/NEA-IAEA *International Nuclear Law* (fn. 120), pp. 155-168; Kamminga, M.T. (1995), "The IAEA Convention on Nuclear Safety", International & Comparative Law Quarterly, Vol. 44, Issue 4, Cambridge University Press, pp. 872-882; Jankowitsch-Prevor, O. and W. Tonhauser (1997), "The Convention on Nuclear Safety", Austrian Review of International and European Law, Vol. 2, Brill/MartinusNijhoff, pp. 319-240; Stoiber, C. (1995), "The Convention on Nuclear Safety: An Introduction", *Nuclear Inter Jura '95, The Biennial Congress of the International Nuclear Law Association AIDN/INLA, Helsinki 1995, Proceedings*, Helsinki 1996, pp. 655-669; Pinel, C. (1995), "*La Convention sur la sûreté nucléaire adoptée le 17 juin 1994: Amélioration ou deterioration de la règle de droit? La confiance en question*", Nuclear Inter Jura' 95 op. cit, pp. 671-677; Handl, G. (2004) "The IAEA Nuclear Safety Conventions: An Example of Successful 'Treaty Management'?", *Nuclear Law Bulletin*, No. 72, (2004/1), OECD/NEA, Paris, pp. 7-27. See also Shull, A. (2008), "The Global Nuclear Safety and Security Regime", *Nuclear Energy Futures Papers*, No. 2, particularly pp. 4-5, available at: www.carleton.ca/cctc/ccms/wp-content/ccms-files/Nuclear-Safety-and-Security.pdf. For additional literature see Handl, G. op. cit. (fns. 6-15); Pelzer, N. (fn. 127), p. 88, fn. 77.
150. Pelzer, N. et al. (1994), "The Year in Review, Energy", *Yearbook of International Environmental Law*, Vol. 5, Issue 1, Oxford University Press, pp. 195-200 at 197.
151. IAEA Registration No. 1676.
152. See also preamble paragraph ii: "Reaffirming the necessity of continuing to promote a high level of nuclear safety worldwide" in French: "*…un haut niveau de sûreté dans le monde entier*".
153. Barkenbus, J.N and C. Forsberg (1995), "Internationalizing Nuclear Safety: The Pursuit of Collective Responsibility", *Annual Review of Energy and the Environment,* Vol. 20, Annual Reviews, Palo Alto, pp. 179-212.

paragraphs ii, vii und viii.[154] The goal of assuring a high level of nuclear safety worldwide requires international efforts, and the convention provides the legal framework for those efforts. The drafting of paragraph i at the same time informs how the convention will achieve its objectives. It leaves "national measures" basically untouched and builds in a supplement on international co-operation to enhance national safety if necessary. Rather than establishing intrusive restrictions through international control systems over national measures, states are requested to provide national input combined with international input. A soft approach to achieving worldwide nuclear safety shall be applied. This is confirmed and achieved by the legal techniques provided by the operative part of the convention.

Chapter 2 of the Convention on Nuclear Safety establishes binding obligations of the contracting parties. The obligations are of different types.[155] There are general obligations which cover the requirement to provide the necessary legislative, regulatory and administrative framework to properly implement the obligations at national level.[156] Then, there are obligations concerning the responsibility and conduct of the operators and their personnel, the human and financial resources, and the human factors.[157] They are followed by provisions of a more technical nature: quality assurance, safety assessment, radiation protection, emergency preparedness, siting, design and construction, and operation.[158] This part of the convention's obligations, in particular its provisions on design, construction and operation, reflects the IAEA "Safety Fundamentals"[159] and thus is based on safety standards of an international nature.

The obligations under chapter 2 of the convention may be qualified as "classical" or "conventional" international treaty obligations. This does not apply to the obligations under chapter 3. They break new ground and implement the soft approach described above. They provide the instruments to implement the preambular paragraph vii:

> "(vii) Affirming the importance of international cooperation for the enhancement of nuclear safety through existing bilateral and multilateral mechanisms and the establishment of this incentive Convention".

The drafters aimed at establishing an "incentive convention". This is a new concept in international nuclear law. It tries "to find a mechanism which could verify the compliance with obligations [under the Convention] without infringing the international consensus that 'responsibility for nuclear safety rests with the State having jurisdiction over a nuclear installation'".[160] This sentence exactly describes the conflict which is addressed in the title of this article: international involvement versus national sovereignty.

The conflict has various facets. There is general agreement that nuclear safety is a matter of international concern. As a consequence, the international community

154. On the relevance of the Preamble see Jankowitsch-Prevor, O. (fn. 149), p. 14, p. 161.
155. See Jankowitsch-Prevor, O. (fn. 149), pp. 15-16, pp. 162-164.
156. Convention on Nuclear Safety (1994), Articles 7, 8.
157. Convention on Nuclear Safety (1994), Articles 9-12. Article 10 "Priority to Safety" implements the safety culture principle, see Section 2.3 above. Safety culture is referred to in paragraph iv of the preamble and thus is an overarching basic principle for the interpretation of the convention.
158. Convention on Nuclear Safety (1994), Articles 13-19.
159. "The Safety of Nuclear Installations" (fn. 42), pp. 4-16, see Jankowitsch-Prevor, O. (fn. 149), pp. 12 et seq. and pp. 159 et seq.
160. De Wright, T. (2007), "The 'Incentive' Concept as Developed in the Nuclear Safety Conventions and its Possible Extension to Other Sectors", *Nuclear Law Bulletin*, No. 80 (2007/2), OECD/NEA, Paris, pp. 29-47, at 33 with reference to paragraph iii of the Preamble to the Convention on Nuclear Safety.

actively contributes to developing a nuclear safety framework. The great number of international safety standards and other forms of safety collaboration provide evidence that there seems to have emerged what has been called a sense of "collective responsibility".[161] Such international collective responsibility could interfere with national sovereignty because internationalising nuclear safety necessarily would entail certain restrictions of national sovereign powers. This consequence is not a welcome development to states and would most probably meet with national objections or even repudiation. For the international community as well, it is probably not desirable to interfere too strongly with national safety regimes. "Collective responsibility" should by no means shift the basic and main responsibility for nuclear safety from the installation state to the international community.

Obviously, finding a compromise solution for this sensitive situation was a crucial issue for a successful outcome of the negotiations on the Convention on Nuclear Safety. However, the starting point for finding a compromise solution was favourable: on the one hand, individual states were aware that they could not completely evade international influence on national safety regimes. In light of the Chernobyl nuclear accident and the resulting growing concern about the safety of nuclear energy, the general public would not have accepted a refusal of international efforts to enhance safety. On the other hand, the international community recognised that a strict external international licensing and control regime to govern national nuclear activities was not achievable if it was desirable at all. States needed to be approached in a softer way with a view to making them partner in enhancing nuclear safety. National co-operation was a necessary requirement for implementing international safety measures. It was certainly a correct assessment when Odette Jankowitsch stated[162] that the problem "was resolved with the help of the convincing argument that enlightened self-interest of states in matters of nuclear safety would be stronger than any form of outside control devised under international law."

The drafters of the Convention on Nuclear Safety made a prudent or even a wise decision regarding the way of implementing this philosophy. They refrained from inserting into the convention any obligatory dispute settlement provisions.[163] In order to "enforce" compliance with the obligations under the convention, "peer review" is exclusively relied on, to be exercised by the contracting parties at "Review Meetings" which the parties shall hold at intervals of not more than three years. Prior to the review meetings, reports on the measures the parties have taken to implement each of the obligations of the convention shall be submitted and will be reviewed at the meeting by the contracting parties. The convention establishes an obligation to attend the meetings. There is also an obligation to adopt and, by consensus, make available summary reports to the public which address the issues discussed and the conclusions reached during the meetings.[164] The report involves the general public in an "extended peer review".

161. See Barkenbus, J.N and C. Forsberg (fn. 153).
162. Jankowitsch-Prevor, O. (fn. 149), p. 13 and p. 160.
163. There is only an obligation to "consult" in case of a "disagreement" between Parties; the consultation shall take place within the framework of a meeting of the Parties, Convention on Nuclear Safety (1994), Article 29.
164. Convention on Nuclear Safety (1994), Articles 5, 20-28. In general on the concept of the review meetings see Stoiber, C. (2009), "The Review Conference Mechanism in Nuclear Law: Issues and Opportunities", *Nuclear Law Bulletin*, No. 83, (2009/1), OECD/NEA, Paris, pp. 5-27. On the peer review process under the Nuclear Safety Convention see De Wright (fn. 160), pp. 31-36, 40-41. Findlay, T. (fn. 125), p. 22, calls the peer review "at the time a significant innovation".

Peer review may only verify compliance or non-compliance with treaty obligations. As a result of the peer review process, parties are not forced to comply immediately but they get the chance to learn best practices and, through a step-by-step review process, may achieve a higher level of nuclear safety. This approach encourages states to adhere to the Convention on Nuclear Safety even if they are not yet in a position to comply fully with all of the agreement's obligations. The minimally intrusive approach of the convention means that no state will lose face. Of course, this approach is available only to the willing. But those states that are not willing cannot be forced by the legal means an international treaty may provide.

It is not surprising that the concept of an "incentive convention" triggered criticism. A more binding nuclear safety instrument was requested. A scholar in 1998 wrote a highly critical article entitled "The Development of Nuclear Law Making or the Art of Legal 'Evasion'".[165] She claims that the Convention on Nuclear Safety has caught nuclear safety in the "trap of 'soft law' and 'nebulous law'".[166] In a thorough treatise, she elaborates on her subject. It can be left open whether her legal argumentation is disputable or not.[167] But her criticism of the incentive approach as too soft and as evasive is not acceptable. It neglects the reality of international life. There is a difference between drafting a national civil code and negotiating an international multilateral treaty on a most sensitive matter which is aimed at attracting as many states as possible.[168] The Nuclear Safety Convention is the best compromise solution which could have been achieved at the time of the negotiations and it is not an instrument of legal evasion.

Günther Handl, in his thoughtful analysis of the concept of the convention, concludes that it is "*prima facie* weak" but it brings "national nuclear power activities within the ambit of international legal safety norms".[169] He also states that neither compliance nor legitimacy, which the peer review process verifies, is "the same as effectiveness". He continues by saying that the convention is caught in the "tension between innovation and tradition." It is "innovative in radically embracing the idea of law as a process of iterative discourse". It is "traditional in the sense of clinging to the ideal of an exclusively state-centred, consent-based model of international law", and it bears "the characteristics of a political compromise, perhaps a necessary one, but one that affects also effectiveness."[170] From the angle of a theoretical lawyer, nothing can be added to this conclusion. However, since the entry into force of the convention in 1996, five review meetings and two extraordinary meetings have taken place. The Fifth Regular Review Meeting was held from 4 to 14 April 2011, and the sixth one is scheduled for 24 March to 3 April 2014. The contracting parties held

165. Boustany, K. (1998), "The Development of Nuclear Law Making or the Art of Legal 'Evasion'", *Nuclear Law Bulletin*, No. 61, (1998/1), OECD/NEA, Paris, pp. 39-53.
166. Boustany, K. (fn. 165), p. 40.
167. It appears to be somewhat bold when she says, "It could therefore be concluded that a general practice has been established which, combined with an *opinion juris*, would have formed a custom specific to the nuclear field or, if such practice is not considered to meet the 'generality' requirement, it could justifiably be thought at least to corroborate an *opinion juris* already expressed in the Safety Code and representing general nuclear law principles with binding force." Boustany, K. (fn. 165), p. 42. On the other hand, it is certainly correct that there is an interface between nuclear safety and nuclear liability, ibid. pp. 47-52, but it is surprising that the international efforts to enhance the international nuclear liability regime in the aftermath of the Chernobyl accident are not mentioned at all. On the relations between nuclear safety and nuclear liability see Pelzer, N. (2002), "*Internationales Haftungsrecht als Element der nuklearen Sicherheit*", *47 atw – Internationale Zeitschrift für Kernenergie*, pp. 536-543.
168. Eighty-three states participated in the Diplomatic Conference to adopt the Convention, Final Act (fn. 148).
169. Handl, G. (fn. 149), p. 26.
170. Handl, G. (fn. 149), p. 27.

an extraordinary meeting in August 2012 to review initial lessons and national actions in response to the Fukushima Daiichi accident.[171] The outcome of the meetings and the national reports reviewed at the meetings provide ample material to assess if and to which extent the Convention on Nuclear Safety is "effective" and contributes to enhancing nuclear safety worldwide. It is worth embarking on the exercise of doing such an assessment in a thorough state-by-state analysis and without diplomatic or political reservations.

4.4. Safety of nuclear activities other than nuclear power plants

4.4.1. Joint Convention

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention) of 5 September 1997[172] aims at achieving and maintaining "a high level of safety worldwide in spent fuel and radioactive waste management, through the enhancement of national measures and international co-operation, including, where appropriate, safety-related technical co-operation; …"[173] This is familiar language from the Convention on Nuclear Safety which also builds on combining national measures and international co-operation to achieve a high level of safety worldwide. The preamble especially emphasises internationalisation as core elements of enhancing safety: "Desiring to promote an effective nuclear safety culture worldwide";[174] "Affirming the importance of international co-operation in enhancing the safety of spent fuel and radioactive waste management through bilateral and multilateral mechanisms, and through this incentive Convention."[175] Paragraph xiv of the preamble, moreover, refers to, and thus bases the Joint Convention on, international standards, namely on the 1996 BSS[176] and on the IAEA Safety Fundamentals entitled "The Principles of Radioactive Waste Management (1995)."[177] Additional international documents are referred to in other preambular paragraphs.[178] The IAEA "Code of Practice on the International Transboundary Movement of Radioactive Waste" of 1990[179] forms the basis of Article 27 of the Joint Convention which regulates the transboundary movement of spent fuel and radioactive waste.

171. Information on the review meetings is provided at the website of the IAEA including links to the national reports, see www-ns.iaea.org/conventions/nuclear-safety.asp. On the Second Extraordinary Meeting of the Contracting Parties from 27-31 August 2012 in Vienna see "Final Summary Report", IAEA Doc. CNS/ExM/2012/04/Rev.2, available at: www.iaea.org/ Publications/Documents/Conventions/cns-summaryreport310812.pdf.
172. IAEA Doc. INFCIRC/546, 2153 UNTS 357, 36 ILM 1436.The Joint Convention currently has 64 contracting parties (IAEA Registration No. 1729). The negotiation history of the convention is fully documented in IAEA (ed.) (2006), *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*, IAEA International Law Series, No. 1, IAEA, Vienna.
173. Joint Convention (1997), Article 1 (i).
174. Preamble paragraph (v).
175. Preamble paragraph (ix).
176. See fn. 76.
177. IAEA (1995), *The Principles of Radioactive Waste Management*, IAEA Safety Series No. 111-F, IAEA, Vienna, available at: www pub.iaea.org/MTCD/publications/PubDetails.asp?pubId=5192.
178. Paragraphs xiii (family of nuclear safety conventions, fns. 122, 124, 125), xv (Chapter 22 of Agenda 21 by the 1992 United Nations Conference on Environment and Development in Rio de Janeiro), xvi (1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal).
179. IAEA Doc. INFCIRC/386.

Obviously, the Convention on Nuclear Safety served as a model for the Joint Convention.[180] While, of course, the Joint Convention's substantive operative parts deal with the specific safety requirements relating to spent fuel and radioactive waste,[181] its general concept and its legal structure are identical to, or at least most similar to, those of the Nuclear Safety Convention.[182] The Joint Convention also uses a "soft law approach" and makes the implementation of its obligations subject to peer review to be exercised at meetings of the contracting parties.[183] The pros and cons of this approach are the same as discussed in connection with the Nuclear Safety Convention. The author of this article deems the peer review concept prudent and most appropriate also with regard to achieving nuclear safety in the field of the management of spent fuel and radioactive waste.

The effectiveness of the Joint Convention was assessed at four Review Meetings in 2003, 2006, 2009 and 2012.[184] In the Summary Report of the 3rd Review Meeting held in Vienna from 11 to 20 May 2009, modest but increasing progress in achieving a high level of safety worldwide was recognised, and it was concluded:

> "35. The review process is maturing well and constructive exchanges and knowledge sharing took place in an open and frank manner.
>
> "36. The Third Review Meeting showed that many contracting parties had initiated new actions or were enhancing existing actions to improve the safe management of spent fuel and radioactive waste. However, each Contracting Party has challenges requiring further action or continuing implementation of recently initiated activities."[185]

In the Summary Report of the 4th Review Meeting, which took place from 14 to 23 May 2012 in Vienna, it was, *inter alia*, concluded:

> "57. Constructive exchanges and sharing of knowledge took place in an open and candid manner. However the Contracting Parties recognize the importance of continuous improvement and the need for the invigoration of the peer review process including an increase in the preparation and willingness of Contracting Parties to challenge and comment on the presentation of other Contracting Parties. The Contracting Parties also noted that a robust peer review process requires full and active engagement by Contracting Parties and Officers. Proper involvement and support by the Secretariat is also very important for ensuring efficient and productive Review Meetings, ensuring continuity between Review Meetings, and facilitating coherence between the review processes of the Joint Convention and the Convention on Nuclear Safety.

180. The Convention on Nuclear Safety (1994) in its preambular paragraph ix, expressly affirms "the need to begin promptly the development of an international convention on the safety of radioactive waste management".
181. Spent fuel and waste are covered by two distinct chapters, albeit the safety requirements are the same. On the reasons for this structure see Pelzer, N. (fn. 127), p. 91.
182. For a brief general overview and particularly for the negotiating history of the Joint Convention see: Tonhauser, W and O. Jankowitsch-Prevor (1997), "The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management", *Nuclear Law Bulletin*, No. 60, (1997/2), OECD/NEA, Paris, pp. 9-22; OECD/NEA and IAEA (eds.), *International Nuclear Law*, (fn. 120), pp. 201-214. For additional literature on the Joint Convention see Pelzer, N. (fn. 127), p. 88, (fn. 78).
183. Chapter 6, Articles 29-37 Joint Convention.
184. On the results of the review meetings see the website of the IAEA at: www-ns.iaea.org/conventions/results-meetings.asp?s=6&l=40.
185. Third Review Meeting of the Contracting Parties, 11 to 20 May 2009, Vienna, Austria, Summary Report, JC/RM3/02/Rev.2, available at: www-ns.iaea.org/downloads/rw/conventions/ third-review-meeting/final-report-english.pdf.

> "58. International peer review missions and the implementation of their recommendations were regarded as an effective process to strengthen the regulatory infrastructure and safety."[186]

This conclusion quite clearly stresses that the peer review process is a decisive element of internationalisation of nuclear safety. It proves at the same time that peer review processes need to be learnt.

4.4.2. Codes of conduct

The scope of application of the Nuclear Safety Convention and of the Joint Convention is limited to land-based nuclear power plants and to the management of spent fuel and radioactive waste respectively. There are no binding international instruments that govern the safety of other activities related or not related to the nuclear fuel cycle. Nevertheless, there is an obvious need to ensure a high level of safety worldwide in branches where the use of nuclear energy is not covered by the two safety conventions. Since states apparently are not yet ready to accept binding international obligations, even of an incentive nature, other instruments have to be considered. A clear alternative would be a recommendation. As has been explained above, a comprehensive set of IAEA recommendations on nuclear safety is already available. But that alternative is too weak, particularly to meet the safety concern of the international general public. Neither do recommendations satisfy the needs of the stakeholders. An instrument is required which, albeit being a recommendation not binding in principle, nevertheless implies elements which make non-compliance at least politically difficult to justify. This brings the option of a "code of conduct" into play.

A code of conduct is not a binding instrument *per se*. It is defined as "a written set of rules governing the behavior of specified groups".[187] In legal literature a "code" is described as follows:[188]

> "Current usage appears to define a code of conduct as a legal instrument embodying a set of principles and rules (norms) adopted by states that establish standards and limits for the behaviour of international actors. These norms may be adopted in the strict legal form of international treaties. More often – indeed, typically – codes are adopted as formal statements, declarations or resolutions that are not legally binding. Even nonbinding codes, however, usually possess some indirect legal significance."

It follows from this description that there are two options for national implementation of codes of conduct: they may either be made legally binding by incorporating them into national legislation or be adopted as self-executing without any implementing legislation.[189] The first option does not pose any particular legal problems. The national legislator decides to which extent a code shall be binding. However, in the context of nuclear safety this option is probably not realistic. If states prefer a legally binding instrument, it is more appropriate to conclude a treaty to ensure that other states comply with the provisions to the same extent. The attraction of the code approach is its "free-standing" and thus more flexible nature, which even implies "indirect legal significance".

186. Fourth Review Meeting of the Contracting Parties, 14-23 May 2012, Vienna Austria, Final Summary Report, JC/RM4/04/Rev. 2, available at: www-ns.iaea.org/downloads/rw/conventions/fourth-review-meeting/summary-report-english.pdf.

187. *Black's Law Dictionary* (fn. 20), p. 293.

188. Fatouros, A.A. (1981), "On the Implementation of International Codes of Conduct: An Analysis of Future Experience", *American University Law Review*, Vol. 30, pp. 941-972 at 943.

189. Wetherall, A. (2005) "Normative Rule making at the IAEA: Codes of Conduct", *Nuclear Law Bulletin*, No. 75, (2005/1), OECD/NEA, Paris, pp. 71-93 at 88-89.

It is exactly that qualification which is needed in our case. Compliance with the legally non-binding code of conduct[190] requires the co-operation of its addressee. Thus a code may only become effective if the respective addressee agrees to it. However, the discretion of the addressee as to whether to comply or not is, as a matter of fact, limited. The individual addressee is part of the "specified group" whose behaviour shall be governed by the code. Among the group, tacit or even explicit peer pressure will be applied which individual members cannot easily evade. So, the indirect legal significance changes to a "quasi-binding norm". It is not of major relevance whether such quasi-obligation is of a political or a legal nature. Political obligations may sometimes be even more effective.

Quite clearly, at this point the incentive convention approach of the Nuclear Safety Convention and of the Joint Convention, on the one hand, and the approach of a code of conduct, on the other hand, approximate to each other. An overlapping area of soft law or, to use the famous term of Prosper Weil, of "relative normativity"[191] can be identified. Although – as the discussion triggered by Weil shows – the area of relative normativity is perhaps not the ideal or most undisputed ground to reliably base the international nuclear safety regime on, it is yet the best option currently achievable. Nuclear safety worldwide will not be enhanced if one insists on establishing classical and legally binding international instruments because states do not accept them. As has been pointed out above, soft law solutions have their merits in the sensitive field of nuclear safety.[192]

Hence, if concluding an international treaty is not a realistic goal, those nuclear activities not covered by the conventions should be regulated by codes of conduct. The IAEA developed and issued three codes of that type:[193]

- Code of Practice on the International Transboundary Movement of Radioactive Waste;[194]
- Code of Conduct on the Safety and Security of Radioactive Sources;[195]
- Code of Conduct on the Safety of Research Reactors.[196]

190. Codes of Conduct are sometimes also referred to as Codes of Practice.
191. Weil, P. (1983), "Towards relative normativity in international law", *American Journal of International Law*, Vol. 77, pp. 413-442. See also Fastenrath, U. (1993), "Relative Normativity in International Law", *European Journal of International Law*, Vol. 4, pp. 305-340; Tasioulas, J. (1996), "In Defence of Relative Normativity: Communitarian Values and the Nicaragua Case", *Oxford Journal of International Legal Studies*, Vol. 16, pp. 85-128; Beckett, J.A. (2001), "Behind Relative Normativity: Rules and Process as Prerequisites of Law", *European Journal of International Law*, Vol. 12, pp. 627-650.
192. Wetherall, A. (fn. 189), pp. 74-79: "Why non-binding norms?"
193. On the Codes see Wetherall, A. op. cit. (fn. 189); Reyners, P. "Three International Atomic Energy Agency Codes", in OECD/NEA (ed.), *International Nuclear Law* (fn. 93), pp. 171-185.
194. IAEA Doc. INFCIRC/386.
195. IAEA (2004), Code of Conduct on the Safety and Security of Radioactive Sources, IAEA Doc. INFCIRC/663, GOV/2004/62-GC(48)/13, IAEA, Vienna, available at: www-pub.iaea.org/MTCD/publications/PDF/Code-2004_web.pdf. See also the information provided at: www-ns.iaea.org/tech-areas/radiation-safety/code-of-conduct.asp.
196. IAEA (2004), "Measures to Strengthen International Cooperation in Nuclear, Radiation and Transport Safety and Waste Management, Code of Conduct on the Safety of Research Reactors", IAEA Docs. GC(48)/7, 19 July 2004; IAEA (2004), "Measures to Strengthen International Cooperation in Nuclear, Radiation and Transport Safety and Waste Management Resolution adopted on 24 September 2004 during the ninth & tenth plenary meetings", IAEA Doc. GC(48)/RES/10, September 2004; IAEA (2006), "Code of Conduct on the Safety of Research Reactors", IAEA, Vienna (in all official UN languages), available at: www-pub.iaea.org/MTCD/Publications/PDF/CODEOC-RR_web.pdf.

The Code of Practice on Transboundary Movement meanwhile has been more or less superseded by Article 27 of the Joint Convention[197] and is, as a quasi-legal source of its own, of less importance. It shall not be dealt with any further here.[198] Of outstanding practical concern, however, is the safety of research reactors.

More than 670 research and test reactors have been built worldwide. Currently 247 research reactors are in operation.[199] Their potential risk is not insignificant: 70% of them have been in operation for more than 30 years, and they face ageing problems.[200] They are often used to store large stocks of spent fuel consisting of high-enriched uranium (HEU). They are often located in densely populated areas. Moreover, with respect to such research reactors, an appropriate legal and regulatory framework is not always in place.[201] During the negotiations of the Convention on Nuclear Safety, it was discussed whether research reactors should be covered. Consensus on this issue could not be reached for various reasons. INSAG repeatedly expressed concern about the situation, which finally triggered a resolution of the IAEA General Conference on the safety of nuclear research reactors.[202] A working group was convened, and it recommended an action plan for research reactors including preparatory work for drafting a respective code of conduct. A Draft "Code of Conduct on the Safety of Research Reactors" was produced which was approved by the IAEA Board of Governors on 8 March 2004 and endorsed by the General Conference on 22 September 2004.[203]

For the purposes of the Code of Conduct on the Safety of Research Reactors, a research reactor is defined as follows:[204]

> "'research reactor' means a nuclear reactor used mainly for the generation and utilization of neutron flux and ionizing radiation for research and other purposes, including experimental facilities associated with the reactor and storage, handling and treatment facilities for radioactive materials on the same

197. See supra Section 4.4.1.
198. For the EU member states see also Council Directive 92/3/EURATOM of 3 February 1992 on the supervision and control of shipments of radioactive waste between member states and into and out of the Community, OJ L 35, 12.2.1992, p. 24, which was repealed by: Council Directive 2006/117/EURATOM of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel, OJ L 337, 5.12.2006, p. 21. On the international shipment of radioactive waste, see generally Strack, L. (2004), "The Safety Regime Concerning Transboundary Movement of Radioactive Waste and its Compatibility with the Trade Regime of the WTO", *Nuclear Law Bulletin*, No. 73, OECD/NEA, Paris, pp. 25-49.
199. See IAEA Research Reactor Database at: www.nucleus.iaea.org/RRDB/RR/ReactorSearch.aspx:?rf=1World Nuclear Association, Research Reactors, at: www.world-nuclear.org/info/ inf61.html.
200. IAEA (2012), "IAEA Nuclear Safety Review for the Year 2012", IAEA Doc. GC(56)/INF/2, p. 34 et seq, available at: www.iaea.org/About/Policy/GC/GC56/GC56InfDocuments/English/gc56inf-2_en.pdf.
201. See Alcalá-Ruiz, F. (1999), *Current Safety Issues Related to Research Reactor Operation*, IAEA-SM-360/2, available at: www-pub.iaea.org/MTCD/publications/PDF/csp_004c/PDFfiles/002.pdf.
202. IAEA (2000), "The Safety of Nuclear Research Reactors", IAEA General Conference Resolution, 22 September 2000, IAEA Doc. GC(44)RES/14; IAEA (2001), "Measures to Strengthen International Co-operation in Nuclear, Radiation, Transport and Waste Safety Resolution adopted on 21 September 2001 during the tenth plenary meeting", IAEA Doc. GC(45)/RES/10 No. A 2 (8), available at: www.iaea.org/About/Policy/GC/GC45/Resolutions/gc45res10.pdf.
203. IAEA (2004), "Measures to Strengthen International Cooperation in Nuclear, Radiation, Transport and Waste Safety", IAEA General Conference Resolution, 24 September, IAEA Doc. GC(48)/RES/10 No. 8.
204. Section IV 'Definitions', No. 8 of the Code.

site that are directly related to safe operation of the research reactor. Facilities commonly known as critical assemblies are included."

The Code of Conduct on the Safety of Research Reactors consists of eight sections: scope – objective – application of the guidance in the code – definitions – role of the state – role of the regulatory body – role of the operating organisation – role of the IAEA. The substance of this code is similar to that of the Convention on Nuclear Safety, which is not surprising because the Code of Conduct on the Safety of Research Reactors is meant to be a substitute for the Convention on Nuclear Safety with respect to research reactors. The language clarifies that the code is not a binding instrument which establishes legal obligations; it uses the auxiliary verb 'should' and not 'shall'. There are two major substantive differences between the Nuclear Safety Convention and the Code of Conduct, however.[205]

The role of the operating organisation is underlined and more elaborated in the Code of Conduct on the Safety of Research Reactors than in the convention. Although the code is not a treaty under public international law binding upon and addressing states only, it directly addresses all stakeholders including the operators. This factor requires a more detailed determination of the role of the operating organisation. Like the other addressees, the operating organisation is also directly committed to comply with the Code of Conduct on the Safety of Research Reactors.

Because the Code of Conduct on the Safety of Research Reactors does not establish a peer review procedure, there is no mutual reporting mechanism. However, this might be only a minor drawback. Among the "specified groups" of those involved in the operation of research reactors, a certain degree of mutual review will in any case take place. Moreover, pursuant to Section VIII 36 (c) of the Code of Conduct on the Safety of Research Reactors, the IAEA, *inter alia*, should "provide safety review services" and "provide for the application of [technical] standards at the request of any State by advising and assisting on all aspects of the safe management of research reactors."

There is no official list enumerating those states that apply the Code of Conduct on the Safety of Research Reactors because the General Conference resolution that endorsed the adoption of the code by the Board of Governors did not require the Director General to prepare such a list.[206] However, the annual *IAEA Nuclear Safety Review* reports about activities with a view to encouraging states to accept the code, and it is said that the Code of Conduct on the Safety of Research Reactors is "now widely known and accepted as a principal source for guidance for management of research reactor safety."[207] This seems to indicate that the number of states having committed themselves to apply the Code of Conduct on the Safety of Research Reactors is not insignificant.

205. Reyners, P. (fn. 193), pp. 182-183.

206. IAEA Doc. GC(48)/RES 10, Section A 8.

207. IAEA (2011), "Nuclear Safety Review for the Year 2010", Code of Conduct on the Safety of Research Reactors, IAEA Doc. GC(55)/INF/3, Appendix 1, Section B.2.1, p. 36. There is identical language in IAEA (2010), "Nuclear Safety Review for the Year 2009", IAEA Doc. GC(54)/INF/2, Appendix 1, p. 31. In previous reviews the respective parts read: "The provisions and guidance in the Code of Conduct have been integrated into appropriate Agency safety review services, technical cooperation projects and extra budgetary programmes. Application of the Code of Conduct is being accomplished through implementation of national safety regulations. Member States are being encouraged to make full use of the Agency's safety standards relevant to research reactors…" IAEA (2009), "Nuclear Safety Review for the Year 2008", IAEA Doc. GC(53)/INF/2, Appendix 1, p. 31.

The other relevant IAEA code is the Code of Conduct on the Safety and Security of Radioactive Sources.[208] Pursuant to its Section II 2,

> "this Code applies to all radioactive sources that may pose a significant risk to individuals, society and the environment, that is the sources referred to in Annex I to this Code. States should also devote appropriate attention to the regulation of other potentially harmful radioactive sources."

The term "radioactive sources" is defined as follows:[209]

> "'radioactive source' means radioactive material that is permanently sealed in a capsule or closely bonded, in a solid form and which is not exempt from regulatory control. It also means any radioactive material released if the radioactive source is leaking or broken, but does not mean material encapsulated for disposal, or nuclear material within the nuclear fuel cycles of research and power reactors."

It follows from this definition that the Code of Conduct on the Safety and Security of Radioactive Sources does not apply to unsealed sources, radioactive material within the nuclear fuel cycle or material encapsulated for disposal. Actually, the sources covered represent a significant risk, and a number of radiation accidents with serious consequences involving such sources have occurred in the past.[210]

The Code of Conduct on the Safety and Security of Radioactive Sources develops "Basic Principles" (Nos. 7-31) which require establishing an effective national legislative and regulatory system of control.[211] To this end, the Code of Conduct on the Safety and Security of Radioactive Sources contains detailed requirements for legislation and regulation and for the regulatory body. There is also guidance on the import and export of radioactive sources.[212] There is no need to investigate further the issue of whether the Code of Conduct on the Safety and Security of Radioactive Sources is an effective tool, as states around the world have accepted it. Currently, 115 states have made a political commitment with regard to the Code of Conduct on the Safety and Security of Radioactive Sources.[213]

208. See fn. 195.
209. Section I.1.of the Code of Conduct. On radioactive sources, see International Nuclear Safety Advisory Group (1999), *The Safe Management of Sources of Radiation: Principles and Strategies*, INSAG-11, IAEA, Vienna.
210. Perhaps the most famous incident happened in 1987 in Goiânia, Brazil. See IAEA (ed.) (1998), "Goiânia – Ten Years Later, Proceedings of an International Conference", Goiânia, 26-31 October 1997, Vienna, in particular the contribution by Favini, J.M., "*Cultura de la Seguridad: Vision de un Abogado sobre su Necesidad y sus Debilidades*", pp. 92-98. An overview of radiation accidents caused by sources is provided by Croft, J. (2004), "The Lessons to be Learned from Incidents and Accidents", in Métiver, H. et al. (eds.), *Current Trends in Radiation Protection*, Les Ulis, France, pp. 149-164. On the risks of radioisotope thermoelectrical generators (RTGs) in the Russian Federation see Sneve, M.K. (2006), "Remote Control", *IAEA Bulletin*, Vol. 48, (2006/1), pp. 42-47.
211. It has to be kept in mind that the Code of Conduct does not only regulate safety but also security, and thus its scope of application is more comprehensive than that of the Code on the Safety of Research Reactors (2006).
212. A slightly critical legal assessment of the code of conduct is published by Boustany, K. (2001), "The IAEA Code of Conduct on the Safety of Radiation Sources and on the Security of Radioactive Materials – A Step Forwards or Backwards?", *Nuclear Law Bulletin,* No. 67, OECD, Paris, pp. 9-20. From the technical point of view see González, A.J. (1993), "Strengthening the Safety of Radiation Sources & the Security of Radioactive Materials", *IAEA Bulletin*, Vol. 41, (1993/3), pp. 2-17.
213. The IAEA General Conference requested the Director General, subject to the availability of resources, to compile, maintain and publish a list of states that have made a political

4.5. Nuclear safety directives of the European Union

While the Convention on Nuclear Safety, the Joint Convention, and the Codes of Conduct provide for graded soft law mechanisms, the EU "Council Directive 2009/71/EURATOM of 25 June 2009 establishing a Community framework for the safety of nuclear installations"[214] (Safety Directive) and the EU "Council Directive 2011/70/EURATOM of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste"[215] (Waste Directive) establish legally binding regimes.[216] What the directives are aiming at is binding upon EU member states but the form and methods of achieving the directives' goals are left to the discretion of the member states.[217]

Pursuant to Article 1 "Objectives" of the Safety Directive, the Directive shall "establish a Community framework in order to maintain and promote the continuous improvement of nuclear safety and its regulation"; it shall furthermore "ensure that Member States shall provide for appropriate national arrangements for a high level of nuclear safety to protect workers and the general public against the dangers arising from ionizing radiations from nuclear installations."[218] The Safety Directive applies to "any civilian nuclear installation operating under a licence … at all stages covered by this licence." The term "nuclear installation" is defined as follows:[219]

"1. 'nuclear installation' means:

(a) an enrichment plant, nuclear fuel fabrication plant, nuclear power plant, reprocessing plant, research reactor facility, spent fuel storage facility; and

(b) storage facilities for radioactive waste that are on the same site and are directly related to nuclear installations listed under point (a);…"

The scope of application of the Safety Directive is more comprehensive than that of the Nuclear Safety Convention which is limited to land-based nuclear power plants. Moreover, member states are entitled to take "more stringent safety

commitment regarding the adoption of the code of conduct (IAEA Doc. GC(47)RES/7, September 2003, Section B). See IAEA (2013),"List of States that have made a political commitment with regard to the Code of Conduct on the Safety and Security of Radioactive Sources and the Supplementary Guidance on the Import and Export of Radioactive Sources" (as of 23 April 2013), available at: www.iaea.org/Publications/Documents/Treaties/codeconduct_status. pdf. See also Map on International support for the Code of Conduct on the Safety and Security of Radioactive Sources (as of 21 August 2012), available at: www-ns.iaea.org/downloads/rw/meetings/code-conduct-map.pdf. It has to be noted that the EU Council regulated the control of high-activity sealed sources for EU member states through a binding Directive. Council Directive 2003/122/EURATOM of 22 December 2003 on the control of high-activity sealed radioactive sources and orphan sources, OJ L 346, 31.12.2003, p. 57.

214. See fn. 48.
215. OJ L 199, 2.8.2011, p. 48.
216. For a drafting history and an article-by-article commentary on the safety directive see Pouleur, Y and P. Krs (fn. 49). See also Stanic, A. (2010) "EU Law on Nuclear Safety", *Journal of Energy and Natural Resources Law*, Vol. 28, pp. 145-158. The Safety Directive currently is under revision; see European Commission (2011), "Roadmap: Nuclear Safety", No. 1, November, Paragraph A: "…the European Council mandated the European Commission to review the existing legal and regulatory framework on the safety of nuclear installations", available at: www.ec.europa.eu/governance/impact/planned_ia/docs/2012_ener_010_nuclearsafetyen.pdf.
217. See fn. 90.
218. See also supra Section 2.2, p. 56.
219. Safety Directive, No. 1, Article 2.1 in conjunction with Article 3.

measures in the subject-matter covered by this Directive, in compliance with Community law."[220] In substance, the Safety Directive mainly builds on the CNS and on the IAEA Safety Fundamentals.[221]

The Waste Directive,[222] according to its Article 1 "Subject-matter", "establishes a Community framework for ensuring responsible and safe management of spent fuel and radioactive waste to avoid imposing undue burdens on future generations". The framework shall "provide for appropriate national arrangements for a high level of safety in spent fuel and radioactive waste management." Without prejudice to Directive 96/29/EURATOM,[223] the Waste Directive shall be a supplement to the basic standards on health protection under Article 30 of the EURATOM Treaty. Its structure and content are, *mutatis mutandis*, similar to those of the Safety Directive. The Waste Directive obliges member states to establish and implement a "national programme for the management of spent fuel and radioactive waste".[224]

The Community (EURATOM) and all European Union member states are party to the Convention on Nuclear Safety and to the Joint Convention.[225] Consequently, the directives have to be in compliance with the Nuclear Safety Convention as far as the safety of land-based nuclear power plants is concerned and with the Joint Convention as far as its scope of application is concerned. It should also be noted that complying with the Safety Directive and the Waste Directive does not exempt a member state from complying with the obligations under both the Convention on Nuclear Safety and the Joint Convention in case there is a discrepancy between obligations under these two conventions and these two Directives. In fact, a discrepancy would create a catch-22 situation for states: complying with one instrument would necessarily entail non-compliance with the other one.

The parallel application to nuclear power plants and to the management of spent fuel and radioactive waste respectively of the Convention on Nuclear Safety and the Joint Convention and the Waste Directive and the Safety Directive risks divergent interpretation and application of the obligations established by the instruments. In particular, there is an apparent tension between the incentive approach of the Convention on Nuclear Safety and the Joint Convention and the strictly binding approach of the Waste Directive and the Safety Directive which, if necessary, are enforceable by a European Court of Justice decision. Some authors expressly stress the Nuclear Safety Convention's "weakness on the implementation and enforcement side", while the European Commission and the European Court of Justice "will guard over the adequate implementation and maintenance" of the Safety Directive's obligations which "can therefore prove it to be a more effective instrument.[226] This statement seems to mirror a total misunderstanding of the incentive approach and of its usefulness for a worldwide international convention. There is no doubt that the European Community is, within the limits of its competences, entitled to implement the Convention on Nuclear Safety and the Joint Convention within the EU member states in a stricter sense. But it is at least

220. Safety Directive, Article 2 (2).
221. Garribba, M, et al. (2009), "The Directive Establishing a Community Framework for the Nuclear Safety of Nuclear Installations: The EU Approach to Nuclear Safety", *Nuclear Law Bulletin*, No. 84, (2009/2), OECD/NEA, Paris, pp. 23-33 at 31.
222. On the Waste Directive see Blohm-Hieber, U. (2011), "The Radioactive Waste Directive: a Necessary Step in the Management of Spent Fuel and Radioactive Waste in the European Union", *Nuclear Law Bulletin*, No. 88, (2011/2), OECD/NEA, Paris, pp. 21-35.
223. OJ L 159, 29.6.1996, p. 1 (Corr. OJ L 314, 4.12.1996, p. 20).
224. Waste Directive, Articles 11-14. The provisions include obligations on the contents of the programme, on notification and on reporting to the Commission.
225. Malta is not party to the Joint Convention.
226. Garribba, M. et al. (fn. 221), p. 32.

disputable whether it is a prudent decision to deviate from the flexible soft approach of the conventions and to rather rely on enforcement of obligations. From the approach of wanting to achieve a high level of nuclear safety worldwide, it is at once an overestimation of the directives and a misjudgement of the effectiveness of the concept of the conventions, when authors state: "At the same time, the Directive plays a significant role internationally: its adoption makes the EU the first regional actor to establish binding legal rules in nuclear safety and to become an example for the rest of the world."[227] Time will tell if and to which extent the conventions and the directives will coexist with each other and, in particular, whether, at the global level, the directives' "enforcement approach" to achieving nuclear safety is superior to the soft approach of the conventions.

5. Summary and conclusion

Will the peaceful use of nuclear energy be safer if there is a higher degree of internationalisation? Is international control superior to national control regimes? There is no clear and undisputable answer to this question. The lawyer's usual answer of, "it depends on the individual case", applies here, too. But there is a high degree of probability that internationalisation is capable of producing a higher degree of nuclear safety worldwide.

At the beginning of this article, it was pointed out that applying international and generally accepted requirements of nuclear safety ensures that a high level of safety based on state-of-the-art technologies will be achieved more reliably than through implementation of safety requirements based on standards developed by using national knowledge only. This is a truism which does not need further explanation. International knowledge and experience are collected and concentrated in a huge repository of recommendations, standards and best practice. This repository represents the international state of the art of nuclear safety and thus may, for convincing reasons, be deemed to provide the best possible nuclear safety requirements.[228]

In accordance with the authorisation in Article III.A.6. of its Statute,[229] the IAEA is the main player in developing, drafting, publishing and disseminating international safety standards.[230] It also encourages states and other stakeholders to adopt these standards. Other international governmental organisations co-operate with the IAEA, including the WHO, ILO, FAO, UNSCEAR, OECD/NEA, and EURATOM. Private scientific international organisations are likewise involved in developing safety requirements (e.g. ICRP, ICRU). Moreover, there are additional international fora, associations and circles, not yet mentioned in this article, that also contribute to develop and refine nuclear safety requirements. Reference has to be made, *inter alia*, to the International Nuclear Regulators Association (INRA), the G8-Nuclear Safety and Security Group (NSSG), the Western European Nuclear Regulators Association (WENRA), the European Nuclear Safety Regulators Group (ENSREG), the Ibero-American Forum of Radiological and Nuclear Regulators, the Forum of the State Nuclear Safety Authorities of the Countries operating WWER Type Reactors, the

227. Garribba, M. et al. (fn. 221), p. 33. Blohm-Hieber, U. (fn. 222), p. 35 also feels that the Waste Directive "could serve as a model for the rest of the world".
228. On the elements of the global nuclear safety regime see International Nuclear Safety Advisory Group (2006), *Strengthening the Global Nuclear Safety Regime: INSAG-21/A Report by the International Nuclear Safety Group*, IAEA, Vienna, pp. 5-9.
229. See fn. 35.
230. Findlay, T. (fn. 125), p. 23, however, states that "the lukewarmth of the CNS text about the nuclear safety role of the IAEA" is surprising. That may be correct but does not belittle the Agency's practical role worldwide, as Findlay later admits, ibid.

Senior Regulators of Countries Operating CANDU-Type Nuclear Power Plants, the Forum of Nuclear Regulatory Bodies in Africa (FRNBA), and the Arab Network of Nuclear Regulators (ANNuR). Details of their activities may be taken from the *IAEA Nuclear Safety Reviews*[231] and from the websites of the associations referred to. Operators, in particular the World Association of Nuclear Operators (WANO), are also involved in efforts to enhance nuclear safety.[232]

With regard to establishing a global nuclear safety framework, special emphasis has to be attributed to the International Nuclear Safety Group (INSAG). "INSAG is convened under the auspices of the International Atomic Energy Agency (IAEA) with the objective to provide authoritative advice and guidance on nuclear safety approaches, policies and principles. In particular, INSAG will provide recommendations and opinions on current and emerging nuclear safety issues to the IAEA, the nuclear community and the public."[233] INSAG has by now published 26 leading documents (INSAG-1 to INSAG-26), and its chair writes Annual Assessment Letters to the Director General of the IAEA, which deal with current safety issues.[234]

As a last example, the Multinational Design Evaluation Programme (MDEP) shall be mentioned. The MDEP is an initiative taken by a number of national safety authorities with a view to developing innovative approaches for nuclear power plant designs. The OECD/NEA performs the functions of a technical secretariat for the MDEP.[235]

The joint efforts of this multilateral network consisting of all stakeholders in the nuclear field result in an elaborate and presumably comprehensive, substantial framework governing the technical prerequisites of nuclear safety. They also deal, in a general way, with the organisational and regulatory requirements of nuclear safety.[236] Hence, nuclear safety rules of the international state-of-the-art standard are available, and states are free to make use of them. States do make use of them but they apparently do so in a selective manner. In exercising national sovereign discretion, they pick what they consider to be appropriate. Such an approach continues to be a national approach that will never lead to a globally unified regime of nuclear safety, which at the same time should ensure that safety requirements are permanently reconsidered and enhanced at the international level, if necessary. Nuclear safety worldwide means that all nuclear safety programmes are measured against identical international safety yardsticks, as appropriate. Without prejudice to the sovereign rights of states and to their prime responsibility for nuclear safety within their territories, choosing and picking based on unrestricted discretion of the

231. A list of the IAEA Safety Reviews is available at: www.iaea.org/Publications/Reports/.
232. See www.wano.info. WANO's aim is to maximise the safety and reliability of nuclear power plants worldwide. On 25 October 2011, operators of the world's commercial nuclear plants unanimously approved wide-ranging new commitments to nuclear safety. See: www.wano.info/press-release/wano-biennial-general-meeting-press-release/.
233. See www-ns.iaea.org/committees/insag.asp(accessed 9 July 2013).
234. See list of INSAG documents and of annual assessment letters at: www-ns.iaea.org/committees/insag.asp. The annual assessment letter for 2012, GC(56)INF/11(11 September 2012), makes "some broader observations about the [Fukushima] accident and the work that is now underway" and concludes that "the IAEA has a critical role in advancing nuclear safety" available at: www-ns.iaea.org/committees/files/insag/743/gc56inf-11_en/NSAGlettertoDG.pdf.
235. See www.oecd-nea.org/mdep/index.html#1 (accessed 9 July 2013).
236. See IAEA (1982), *Licences for Nuclear Power Plants: Content, Format and Legal Considerations, A Safety Guide*, IAEA Safety Series, No. 50-SG-G8, IAEA, Vienna; IAEA (1988), *Code on the Safety of Nuclear Power Plants: Governmental Organization*, IAEA Safety Series, No. 50-C-G (Rev. 1), IAEA, Vienna; IAEA (2000), *Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety, Safety Requirements*, IAEA Safety Series, No. GS-R-1, IAEA, Vienna.

individual state concerned is not the best option to achieve a harmonised level of nuclear safety worldwide. It follows that an international legal framework with at least a minimum of binding obligations is needed.

In this article, it has been shown that legal instruments of different types are available to govern radiation and nuclear safety. However, states cannot be forced to adhere to them. They need to be convinced. International peer influence may be a means to motivate states to join the instruments. The IAEA also plays an important role.[237]

Binding international instruments cover radiation protection and transport of radioactive material. In substance, these activities are based on technical rules and standards that are internationally agreed and adopted. This approach seems to create a "perfect world" which could be achieved because states accepted internationalisation and the limitation of national discretion (i.e. sovereignty) consequential to this approach. However, the number of participating states, in particular regarding radiation protection, is still too low.

Readiness to accept international restrictions on national sovereignty is more difficult to achieve with regard to internationalising nuclear safety requirements. National nuclear fuel cycle programmes are strictly guarded by states as elements of national independence and of national pride. It is, as experience proves, a highly sensitive matter to try and subject such programmes to "internationalisation", i.e. to nuclear safety requirements which are governed by international standards and rules and thus appear to infringe on national sovereign authority. It is due to the Chernobyl accident that negotiations to change this situation were successful: The innovative incentive nature of the Convention on Nuclear Safety and the Joint Convention makes internationalisation of nuclear safety prerequisites less "intrusive" and thus more acceptable. There are only "soft law" obligations which require the collaboration of the states parties. Compliance with the obligations under these conventions is monitored by the other parties – the "peers" – and compliance is not enforced by mandatory procedures. The numbers of 76 and 67currentcontracting parties to the Convention on Nuclear Safety and the Joint Convention respectively demonstrate that the concept of these conventions is appropriate to harmonise safety worldwide. At the same time, the concept of these conventions meets the concern of states about conflicts with their sovereign rights. The flexible approach to achieving a high level of nuclear safety also is a successful means to avoid instruments which base their obligations on the lowest common denominator of nuclear safety. The incentive nature of the conventions involves the chance to enhance nuclear safety beyond the level of the lowest common denominator. Nevertheless, efforts need to be continued to attract more states to adhere to these conventions. These conventions are attractive for non-nuclear states also because adherence entitles them to participate in the peer review process.

The Codes of Conduct on the Safety of Research Reactors and on the Safety and Security of Radioactive Sources are the third layer of instruments to internationalise nuclear and radiation safety. Codes are not binding but their addressees form a group in which the members are under mutual peer pressure. This approach is even slightly softer than the soft approach of the two safety conventions. However, with respect to both codes, there is at least "relative normativity". The codes establish a commitment, too, and if not a legal one, it is a political commitment, and non-compliance requires special justification.

237. See the activities of the IAEA Office of Legal Affairs (OLA) in the field of legal assistance at: http://ola.iaea.org/ola/legislative-assistance.html.

In summary, it is impressive what has been gained to date. The main parts of the nuclear fuel cycle are covered by binding or quasi-binding international instruments.

Yet there are still gaps. There is no international legal framework governing the safety of enrichment plants, nuclear fuel fabrication plants, reprocessing plants and off-site storage facilities. International technical standards regarding these types of nuclear facilities, however, are available.[238] There is only a remote chance that these facilities will be covered by a new international convention. Whether codes of conduct can be developed and agreed upon seems to be a question to be answered by technical experts rather than by lawyers. There is, however, an international project which is flagged by the name "Multilateral Approaches to the Nuclear Fuel Cycle".[239] This project is aimed at strengthening the prevention of nuclear weapons proliferation while at the same time securing the supply of nuclear fuel through internationalisation of the fuel cycle. In this context, nuclear safety also comes into focus: an internationalised fuel cycle requires the application of the international nuclear safety standards as well. This option to internationalise nuclear safety within an international technical and legal framework should more closely be considered and investigated.

Possible future efforts to establish an international legal nuclear safety regime to govern nuclear activities not yet covered by the existing instruments or to improve the existing instruments should focus on soft law solutions rather than on establishing a legally binding international licensing system. For the future, even in the light of the Fukushima nuclear accident, it cannot be expected that states will be ready to leave licensing and supervision of nuclear activities entirely to an enforceable international supervision regime. It is even more unrealistic to aim at an international regulatory body authorised to directly license and control national activities in place of national authorities. Moreover, there are doubts as to whether international organisations deploy the workforce qualified for these tasks. They would also require expertise in fields of law other than nuclear law that are not internationalised, such as national construction law, environmental law, or water law, which are governed by national constitutional requirements and national legal doctrine.[240]

This critical assessment should not prevent a consideration of ways to enhance the existing international nuclear safety regime. Without any doubt, Fukushima requires a review of the existing regime. But it has to be cautioned against hastily embarking on exercises to substantially revise the existing

238. See IAEA (2008), *Safety of Nuclear Fuel Cycle Facilities, Safety Requirements*, IAEA Safety Standards Series, No. NS-R-5, IAEA, Vienna; IAEA (2010), *Safety of Conversion Facilities and Uranium Facilities, Specific Safety Guide*, IAEA Safety Standards Series No.SSG-5, IAEA, Vienna.

239. IAEA (ed.) (2005), "Multilateral Approaches to the Nuclear Fuel Cycle: Expert Group Report submitted to the Director General of the International Atomic Energy Agency", IAEA Doc. INFCIRC/640. See also the latest information on the status of the "Revisiting the Nuclear Fuel Cycle" project, available on the IAEA website at: www.iaea.org/newscenter/ focus/fuelcycle/index.shtml.

240. That concern does not apply to the same extent to the EU, to which the member states transferred sovereign rights and which, within its competence, has supranational power. Cf. "Roadmap: Nuclear Safety", (fn.216): "Furthermore, the European Commission has already expressed, in several papers, its intention to promote regulatory harmonisation and develop a licensing process of nuclear power plants at the EU level."

instruments.[241] They are well apt to cope with the challenge, and they leave room for enhancement without touching upon their basic concept and their substance.

For many years the IAEA has been performing so-called review missions: on the voluntary request of states, a group of experts is sent to the inviting state in order to review the safety of a defined nuclear installation in that country. Currently, the following types of IAEA nuclear safety peer review instruments ("Operational Safety Services") exist:[242]

- OSART – Operational Safety Review Team;[243]
- PROSPER – Peer Review of Operational Safety Performance Experience;[244]
- IRS – Joint IAEA-OECD/NEA International Reporting System for Operating Experience;[245]
- SALTO – Safety Aspects of Long Term Operation of Water Moderated Reactors Peer Review Service;[246]
- SCART – Safety Culture Assessment Review Team;[247]
- IRRT – International Regulatory Review Team.[248]

The missions are "neither an inspection nor an audit, but a mutual learning mechanism that accepts different approaches."[249] This mechanism entails states' self-assessments, which are based on the findings of the missions. Thus the missions have become a most successful exercise that considerably contributes not only to improving the level of safety of the reviewed nuclear installations but also to collecting knowledge and experience that may be used for drafting general safety recommendations. In the period from 1982 to 2010, more than 150 OSART missions took place. It may be concluded from this figure that states accept voluntary peer review exercises. But will they agree to make them mandatory?

Another option to internationalise nuclear safety could be the mandatory involvement of international experts to be designated by the IAEA or by another

241. See Pelzer, N. (2011), "Does the Fukushima Nuclear Incident Require a Revision of the International Legal Regime on Nuclear Safety?" Presentation at the IAEA Ministerial Conference on Nuclear Safety, Working Session 3: Possible Ways for Strengthening the Global Nuclear Safety Framework, 20 to 24 June, Vienna, paper available at: www-pub.iaea.org/MTCD/Meetings/PDFplus/2011/cn200/working-sessions/w_d4_N.Pelzer.pdf. See also Pelzer, N. (fn. 147).
242. See www-ns.iaea.org/reviews/op-safety-reviews.asp#prosper (accessed 9 July 2013).
243. IAEA (2005), *OSART Guidelines: 2005 Edition Reference report for IAEA Operational Safety Review Teams (OSARTs)*, IAEA Services Series No. 12, IAEA, Vienna; Sacchetti, D. (2009), "The Peer review", *IAEA Bulletin*, Vol. 50, (2009/2), IAEA, Vienna, pp. 27-29.
244. IAEA (2003), *PROSPER Guidelines: Guidelines for peer review and for plant self-assessment of operational experience feedback process*, IAEA Safety Series, No. 10, IAEA, Vienna.
245. IAEA/NEA (2010), *IRS Guidelines:* Joint IAEA/NEA International Reporting System for Operating Experience, IAEA Services Series, No. 19, IAEA, Vienna.
246. IAEA (2008), *SALTO Guidelines: Guidelines for peer review of long term operation and ageing management of nuclear power plants*, IAEA Services Series, No. 17, IAEA, Vienna; see also IAEA (2009), *Ageing Management for Nuclear Power Plants*, Safety Standard Series, Safety Guide No. NS-G-2.12, IAEA, Vienna; IAEA (2008) *Safe Long Term Operation of Nuclear Power Plants*, Safety Report Series No. 57, IAEA, Vienna.
247. IAEA(2008), *SCART Guidelines: Reference report for IAEA Safety Culture Assessment Review Team (SCART)*,IAEA Services Series, No. 16, IAEA, Vienna. See also Verlini, G. (2008), "The Mindset of Nuclear Safety", *IAEA Bulletin*, Vol. 50, (2009/2), IAEA, Vienna, pp. 47-49.
248. IAEA (2002) *IRRT Guidelines*, IAEA Services Series, No. 8, Vienna.
249. EU Safety Directive (fn. 48), Recital 21 of the Preamble.

competent international organisation in national licensing and supervision procedures. Participation of foreign experts in national procedures is only a minimal "interference" with national sovereign rights, and perhaps it would be acceptable for states to agree to such involvement as a binding obligation.

The envisaged global internationalisation of nuclear safety needs to be complemented by international provisions on the compensation of nuclear damage, should a nuclear incident occur. That issue is not addressed in this article because it would go beyond its limits. International conventions on civil liability for nuclear damage exist.[250] The IAEA Action Plan on Nuclear Safety requests "Member States to work towards establishing a global nuclear liability regime that addresses the concerns of all States that might be affected by a nuclear accident with a view to provide adequate compensation for nuclear damage."[251] The existing nuclear liability conventions may form the basis of a global regime but it has not yet been achieved, and there are doubts as to whether it is achievable at all.[252]

In summarising the results of this article, one may clearly declare that the involvement of states and of international organisations in shaping safety standards and sharing experience regarding the use of nuclear energy does improve the level of nuclear safety. However, achieving and maintaining a high level of nuclear safety worldwide is a demanding and continuous challenge. In order to meet that challenge, the highest standard of technical safety measures, including an adequate legal and regulatory framework, is required. An integral part of these technical and regulatory requirements, and thus equally ranked, is the human element of safety: A robust safety culture has to be created and maintained. Both the Chernobyl nuclear accident and the Fukushima nuclear accident were caused by the combination of technical shortcomings and of a weak safety culture.[253] Regarding Fukushima, the

250. For references to the nuclear liability conventions in their revised versions of 1997 and 2004 respectively, see fn. 123. For the text of the unrevised Vienna Convention, see IAEA Doc. INFCIRC/500; the 1960, 1964, 1982 Paris Conventions are available at: www.oecd-nea.org/law/nlparis_conv.html; the 1963, 1964, 1982 Brussels Supplementary Conventions are available at: www.oecd-nea.org/law/nlbrussels.html.

251. "Draft IAEA Action Plan on Nuclear Safety" (fn. 5), p. 4.

252. On the international nuclear liability regime see OECD/IAEA (eds.) (2000), *Reform of Civil Nuclear Liability, Budapest Symposium 1999*, Paris; OECD (ed.) (2010), *International Nuclear Law: History, Evolution and Outlook*, pp. 307-416, Paris; Schwartz, J. (2006), "International Nuclear Third Party Liability Law: The Response to Chernobyl", OECD/NEA-IAEA (eds.) *International Nuclear Law* (fn. 120), pp. 37-72; Pelzer, N. (2008), "On Global Treaty Relations – Hurdles on the Way towards a Universal Civil Nuclear Liability Regime", *6 Zeitschrift für Europäisches Umwelt- und Planungsrecht*, EurUP, pp. 268-280; Pelzer, N. (2012), "On a Global Nuclear Liability Regime", paper presented during the "Panel Discussion: Perspective of a Global Nuclear Liability Regime" at the Nuclear Inter Jura Congress, 8-11 October, Manchester, UK paper available at: www.burges-salmon.com/INLA_2012/10234.pdf; McRae, B. (2011), "Convention on Supplementary Compensation for Nuclear Damage (CSC) and Harmonisation of Nuclear Liability Law within the European Union", *Nuclear Law Bulletin*, No. 87, (2011/1), OECD/NEA, Paris, pp. 73-86. Further references in Pelzer, N. "Learning the Hard Way" (fn. 127), pp. 100-115 and 101 fn. 146.

253. On the relevance of the human factor for the Fukushima nuclear accident, see respective press reports, for example, Harris, R. (2011), "What Went Wrong in Fukushima: The Human Factor", available at: www.npr.org/2011/07/05/137611026/what-went-wrong-in-fukushima-the-human-factor; Schaps, K. (2011), "Fukushima Human Factor under the Microscope", at: www.reuters.com/article/2011/05/18/us-fukushima-enquiry-idU STRE 74H4YX20110518. See also Cochran, T. and, M.G. McKinzie (2011), "The Fukushima Nuclear Disaster – Implications for Nuclear Power Policy, International Workshop on Nuclear Energy Safety: Improving Safety in the Aftermath of the Fukushima Crisis, Beijing, June 29-30", available at: http://docs.nrdc.org/nuclear/files/nuc_11080901a.pdf.

official Investigation Commission of the Japanese Diet clearly stated that it was a "man-made" disaster.[254]

Hence, the goal is well defined. But there are still doubts as to whether states, in particular those with a nuclear programme, are ready to co-operate and to subject all of their nuclear activities to internationalisation, in particular to internationally agreed prerequisites for nuclear safety and, in the best case, to respective international obligations. The options that lawyers can provide to change this situation are limited. It is up to the politicians to make internationalising nuclear safety more attractive with a view to establishing a truly global nuclear safety regime covering all branches of the use of nuclear energy and ionising radiation.

254. The National Diet of Japan (2012), "Report of the Fukushima Nuclear Accident Independent Investigation Commission, Executive summary", p. 16, reproduced at: www.nirs.org/fukushima/naiic_report.pdf. For the complete report see http://warp.da.ndl.go.jp/info:ndljp/pid/3856371/naiic.go.jp/en/report/.

Special report on the Second Annual Meeting of the Nuclear Law Association

"India's nuclear energy sector: Business opportunities and legal challenges" 2 March 2013, Mumbai, India

Summary of the proceedings[1]

The Second Annual Meeting of the Nuclear Law Association, India (NLA India) was held on 2 March 2013 in Mumbai. The theme of this year's meeting was: "India's Nuclear Energy Sector: Business Opportunities and Legal Challenges".

Several of the papers presented will be published in the *Journal of Risk Research* in June/July 2013 as part of a special edition featuring proceedings from this Nuclear Law Association, India Second Annual Meeting.[2]

Inaugural session

Welcome address: Dr. M.P. Ram Mohan, Nuclear Law Association, India; and The Energy and Resources Institute (TERI)

Dr. Ram Mohan, Chairman of the Nuclear Law Association, India, and Fellow at TERI, set the stage with his welcome speech. A special announcement was made regarding the new "winter course" on nuclear law which will be offered by NLA India in co-operation with the National Law University of Delhi (NLUD), and will be held 18 to 22 November 2013, at the NLUD campus.

Presidential address: Ravi Kadam, Senior Counsel, Bombay High Court; and former Attorney General, Maharashtra

Mr. Ravi Kadam emphasised the necessity of a clear legal framework of nuclear law in India. He noted the important responsibility of the legal community with respect to clarifying the intricate and complex issues relevant to nuclear law and representing the interests of common people as well.

However, he stressed the need to strike a balance between competing interests, and referred to the fact that some of the public interest litigation (PIL) matters may not necessarily represent the interests of common people. Moreover, he noted that in Maharashtra alone a large number of infrastructure projects have not received the necessary approvals due to the PILs filed against the project. He observed that courts are not always well equipped to deal with a large number of PILs which are technical in nature and often based on the complex "precautionary principle" that imposes the burden of proof on the person proposing to undertake activities that may affect the environment. Groups of technical experts, or an active government regulator to whom certain matters could be referred or from which expert opinions could be obtained, would be of great assistance to the judiciary in its review of PILs.

1. These proceedings were prepared by Vivek Nemane, Academic Associate, Symbiosis Law School, Pune, India and Els Reynaers-Kini, Partner, MV Kini & Co. and Secretary, Nuclear Law Association, India. The proceedings of the Nuclear Law Association, India Second Annual Meeting are available at: www.nlain.org and http://nuclearlaw.wordpress.com.
2. Additional information regarding the *Journal of Risk Research* is available at: www.tandfonline.com/loi/rjrr20.

Based on his own experience as the former Attorney General of Maharashtra, Mr. Kadam cited some of the reasons behind recent protests at the Jaitapur nuclear project site in Maharashtra, which are to a large extent based upon a lack of information and justification with respect to the positive impact of large-scale infrastructure or energy projects. He noted that there is a need for close interaction among experts, the public, the media and industry to address the concerns of the general public. In Mr. Kadam's words: "To address the concerns of common people is absolutely essential in this country in order to prevent the roadblocks in carrying out future nuclear projects."

Special address: Siddharth Varadarajan, Editor, The Hindu

As a journalist, Mr. Siddharth Varadarajan has tracked the evolution of the legal and political framework governing the development of nuclear energy projects in India. He noted that the development of the nuclear industry in India in recent years evolved alongside nuclear law in the country including:

a) the Agreement Between the Government of India and the IAEA for the Application of Safeguards to Civilian Nuclear Facilities, which takes into account that India is not a party to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT);

b) the bilateral agreement with the United States for co-operation concerning peaceful application of nuclear energy (also known as the "123 agreement");

c) bilateral agreements for nuclear co-operation with various countries, including France and Russia;

d) the 2008 Nuclear Suppliers Group (NSG) decision to grant India a waiver from its rules which forbid nuclear trade with a country that has not signed the NPT;

e) export control regulations;

f) Weapons of Mass Destruction (WMD) legislation;[3]

g) The India-Pakistan Non-Attack Agreement which outlaws attacks against each other's civil nuclear facilities;

h) the Civil Liability for Nuclear Damage Act, 2010 and its implementing rules;[4] and

i) draft nuclear safety regulation under consideration.

Mr. Varadarajan cautioned that a legal regime is only as good as the manner in which it is implemented. Specifically, he argued that the implementation of nuclear projects must be undertaken with widespread public confidence. Creating a conducive environment and gaining public acceptance for nuclear projects are important to the success of such projects. He believes that negative public perception has its greatest impact on the issue of land acquisition. He noted that peaceful protests are important and should be allowed because it is the right of the

3. Note from the editor: additional information regarding the legislation prohibiting unlawful activities in relation to weapons of mass destruction and their delivery systems is available at: www.iaea.org/Publications/Documents/Infcircs/2005/infcirc647.pdf.
4. Note from the editor: the Civil Liability for Nuclear Damage Act, No. 38 of 2010, 47 Gazette of India, pt. II, sec. 1, pp. 1-15 (New Delhi , 21 Sept. 2010) is reprinted in this edition of the *Nuclear Law Bulletin*. The Civil Liability for Nuclear Damage Rules, 2011, 2112 Gazette of India, pt. II, sec. 3, pp. 1-20 (New Delhi, 11 Nov. 2011) are available at: www.prsindia.org/billtrack/the-civil-liability-for-nuclear-damage-bill-2010-1042/ and were published in *Nuclear Law Bulletin,* No. 88, (2011/2), OECD, Paris, p. 163.

common people, and that protests must be handled cautiously. For instance, in his opinion, the sedition charges against some of the Kudankulam protesters were uncalled for.

He noted that implementation of the law in its letter and spirit is absolutely essential because the law is a torchbearer for industry, business, and society at large. He stated that an open-minded approach toward various stakeholders would be advisable to enable the smooth evolution and implementation of nuclear law and policy.

Mr. Varadarajan indicated that the extensive negotiations during the preparatory and drafting phases of the nuclear liability law actually strengthened its outcome. He stated that against the backdrop of the recent judicial decision on the Bhopal accident and international developments including the Fukushima Daiichi accident and the British Petroleum oil spill in the waters off the United States, a strong domestic law was enacted with consistent support from all stakeholders. "The technological and legal doors for the development of nuclear energy are open now, but further progress will depend upon policies being implemented in an enlightened way" concluded Mr. Varadarajan.

Keynote address: Dr. R.B. Grover, Homi Bhabha Chair and Director, Homi Bhabha National Institute

Dr. R. B. Grover provided a detailed background on the nuclear energy development in India, a country where developing sources of electricity generation is a pressing need. Dr. Grover offered a comparison between the availability of energy resources versus various needs to be fulfilled on the basis of currently available resources. For instance, coal is still abundant currently but India's domestic reserves are expected to be depleted within five decades; solar energy and wind energy as renewable resources are equally important to meeting the overall energy demand. He noted that nuclear energy is a significant option to be pursued in India, as it is well tested and affordable. He stated that the government of India is committed to the growth of nuclear energy to provide energy security in a manner that is environmentally sustainable.

He pointed out that following the accident at the TEPCO Fukushima Daiichi nuclear power plant, countries around the world took precautionary steps towards the safety of nuclear power plants. In this regard, India was not an exception. Post-Fukushima, the Nuclear Safety Regulatory Authority Bill, 2011, was introduced in the Parliament of India to establish a national framework for the governance of nuclear power generation.

Dr. Grover also touched upon the options and needs for the growth of nuclear electricity generation in India. India's aggressive pursuit of additional uranium resources in the country over the last decade is now showing results. India has also undertaken policy initiatives to engage in international trade in uranium including through:

a) importing uranium to build additional pressurised heavy water reactors (PHWRs) based on indigenous technology;

b) importing uranium to build light water reactors (LWRs) in technical collaboration with other countries; and

c) establishing a dedicated reprocessing facility under IAEA safeguards for the development of an indigenous fast breeder reactor (FBR) programme.

Dr. Grover stated that the NSG waver enabled India to import more uranium, thereby increasing the capacity of nuclear power plants. He further offered an overview of the likely capacity additions and new power plant projects projected under the XIIth Five Year Plan (2012-2017).[5]

Dr. Grover submitted that countries rely upon different models of government and private sector participation in the development of nuclear projects. He noted that some models are inclined toward the primacy of government, whereas others toward the primacy of the private sector. In his opinion, the Indian model of public/private participation is still evolving, however, he believes it is important to establish the basic comprehensive framework for nuclear energy before allowing private sector participation.

Reflecting on the specific themes of the Second Annual Meeting, Dr. Grover acknowledged that it would be essential to ensure that whatever is being done is safe from a technical point of view vis-à-vis the public. While stressing the importance of the engagement with the public, Dr. Grover also stated that there would be a need for a constructive debate with all stakeholders. He noted that from the government's perspective one could consider involving skilled communicators (as opposed to merely technical experts) to convey some of the most important issues related to nuclear energy, project development and India's vision in this regard to the local population and the general public.

In response to a question regarding whether the government of India has a roadmap for private sector participation in the field of nuclear energy, Dr. Grover started by referring to the fact that the private sector is already engaged in the design, manufacture of equipment, and construction of nuclear power plants. He underlined that only the ownership and operation of nuclear power plants is not private. To the best of his knowledge, under the current policy and legal framework, the government of India has not planned such a roadmap. Moreover, he noted that it will be important to develop a more robust framework for the governance of nuclear power, including the adoption of the Nuclear Safety Regulatory Authority Bill, 2011, since without such a concrete framework, private sector participation would not be encouraged.

In response to a question whether the NSG waiver regarding India might imply that India could serve as an exporter and supplier of nuclear equipment and technologies to other countries and whether the Indian authorities have a plan in this regard, Dr. Grover indicated that India is already a supplier of nuclear equipment and technology. Licences to export are already given to a few companies and applications for such licences are increasing. Slowly, Indian companies will grow in this sector; no legal barriers to such trade exist today but commercial and political barriers do exist. For instance, India has significant experience with small modular reactors, which are now attracting attention abroad, but this attention has not resulted in a concrete proposal to export these reactors.

Panel Session 1: Nuclear Energy Projects & Private Sector Participation

- Chair: Bahram N. Vakil, AZB & Partners

Mr. Vakil raised the issue of how the private sector can optimise growth without the growth of the power sector. With a 4% increase in energy generation, he questioned how India can achieve a 7.8% increase in GDP growth. He noted that unlike other countries, India does not have the luxury of choice between various

5. India's economic planning is based on five-year plans developed and executed by the Planning Commission of India. See http://planningcommission.gov.in/plans/planrel/index.php?state=planbody.htm.

energy options and, therefore, would have to pursue thermal, renewable and nuclear power to maintain its GDP. He noted that France embarked on its nuclear programme in 1947, just like India; however, India generates 4380MW from its NPPs whereas France achieves 63000MW.

- Rajendra Shrivastav, Director India, Nuclear Business, Alstom India Limited

Mr. Shrivastav explained the intricate technological requirements of nuclear power projects, noting that in India, Alstom provides components which are used in the turbines of conventional islands in the power plant, not the nuclear reactors themselves. He noted that in India the nuclear power plants have evolved from the smaller 220MW to 540MW NPP models and now onwards to larger 700MW nuclear power plant designs. Given the significant investments made by suppliers and sub-contractors in technologies in India – and that there is essentially only one buyer (the Nuclear Power Corporation of India Limited [NPCIL]) in the country - it is important to have a sense of continuity and a guaranteed market. In addition, considering the duration of the projects, a long-term and permanent partnership is expected from the NPCIL. Nuclear plants operate for an average of 60 years: a first phase of 40 years plus a possible extension. Thus, the suppliers and subcontractors are engaged in the process of providing technologies for the lifetime of the plant. Mr. Shrivastav stated, "our work is not over after selling the equipment", given that there is a continuous project cycle for long-term operation. Such long-term association between suppliers, subcontractors and the NCPIL is expected to endure for several decades, necessarily entailing significant commitments for investments as well.

From a legal point of view, Mr. Shrivastav noted that it is important that suppliers and subcontractors obtain clarity on the breadth of certain legal provisions, so as to better assess their possible long-term impact. Moreover, technology providers such as Alstom are asked to agree to civil nuclear liability clauses in contractual provisions. He clarified that it is important to understand that it is not fair to ask the subcontractors to agree to civil nuclear liability clauses in contractual provisions and that subcontractors would not agree to assume such liabilities.

- Badrinath Durvasula, Vice President and Legal Head, Larsen & Toubro (L&T)

Mr. Durvasula showcased the industry-specific concerns that can be categorised as domestic and international.

Mr. Durvasula noted that under India's domestic legal provisions (Sections 17 and 46 of the Civil Liability for Nuclear Damage Act, 2010), there are two important issues: the liability of the operator and the liability of the contractor.[6] He stated that through contractual provisions on the right to recourse, an operator may subrogate its liability to a contractor/supplier. He stipulated that contractors can be typically divided into two groups, large and small. Large contractors, such as L&T, may be able to afford such liability recourse clauses with an operator, factoring risk into its overall project cost. However, smaller companies and subcontractors of primary contractors are often not willing to sign such liability recourse clauses, which may pose significant legal and financial challenges to smaller businesses.

Mr. Durvasula indicated that the problem of risk exposure is compounded by the fact that suitable insurance to cover liability risk is not available, neither from the

6. Editor's note: for a discussion of India's liability regime, see Gruendel, R. and E. Raynaers-Kini (2012), "Through the looking glass: placing India's new civil liability regime for nuclear damage in context", *Nuclear Law Bulletin,* No. 89, (2012/1), OECD/NEA, Paris, pp. 45-66.

General Insurance Corporation of India (GIC Re) nor from any of the Indian insurers, due to the lack of resource pooling arrangements. He believes that introducing such insurance coverage would enable the entire contractor community to bid for projects, thus making the bidding process more competitive. He believes that in the absence of suitable insurance coverage, the contractors that are willing to take calculated risks will factor the risk into their estimated project cost, which is detrimental to the contracting process.

Mr. Durvasula explained that L&T is engaged in several international nuclear projects including the International Thermonuclear Experimental Reactor (ITER) project in France, which is underway with 7 members: the European Union, India, the Russian Federation, the United States, Japan, the Republic of Korea and China. More specifically, he noted that L&T has undertaken the supply and installation of critical equipment for this unique fusion energy experiment located in Cadarache, France. He noted that for an Indian company it is paradoxical to note that French laws offer a greater degree of business comfort and legal clarity to suppliers than the nuclear liability legislation in India. He believes that it is, therefore, important that clarity and confidence is given to Indian contractors with respect to legal nuclear liability in India as well.

Mr. Durvasula explained that there is a lack of clarity on the liability exposure of the contractors with respect to the Kudankulam nuclear power plant units 1 and 2, to which the Civil Liability for Nuclear Damage Act and Rules may not apply due to the precedence of the provisions of the agreement signed by the Prime Minister of India and the President of the former Soviet Union on 20 November 1988 over the provisions of the Civil Liability for Nuclear Damage Act. Application of the provisions of the Civil Liability for Nuclear Damage Act to the Kudankulam nuclear power plant units 3 and 4 requires further examination as it is a confusing issue, particularly for contractors trying to assess their risk with respect to particular projects.

- Vyoma Jha, Associate Fellow, Centre for International Sustainable Development Law[7]

Ms. Jha discussed India's investment treaty commitments and obligations noting that the involvement of foreign corporations in building nuclear reactors in India increases the amount of foreign direct investment in nuclear energy and, as a result, increases the threat of foreign investor claims against domestic entities. She noted that investment treaties typically include provisions that grant special protections to investors from one state (home state) who invest in the territory of the other state (host state). She explained that one of the broad investor guarantees provided in these treaties gives private investors the right to sue countries directly before an international arbitral tribunal in the event of a breach of any treaty obligation. She indicated that this development is all the more relevant in light of the rapid increase in investor-state disputes over the last decade, coupled with the first known investment treaty arbitration outcome against the government of India[8] and a spate of recent investor claims against India.

Ms. Jha stated that India is aiming to attract foreign direct investment of USD 100 billion in nuclear energy in the next 20 years. She highlighted the fact that in light of the various investment treaties India has signed with different countries, India is vulnerable to being sued by foreign investors in the nuclear energy sector. One such example that she focused on was with respect to Russia's request to waive

7. Vyoma Jha's paper on "International Investment Treaty Implications for the Indian Position on Nuclear Liability" will be published in the *Journal of Risk Research* in 2013 as noted above.
8. White Industries Australia Limited v. Republic of India, UNCITRAL, final award dated 30 November 2011.

the Civil Liability for Nuclear Damage Act, 2010 for the two Russian reactors being built at the Kudankulam nuclear power plant units 3 and 4. The Indian government has taken the position that the Kudankulam nuclear power plant reactors 1 and 2 are not covered by the Civil Liability for Nuclear Damage Act, 2010 as they are governed by an intergovernmental agreement with Russia that never envisaged a right of recourse against the Russian suppliers. The applicability of the Civil Liability for Nuclear Damage Act, 2010 to units 3 and 4 remains unsettled. Ms. Jha noted that Indian nuclear liability law is *sub judice* before the Supreme Court of India by way of a public interest litigation matter that seeks a writ declaring that all nuclear suppliers to the Kudankulam plants be covered by the Civil Liability for Nuclear Damage Act, 2010 irrespective of any agreement or undertaking.

Relying on the two investment treaty arbitrations involving Germany and the Swedish company Vattenfall that challenged host state regulatory discretion, Ms. Jha analysed whether a decision of the Supreme Court of India (or any subsequent policy decision by the government of India), which would affect the liability waiver to Russian suppliers, could have serious implications under international investment law. She noted, for instance, that a decision by the Supreme Court of India on the question of nuclear liability may raise potential investor claims on the grounds of a breach of "fair and equitable treatment".

Ms. Jha concluded by highlighting that in its zealousness to increase foreign direct investment in the nuclear energy sector, India might be exposing itself to the threat of investor claims for the slightest inconsistencies between its regulatory actions and international investment commitments. In other words, policymakers in India need to be mindful of the possible implications of investment treaties on its domestic policy or regulatory action, even in the nuclear energy sector. Thus Ms. Jha suggested that the Indian government ought to ensure that future investment treaties with countries, which may be potential foreign investors in the nuclear energy sector, do not suffer from the same pitfalls as seen in the existing old-style Indian investment treaties.

- Amey Pathak, Partner, Amarchand & Mangaldas& Suresh A. Shroff & Co. (AMSS)

Mr. Pathak noted that financing is a key aspect of nuclear power projects due to the large amount of investment required. He explained that the primary sources of financing for such power projects are typically banks, export credit agencies (ECAs) and financial institutions. However, he stated that banks generally have a limited ability to fund these large-scale infrastructure projects.

He suggested that nuclear power projects face several challenges and risks, including the particularly sensitive issue of land acquisition. He explained that the Land Acquisition Bill with its "public purpose" provision proposes an amount of compensation which is 2 to 4 times the market value of the land. He noted that even requirements under environmental laws, such as clearance from the Ministry of Environment and Forests of the government of India, come with their own set of requirements and challenges. In addition, he reminded the audience that it is not uncommon to observe delays in the construction of nuclear power plants and that such delays result in cost overruns which affect the viability of the projects themselves. He explained that, generally speaking, the original capital cost of a nuclear power plant is approximately 8-10 Crore/megawatt, and that such a project is typically of 200-400 megawatt size, which results in a very high cost.

Mr. Pathak suggested that from an asset management perspective, Indian banks can provide loans having a start-to-finish tenure of 10-15 years. He noted that the first 4-5 years of a nuclear power plant project are dedicated to construction (during which time there is a moratorium on the repayment of loans) which leaves about 10 years for the repayment of loans, a time period that is usually too short for the

repayment of large loans. He suggested that if the amount of debt required for nuclear project funding is reduced to enable the debt to be repaid within a shorter period, the promoter entity, government entity or private sector entity assisting in the funding of the nuclear project must contribute a larger amount of capital. He noted that private sector funding is not permitted in this sector at this time, and that as a result, export credit agencies and multilateral lending agencies have become more important as they are able to provide loans of longer tenure. However, he stipulated that there are certain multilaterals which have policies not to fund nuclear power projects.

Mr. Pathak further observed that procurement risks should be taken into account, specifically since suppliers of equipment are very few and that every supplier has its own intellectual property rights. He explained that for this reason it may be difficult to find a substitute supplier, especially in a situation in which a supplier is in breach of contractual obligations or is being wound up. He felt that because suppliers are few in numbers, technical expertise is limited.

He also reviewed the fuel requirements for nuclear power plants, noting that the domestic availability of uranium is sufficient for operation of a 10 000 MW reactor and that fuel resources are governed by international treaties. He indicated that there is always a risk of a fuel supplier not supplying the fuel due to international treaty commitments, which is a significant risk, given that fuel is required on a constant basis for the life of a nuclear plant.

Following a comment made by one of the participants that the private sector is taking steps towards developing its capabilities with respect to technology, supply and design in the nuclear power sector, Mr. Pathak concluded that it would be worth looking at "global best practices" in this regard.

When asked whether bonds would be a good option to ensure capital availability, Mr. Pathak responded that the bond market in India needs to develop further. He explained that, typically, bonds are raised after the construction phase, and not during construction, as there is significant construction risk which bond holders may not be willing to assume.

Panel Session 2: Regulatory and Stakeholder Engagement in Nuclear Energy Projects

- Chair: Justice A.M. Thipsay, Judge, Bombay High Court

The Chair of the session stated that nuclear energy development requires robust laws and regulations that address all relevant aspects and concerns, and that such laws and regulations also ensure that there will be public participation and safety at all levels.

- Dr. S. S. Bajaj, Chairman, Atomic Energy Regulatory Board (AERB)

Dr. Bajaj began his presentation by stating that the regulation of safety stands at the centre of all the AERB's activities. He traced the development of the nuclear sector in India and the establishment of the AERB in 1983 through the provisions of Atomic Energy Act, 1962. He noted that there has been an evolution from self-regulation in the 1950s to close safety supervision and consent by the AERB throughout the siting, construction, commissioning, operation and decommissioning phases of a nuclear power plant's lifetime. He stated that while the licensee retains the prime responsibility for ensuring safety of a nuclear power plant, the AERB ensures that the licensee is performing its responsibilities adequately. Dr. Bajaj also provided an overview of the various AERB safety reviews and committees, which include external experts. Dr. Bajaj further elaborated upon the regulation of operating plants which involves regular reporting requirements, inspections and detailed safety reviews, and a periodic safety review every 10 years. He stated that this process entails a thorough safety assessment of the nuclear

power plant against current safety standards and practices, and that any shortfalls or non-compliance is analysed and upgrades are carried out, if necessary, ensuring constant safety.

Dr. Bajaj suggested that there are well-established safety principles, criteria and practices for design, operation and management of nuclear power plants. He explained that the designs incorporate defence-in-depth philosophy and safety design principles of multiple barriers, among other safety and security measures. He stated that the annual reports of the AERB, which are publicly available on its website, provide information at a very detailed level regarding the safety performance of all nuclear power plants in India.

Dr. Bajaj also stressed the fact that the AERB is independent of the Department of Atomic Energy (DAE). He explained that the AERB's reporting to the Atomic Energy Commission (AEC), a high-level policy making body, consists of the presentation of annual reports and budget proposals. He stressed the fact that the AERB has total autonomy in regulatory decision-making, and that its independence can be gauged by the large number of enforcement actions taken by the AERB. He emphasised that the AERB had ordered numerous safety improvements in design/operation, additional tests, analyses, and even stoppage of work or operation on previous occasions and noted that the recently tabled Nuclear Safety Regulatory Authority Bill proposes to further strengthen the independence of the nuclear regulator.

Given the importance of public involvement and the mixed experience thus far with public hearings as part of the environmental impact assessment procedure, Dr. Bajaj was also happy to announce that the AERB is finalising a new method to engage with the public in the early planning stages going forward, which will be implemented on a trial basis with the Haryana (Gorakhpur) siting process. In conclusion, Dr Bajaj stated that "public confidence is of absolute importance to the AERB."

- Shah Nawaz Ahmad, Senior Advisor, World Nuclear Association

Mr. Ahmad outlined the objectives and functions of the World Nuclear Association (WNA), a body that encompasses the entire range of nuclear power works and services and that remains the predominant industry voice in the international nuclear power arena with 200 members from around the world.

He explained that WNA members comprise the who's who of the nuclear world including uranium miners, transporters, technology providers, manufacturers, contractors, plant owners and operators, and lawyers and other service providers. He noted that the WNA has 16 working groups which deal with the detailed and technical aspects of the nuclear business, suggesting that from the point of view of this event, the most relevant WNA working groups are those related to nuclear law and contracting, co-operation in reactor design evaluation and licensing (CORDEL), supply chain, construction risk management and security of the international fuel cycle. He explained that these working groups address industry-related issues in the relevant technical areas and articulate them in appropriate fora and with the relevant organisations, particularly the IAEA.

Mr. Ahmad praised the AERB as a robust, safety-oriented board with great technical expertise. Moreover, he claimed that the AERB's ability to call upon designers, developers, operators and other specialists is a distinct advantage.

However, he reflected that post-Fukushima, people are not at all convinced that accidents will not take place. He suggested that theoretical figures about failure rates and assurances of being able to tackle beyond design basis events need to be supplemented through increased transparency and more robust confidence building measures. He concluded that a lot of assurance work needs to be done on this front.

Mr. Ahmad explained that the WNA focuses on the harmonisation of licensing and design, as there are many licensing models worldwide, observing that flexibility and adaptation to cultural variations is important. He suggested that working toward greater clarity regarding requirements and timelines for approvals as well as closer interaction between regulators and other involved agencies may be helpful as a way to address the challenge to build projects on time and within budget. He noted that documentation and compliance with legal and regulatory requirements are essential to a nuclear power plant project. For this reason, ensuring the coherence of documents with comprehensive international treaties or agreements is very important.

Through its CORDEL working group, WNA seeks to promote a world-wide regulatory and industry environment in which internationally accepted standardised reactor designs can be widely deployed without major design changes. Mr. Ahmad added that it is a misconception that standardisation means similar designs and that standardisation should be interpreted in the context of ensuring easy understanding and comparability of all designs. He suggested that better communication amongst the stakeholders is of vital importance to the success of standardisation. Mr. Ahmad concluded by stating that "patience, precise communication and documentation, and transparency are key requirements to move forward."

- Mohit Abraham, Partner, PXV Law Partners

Mr. Abraham claimed that in the wake of the accident at the TEPCO Fukushima Daiichi nuclear power plant, public acceptance of nuclear power is of critical importance. He delineated two different phases in the history of nuclear power projects in India: a "secretive phase" and a "post-secretive or public phase". He suggested that earlier projects such as Narora and Kalpakkam were undertaken in the secretive era. He stated that following the conclusion of the agreement between India and the United States on civil nuclear co-operation (also known as the "123 Agreement") and the Nuclear Suppliers Group waiver on exports to India, as well as the accident at the Fukushima nuclear power plant, "nuclear" became a public issue in the sense that it received nationwide publicity. He is of the view that easy access to information (particularly via the Internet) has left both good and bad perceptions open to scrutiny. He claimed that concrete steps are required to tackle the transition from the secretive to the public era and that the following aspects require special attention:

a) ensuring the health and safety of people living in the proximity of nuclear projects;

b) explaining basic information to the public regarding nuclear waste, including the amounts generated and its treatment;

c) mitigating public fear of nuclear catastrophes and ensuring appropriate management of such incidents; and

d) addressing non-radiological aspects relating to operation including pollution and soil contamination.

Mr. Abraham noted the vastly different socio-economic strata of people in India and the critical need for effective communication via appropriate channels for each segment of the population. He suggested that the manner in which information is communicated should be tailored to address each particular audience, and that communication may be very different with the urban middle class versus blue collar workers in rural areas or illiterate people. He stated that one should design a communication strategy in a creative manner to ensure effective results.

Mr. Abraham claimed that examining models for public communication that have been successful in other countries, such as the model institutionalised in France to educate its citizens about nuclear energy, may be useful. He argued that India may require a different approach in light of socio-economic considerations. However, one possible model could focus on public awareness efforts through the training of school teachers, doctors and other public officials who in turn disseminate information to the local community. He suggested that appointing local information officers on a permanent basis to address queries and provide information to the general population is one possible option. He stressed that all of these approaches should be institutionalised in laws that expressly provide people with the right to information and transparency in relation to nuclear power projects in India, and that this approach would go a long way toward building trust in nuclear energy in the general population.

- Dr. Anupam Jha, Assistant Professor, Faculty of Law, University of Delhi[9]

Dr. Jha examined the impact of international and national law on the safety of nuclear power plants in India, the international peer review system and the functioning of the regulatory authorities in India. On the issue of the international peer review system, Dr. Jha highlighted the importance of the Convention on Nuclear Safety, to which India is a party, and the weaknesses of its review system of nuclear power plants in member states. He claimed that the Fukushima accident proved that peer review by independent experts on a constant basis could significantly enhance safety at nuclear power plants because the awareness that any plant could be subject to review by independent experts would give operators an additional incentive to implement the highest possible safety standards.

Dr. Jha stated that the nuclear establishment in India considers the safety of nuclear power plants to be its primary objective. Dr. Jha was, however, of the view that the institutional structures which have been created to meet this objective have by and large not been successful in doing so. He also touched upon the issue of regulatory independence, noting that the AERB has not been granted enough power to implement its safety codes and practices because the AERB is dependent administratively as well as financially on the DAE. He claimed that although the need of a completely independent regulator with full powers to implement safety regulations has been accepted by the government in the wake of the Fukushima accident, the actual configuration of the powers of the proposed new Nuclear Safety Regulatory Authority is difficult to assess.

Dr. Jha raised the issue of transparency, claiming that even though the Indian legislature has enacted the Right to Information Act, 2005,[10] citizens are not enjoying the full benefit, especially in the field of nuclear safety. He noted that the recent example of the NPCIL withholding certain information related to the Kudankulam nuclear power plants on the basis that the Russian partner would withdraw from the project if information had been revealed shows the inadequacy that must be addressed in dealing with public concerns about nuclear safety.

9. Dr. Anupam Jha's paper on "Dynamics of Legal Regime on Safety of Nuclear Power Plants in India" will be published in 2013 in the *Journal of Risk Research* as noted above.
10. Act No. 22 of 2005, available at: http://rti.gov.in/webactrti.htm.

Panel Session 3: Nuclear Liability and Insurance: Impact on Commercial Viability

- Chair: Patrick Reyners, Advisory Council Member, Nuclear Law Association & Scientific Advisor, International Nuclear Law Association
- Pierre Charreton, Chief Administrative Officer and General Counsel, AREVA

Mr. Charreton underlined that there are significant differences among civil nuclear liability legislations in different countries, while also observing that all civil nuclear liability regimes are nevertheless based on some common legal principles which remain the cornerstone of the nuclear liability regimes and by extension the nuclear sector. He explained that the five principles that tend to underpin most nuclear liability regimes are: (1) channelling of liability; (2) no-fault liability; (3) limitation of liability in amount and time; (4) mandatory financial security matching the amount of the operator's liability; and (5) exclusive jurisdiction so that all claims are handled by a single dedicated jurisdiction.

Mr. Charreton explained that the importance of the legal channelling mechanism lies in the fact that the operator, who is primarily responsible for the nuclear safety of its installation, is exclusively liable to the victims of nuclear damage. He noted that at the same time, the legal channelling mechanism has ensured that nuclear suppliers have not been exposed to a disproportionate risk, which in turn could act as a deterrent and could in turn affect the development of the nuclear energy industry, and nuclear energy by extension. He clarified that as a result of this legal channelling system, victims do not have to investigate whether the operator, the supplier, the designer, or the carrier actually caused the nuclear incident. He stated that the Bhopal tragedy was an example of what is likely to happen in the event of a large disaster if liability principles such as those developed in the nuclear industry do not exist. As a result, it is critical, even from a potential victim's perspective, that the legal channelling principle to the operator remains robust.

Mr. Charreton insisted on the relevance of the international civil nuclear liability regimes, which have been again confirmed in the most recent amendments to the Paris and Vienna Conventions. For him, it is essential that the basic principles of the civil nuclear liability be kept together, as one missing principle would be detrimental to the interests of possible victims as well as the nuclear energy industry. He argued that these intertwined principles have proven their efficiency in structuring the nuclear industry via a genuine allocation of risk, while ensuring a rapid indemnification of victims and the availability of funds in the unlikely event of a nuclear incident.

Given the transboundary dimension of the potential outfall of a nuclear incident, he stated that it is equally important for countries to ensure the equal treatment of all victims including those not located in the state in which the nuclear installation is located. He claimed that the best option for countries is to be part of an international treaty regime highlighting that once a country joins such an international regime, the domestic operator also obtains access to the global insurance market, which is of critical importance. He stated that obtaining such insurance is in turn assurance for the general public that sufficient funds will be available in the event of a nuclear incident. Mr. Charreton believes that striving toward a strengthened harmonisation between the various domestic and international nuclear liability regimes is critical for everyone involved – the potential victims of a nuclear incident as well as the nuclear industry.

Turning his attention to AREVA's experience in India, Mr. Charreton concluded that AREVA sees its presence in India as one aimed at forging strong partnerships based on win-win approaches, where joint research and development can be undertaken, and with a strong emphasis on localisation. Mr. Charreton also

observed that during the years that AREVA has been present in India, it has witnessed the development of an increasingly proactive and thorough government regulator at work.

- Y. Ramulu, Deputy General Manager (nuclear insurance), General Insurance Corporation of India (GIC Re)

Mr. Ramulu argued that the passing of the Civil Liability for Nuclear Damage Act, 2010 was a major turning point in the history of nuclear industry in India. He explained that by way of this act, the operator of a nuclear facility is strictly liable for compensation as stated in Section 6(2), adding that Section 8 of the Act requires the operator to maintain insurance or financial securities to cover its liabilities.

He remarked that the coverage up to the prescribed liabilities may be easy for state sponsored companies like NPCIL. However, as and when the nuclear sector opens up to private players, the availability of cost effective insurance and/or financial security will pose a major hurdle for them to enter the marketplace.

He argued that nuclear insurance is an unattractive market as a result of its inherent characteristics such as a large capacity requirement, unknown/undesirable accumulation of risk, low probability/frequency with corresponding high severity, catastrophic nature of risk, very few number of risks worldwide, few past claims history, shortage of expertise, or the exclusion of nuclear perils from individual policies, and, hence, any such insurance coverage is offered with an objective of catering to social and national obligations rather than one of profit making.

He explained that nuclear power plants are divided into a "hot zone," the critical area in which the nuclear reactions take place, and a "cold zone" where steam generated turbines are operated. He went on to note that in India, insurance covers material damage to assets and consequent business interruption, as well as damage to the cold zone of a nuclear power plant arising out of fire, lightning, flooding, earthquakes, or machinery breakdown, whereas insurance coverage for damage relating to the "hot zone" is not available. In the current commercial scenario wherein NPCIL is the sole commercial operator, he stated that there is an immediate need for insurance coverage of the 6 power stations and their 20 reactors, which would require an enormous insurance capacity.

Mr. Ramulu explained that such risks are covered internationally by insurance pools that are usually country-specific in nature, with few exceptions including the Nuclear Risk Insurers (UK), the French Atomic Risk Insurance Pool (Assuratome) and the Czech Nuclear Insurance Pool. There are around 26 nuclear insurance pools operational worldwide. He noted that the inspection of the nuclear installations, a prerequisite for the coverage of such installations from international insurance pools, is a major hurdle in the creation of the nuclear insurance pool for India.

He announced that GIC Re has taken initiative toward the creation of a nuclear insurance pool for India and is actively engaged with all the relevant stakeholders in this regard.

Mr. Ramulu clarified that one of the ideas which emerged was to proceed with establishing a domestic insurance pool based upon commitments from Indian insurance companies, which would then be supplemented, as necessary, with financial support from the government of India to provide sufficient funds to constitute a viable insurance pool.

GIC Re is of the view that with the right approach, these issues can be resolved and India can have its first nuclear insurance pool.

- Dr. Jitendra Kumar, Legal Advisor, Department of Atomic Energy[11]

Dr. Kumar began with an overview of the policy landscape, noting that India is a large country, both in terms of surface area as well as population, and arguing that it is therefore necessary to exploit the full potential of all resources, including nuclear energy, in a safe manner. He believes that overall policies with regard to India's pursuit of nuclear power should be viewed against this background. He explained that India has established a legal framework to address the incidental issues related to nuclear energy including safety, security and non-proliferation, as embodied in national laws, international conventions, treaties and agreements to which India is party.

Outlining the legal framework, Dr. Kumar mentioned that the Atomic Energy Act, 1962 is the primary legislation for the governance of nuclear issues in India. The Atomic Energy Regulatory Board (AERB) has functioned since 1983 under this Act. To convert the *de facto* autonomy of the regulator into a *de jure* one, he explained that the Nuclear Safety Regulatory Authority Bill, 2011 has been introduced in Parliament and is going through the legislative process. Dr. Kumar clarified that nuclear trade is regulated through the Guidelines for Implementation of Arrangements for Cooperation Concerning Peaceful Uses of Atomic Energy with Other Countries for nuclear transfers, issued on 4 July 2010. Subsequent to the relaxation of the NSG guidelines with respect to nuclear trade with India, he noted that India has signed agreements of co-operation with France, the US, the Russian Federation, Namibia, Argentina, Canada, Kazakhstan and the Republic of Korea, as well as memoranda of understanding with the UK and Mongolia. He believes that as this process continues and India's nuclear power programme expands, India's engagement in the international arena will intensify, leading to the further evolution of the framework for governance to support India's accelerated growth in the installed nuclear capacity base.

Dr. Kumar stated that the Civil Liability for Nuclear Damage Act, 2010, was enacted to provide prompt compensation to the victims of a nuclear incident, should such an unlikely event occur. He explained that the Act provides for the channelling of liability to the operator of a nuclear installation through a no-fault liability regime. He went on to explain that although some concerns have been expressed about Rule 24, in fact, this Rule does not restrict the scope of the operator's right of recourse contained in Section 17 of the Act, either in amount or duration.

He clarified that the Rule specifies a minimum amount for the operator's right of recourse under Section 17(a) and the corresponding time period for which this right must be valid. However, nothing in Rule 24 prohibits the operator and the supplier from agreeing to a larger right of recourse in the contract. He further clarified that the Rule makes no mention of the other two clauses of Section 17 which stand alone, and that Rule 24 protects the interests of the suppliers who would be supplying nuclear material or nuclear equipment or components of low value.

He stated that it would be unreasonable to expect every supplier, irrespective of the value of the contract with the operator, to be liable for the full amount of the operator's liability under the Act. In his opinion, arguments that large contracts can be split into several smaller value contracts, thereby effectively limiting liability, is based neither on facts nor practice. He stated that, as a matter of fact, any nuclear incident is the result of failure of several pieces of safety equipment and thus the supplier of one particular component cannot be held solely responsible for an incident. Dr. Kumar added that the duration of the operator's right of recourse needs

11. Dr. Kumar is the Legal Adviser to the government of India. This presentation was solely in his personal capacity and can in no way be attributed to the government of India.

to be examined keeping in mind that plant life and equipment life are not the same, rationalising that the life of equipment can be much less than the life of the nuclear power plant, and equipment is guaranteed only for its own life and not for the life of the plant. Thus, he analysed, the right of recourse for equipment or service has to be linked to the specific product liability period and Rule 24 extends the duration of this right to the period of the initial licence in cases where this period is longer than the product liability period stipulated in the contract.

As to the misconception that Explanation 2 to Rule 24 restricts the operator's right of recourse, Dr. Kumar recalled that Section 17 of the Act provides the operator with a right of recourse only "after paying the compensation for nuclear damage in accordance with section 6" of the Act. He explained that this provision essentially means that the operator's right of recourse cannot be more than the amount actually paid as compensation under Section 6. He added that one must rely on the definitions within the Act and established principles of contractual obligations in order to ascertain the nature and extent of liability under the Act and the Rules.

Upon being asked to put forward his analysis of Section 46 of the Liability Act which states that "the provisions of this Act shall be in addition to, and not in derogation of, any other law for the time being in force, and nothing contained herein shall exempt the operator from any proceeding which might, apart from this Act, be instituted against the operator", Dr. Kumar opined that Section 46 is clear in its importance in as much as it refers to liabilities other than civil liability for nuclear damage, e.g. criminal liability or environmental offences.

In response to a query as to the compatibility of the Act with the Convention on Supplementary Compensation for Nuclear Damage (CSC), Dr. Kumar referred to Article XII (2) under Chapter IV of the CSC on the exercise of options, according to which "[n]othing in this Convention shall prevent any Contracting Party from making provisions outside the scope of the Vienna or the Paris Convention and of this Convention, provided that such provision shall not involve any further obligation on the part of the other Contracting Parties, (..)"[12]

Upon enquiry by the Chair of the Session about whether India would consider having its national legislation peer reviewed by an international body/treaty mechanism – as was the case with Germany under the Paris Convention when it decided to revert to an unlimited liability principle in its domestic legislation – Dr. Kumar clarified that the Indian law must be seen as legislation of a sovereign country and the democratic expression of the will of a nation with 1.21 billion people. Ultimately, the law can be reviewed only by the Parliament or the judiciary in accordance with the Constitution of India.

Dr. Kumar concluded that the Act does away with certain outdated notions of nuclear liability, in particular the restricted view of legal channelling, and may well be a forerunner of a new model of domestic legislation. He stated that this novel approach may in the long run influence the outlook of the classic international nuclear liability regimes, none of which qualifies as a global nuclear liability regime – a goal still to be pursued.

Lastly, Dr. Kumar reminded the audience that the authoritative interpretation of laws is ultimately only a judicial prerogative and the constitutionality of both the Act and the Rules is currently under examination by the Supreme Court of India in the public interest litigation pending before it, and, hence, is a matter *sub judice*. He clarified that it is, therefore, the Supreme Court's judgment that must be awaited as

12. Convention on Supplementary Compensation for Nuclear Damage (29 September 1997), 36 ILM 1473, available at: http://www.iaea.org/Publications/Documents/Infcircs/1998/infcirc567.shtml.

the court is the only authority on the status and interpretation of the Act and the Rules. He suggested that all interested parties would be well advised to engage in due diligence and should be encouraged to consult professionals of their choice in making conscientious business decisions for themselves.

- S. K. Dhiman, Head, Corporate Legal Group, Nuclear Power Corporation of India Limited (NPCIL)

Complementing the view of Dr. Kumar, Mr. Dhiman reiterated the fact that the Civil Liability for Nuclear Damage Act, 2010 must be seen as a "complete code", arguing that everything is clearly stated in the Act itself. Hence, he believes that no civil court will have jurisdiction in case of a nuclear incident, noting that Section 35 of the Act bars filing any claim against the *operator* in any court. He explained that even Section 46 of the Act widens its scope only vis-à-vis the operator and not the supplier. Moreover, Mr. Dhiman re-emphasised that in this context the Atomic Energy Act, 1962, permits only the government, an authority or corporation established by the government or a "government company" to operate a nuclear power plant in India, which is reflected in Section 1(4) of the Civil Liability Act. He noted that the Civil Liability Act contains numerous provisions which directly target the operator (NPCIL), but apart from the right of recourse provision pertaining to the operator-supplier relationship, private companies as such cannot be prosecuted under the Act.

Mr. Dhiman added that the Civil Liability Act must clearly be seen as a "*lex specialis*" – that is, in the event of conflict between the Civil Liability Act and the general rules of (tort) law, the specific provisions of the Civil Liability Act would necessarily prevail based on the principle that a later specific statute overrides the provisions of a prior general statute (*lex specialis derogat leg generali*).

Case law

Canada

Judicial review of Ontario Power Generation's Darlington new nuclear power plant project licence to prepare site

Ontario's government-owned power company, Ontario Power Generation (OPG), has been pursuing a new nuclear power plant project at one of its current nuclear power sites, Darlington, for a number of years.[1] In this regard OPG applied to the Canadian Nuclear Safety Commission (CNSC) for a licence to prepare the site.[2] This application triggered the requirement for an environmental assessment (EA) at the federal government level before a licensing decision could be made, and this process was completed in 2011. The EA ultimately determined that the project was not likely to cause significant adverse environmental effects, provided the mitigation measures proposed and commitments made by OPG during the review, and the EA Panel's various recommendations, were implemented.[3] The completed EA allowed the CNSC to proceed with considering the issuance of a licence to prepare the site for the new build. However, before the CNSC could decide on the licence application, the EA process was challenged in the Federal Court of Canada by two Canadian non-governmental organisations (NGOs).[4] The proceedings in this matter are ongoing but did not prevent the CNSC from making a licensing decision, which it did in 2012 when it issued a licence to OPG to prepare the site. This licensing decision has now also been challenged in the Federal Court by the same NGOs with the main basis for the challenge being that the EA was flawed, such that no licensing decision could have been properly made. As such, the legal challenge to the licence decision largely repeated the bases for the earlier challenge to the EA process.

As the two judicial review applications are nearly identical, the Federal Court directed by order in November 2012 that the two matters be heard one immediately after the other by a single judge, and the evidence filed will be reviewed as part of both applications. While a hearing date has not yet been set, it is anticipated that the matter could be heard by the summer of 2013.

1. To date OPG has not yet selected a specific technology and is seeking regulatory approvals on a plant parameter envelope basis within which various technologies could be considered. Any final decision to proceed will have to have been considered within this envelope by regulators, including the CNSC.
2. Other licences required from the Commission include licences to construct, to operate, to decommission, and to abandon.
3. See Canadian Environmental Assessment Agency (2011), "Joint Review Panel Environment Assessment Report – Darlington New Nuclear Power Plant Project – August 2011", available at: www.ceaa.gc.ca/050/documents/55381/55381E.pdf.
4. For additional information on this matter, please see *Nuclear Law Bulletin*, No. 88, (2011/2), OECD/NEA, Paris, p. 65.

France

Court of Appeal of Toulouse, 3 December 2012, Judgement No. 1200867, Golfech – Prosecution for accidental spillage of radioactive effluents

In January 2010, a significant amount of radioactive effluents from the Golfech nuclear power plant, operated by Electricité de France (EDF), was accidentally released into the environment following a series of technical incidents.

In order to eliminate radioactive elements from the water and to avoid any hazards, a branch circuit had been established running through a sump pit which is normally intended to store residual water. In this case, the water level rose within the sump pit and sewage pumps, and an overflow occurred when the automatic drains stopped working.

The police court of Castelsarrasin rendered a judgement on 29 March 2012, whereby EDF was found innocent of the following offenses for which it was being prosecuted:

- Absence of staff environmental protection training for personnel;
- Insufficient volume of fluid retention in case of accident;
- Insufficient volume of the sump pit;
- Absence of a detection or alarm system appropriate to the risk; and
- Non-compliant storage and disposal of liquids.

The public prosecutor and the three associations which had initially complained appealed this decision on the grounds, *inter alia*, that:

- The sump pit was not intended for this purpose and the affected pumps were not designed for continuous operation; and
- The alarm used was not specifically dedicated to the reporting of overflows.

The Court of Appeal of Toulouse, in its judgment of 3 December 2012, confirmed the dismissal of charges against EDF relating to the absence of environmental protection training for staff, insufficient volume of fluid retention in case of accident and insufficient volume of the sump pit.

However, EDF was found guilty of the two other offenses and was fined EUR 2 000 per offense. Finally, EDF was ordered to pay EUR 1 500 in damages to each of the associations having filed the complaint.

Court of Cassation, Criminal Chamber, 20 November 2012, Decision No. 11-87531

Following the explosion of one of the reactors at the Chernobyl nuclear power plant on 26 April 1986, radioactive substances were released into the atmosphere in the form of a plume which was driven by winds to the south-east of France.

In March 2001, two associations and fifty-one individuals lodged a criminal complaint and applied for damages, on the grounds, *inter alia*, of poisoning, administration of harmful substances, injuries and involuntary manslaughter.[5]

In May 2006, the Director of the Central Department for Protection against Ionising Radiation (*Service central de protection contre les rayonnements ionisants* – SCPRI) was charged with the offences of deceit and aggravated deceit. The examining

5. See *Nuclear Law Bulletin,* No. 88 (2011/2), OECD/NEA, Paris, p. 71.

magistrate ordered the continuation of the proceedings. However, the investigating Chamber of the Court of Appeal of Paris, on 7 September 2011, overturned the order and dismissed all charges.

The plaintiffs appealed to the Criminal Chamber of the Court of Cassation. In a decision of 20 November 2012, the Court of Cassation rejected the appeals, thus confirming the dismissal, on the grounds that:

- It is clear from established case-law that "the judges hearing proceedings for homicide and unintentional injuries can only charge the defendant with these offenses when the accident is connected with certainty, even indirect, through a causal relationship with the offense allegedly committed".[6] In addition, in the case of administration of harmful substances, the legal literature traditionally considers, on the basis of Article 222-15 of the French Penal Code, that there must be a definitive causal link between the disease recognised and the act of administrating the substance. However, in this case no causal link has been proven with certainty;
- The offense of deceit, as defined in Article L. 213-1 of the French Consumer Code, can only be characterised when bad faith is proven on the part of the defendant,[7] which has not been demonstrated in this case.

India

Ruling from India's Supreme Court in a public interest litigation regarding Kudankulam nuclear power plant

On 6 May 2013, a two-judge bench of India's Supreme Court rejected the arguments put forward in the public interest litigation (PIL) petition which sought to obtain the closure of the Kudankulam nuclear power plant (KKNPP).[8] The Supreme Court did so particularly based on the larger reasoning that it is not for courts to scrutinise a particular policy (such as the government's nuclear energy policy) or decisions taken in fulfilment of that policy, in this case the establishment of the KKNPP. The Supreme Court further noted that from a safety and security point of view regarding life and property, with respect to the environment and related issues, all of the expert bodies were unanimous in their opinion that the KKNPP fully satisfied all safety norms. It added that the Supreme Court "cannot sit in judgment on the views expressed by the technical and scientific bodies in setting up of KKNPP plant at Kudankulam and on its safety and security." Moreover, it also stated that courts cannot stand in the way of India's honouring its inter-governmental agreement with the Russian Federation. The Supreme Court issued approximately 15 directions which mainly addressed safety concerns pertaining to the KKNPP, but also included the suggestion that all criminal cases filed against local protesters should be withdrawn and that "steps should be taken to educate the people of the necessity of the plant which is in the largest interest of the nation particularly the State of Tamil Nadu."[9]

6. Criminal Chamber of the Court of Cassation, decision of 11 December 1957, Bull. crim. n° 829; JCP 1958. II. 10423.
7. Criminal Chamber of the Court of Cassation, decision of 13 June 1984, D. 1985. IR 65, JCP 1985. I. 13711.
8. For more information on the cases related to the KKNPP, see *Nuclear Law Bulletin*, No. 90, (2012/2), OECD/NEA, Paris, pp. 103-109.
9. G. Sundarrajan v. Union of India & Ors., Civil Appeal No. 4440 of 2013, 6 May 2013, available at: http://judis.nic.in/supremecourt/imgs1.aspx?filename=40374.

Switzerland

Unlimited-duration operating licence granted to the Mühleberg nuclear power plant

Judgment of the Federal Supreme Court of 28 March 2013 in the matter of *Département fédéral de l'environnement, des transports, de l'énergie et de la communication*[10] *(DETEC) and Forces motrices bernoises (FMB) Energie SA v. Ursula Balmer-Schafroth a.o.* concerning the repeal of the time limitation of the operating licence for the Mühleberg nuclear power plant.[11]

On 17 December 2009, DETEC repealed the time limitation which it had imposed on FMB for the operation of the Mühleberg nuclear power plant, determining that this limitation was no longer justified in light of the establishment of the Swiss Federal Nuclear Safety Inspectorate (ENSI). Several organisations and citizens living close to the nuclear power plant appealed this decision to the Federal Administrative Court (*Tribunal administratif federal*).[12]

In its decision of 1 March 2012, the Federal Administrative Court confirmed the revocation of the time limitation formerly imposed by DETEC. However, it determined that a new time limitation was required for policy reasons and set a new deadline of 28 June 2013 for DETEC to establish a new time limitation. In parallel to the deposit of a potential new demand for continuation of the operating licence, the FMB had to provide a comprehensive maintenance plan.

FMB and DETEC then appealed to the Federal Supreme Court. While FMB alleged primarily that the new time limit and the new deadline were illegal and arbitrary, DETEC focused mainly on issues of institutional law, since it considered that the decision of the Federal Administrative Court went against the distribution of competencies purposely institutionalised by legislation between the administration (i.e. DETEC and the Swiss Federal Office of Energy – SFOE) and the safety authority (ENSI).

On 28 March 2013, the Federal Supreme Court upheld the appeals of DETEC and FMB and decided that the Mühleberg nuclear power plant should be granted an unlimited-duration operating licence. The judgement of the Federal Supreme Court in cases 2C_347/2012 and 2C_357/2012 was delivered during a public hearing; the written decision was not available as of the date this volume went to print.[13]

United States

Judgment of the Court of Appeals for the first circuit upholding NRC's consideration of wind power as alternative to relicensing under NEPA

On 4 January 2013, the US Court of Appeals for the First Circuit decided the case involving the relicensing of the Seabrook nuclear power plant.[14] The court dismissed the petition in its entirety. Before the Nuclear Regulatory Commission (NRC), Beyond Nuclear had proffered an energy-alternatives contention, arguing that, under the National Environmental Policy Act (NEPA), the license applicant's Environmental Report failed to consider wind power as a reasonable alternative to relicensing. Beyond Nuclear contended that, by limiting its alternatives analysis to just baseload-

10. Federal Department of the Environment, Transport, Energy and Communications.
11. See: www.uvek.admin.ch/dokumentation/00476/03259/03324/03377/index.html?lang=fr.
12. For additional information regarding the various pending matters in relation to the Mühleberg nuclear power plant, see *Nuclear Law Bulletin*, No. 90, (2012/2), p. 109 and *Nuclear Law Bulletin*, No. 89, (2012/1), OECD/NEA, Paris, p. 110.
13. See: www.bger.ch/fr/index/juridiction.htm.
14. Beyond Nuclear v. NRC, 704 F.3d 12 (1st Cir. 2013).

energy providers, the NRC was engaged in "outcome controlled rigging." The court disagreed: "[F]or reasons both of law and common sense…NEPA requires only consideration of reasonable alternatives." The court then defined "reasonable alternatives" to be only those that can bring about the ends of the project being contemplated; here, baseload power generation.

Beyond Nuclear also noted that the applicant sought license renewal twenty years before expiration of its original operating licence and asserted that, given the long period of time before any renewal period would commence, the Commission should not have relied upon near-term technology as a proxy for energy alternatives during the renewal period. The court once again disagreed, and it specifically lauded the Commission's approach: "The NRC acknowledged the need for prediction, and made a rational decision that in most instances the best predictor of viability of an alternative in the distant future is the near term viability of the alternative. It did so in compliance with the law."

Judgment of the Court of Appeals for the second circuit upholding NRC's authority to issue exemptions and remanding for consideration of public participation in preparation of environmental assessment and finding of no significant impact

This case involves judicial review of NRC's grant of exemptions to Entergy for Indian Point Unit 3's fire protection programme. On 7 January 2013, the US Court of Appeals for the Second Circuit issued its decision affirming in part and reversing in part a decision of the district court, and remanding for further proceedings before NRC.[15] The Second Circuit affirmed the validity of NRC's action with regard to the issuance of exemptions to its regulations, concluding that, in its regulations, "the NRC has specifically provided for an exemption procedure," 10 CFR § 50.12, and that, "[i]n so doing, the agency acted well within the scope of its regulatory discretion."

However, the Second Circuit reversed the decision of the district court with respect to its conclusion concerning the right of the public to participate in the Commission's preparation of an Environmental Assessment (EA) and Finding of No Significant Impacts (EA/FONSI). In that respect, the court found that the record before it did not adequately explain why the EA/FONSI excluded an opportunity for public comment.

The single issue on remand hinges on regulations issued by the Council on Environment Quality (CEQ) governing public participation in agency decision making, which the court deemed applicable despite recognising case law supporting the position that CEQ regulations are not binding on the NRC. These regulations require federal agencies to ensure that "environmental information is available to public officials and citizens before decisions are made and before actions are taken,"[16] and that agencies "make diligent efforts to involve the public in preparing and implementing their NEPA procedures…and solicit appropriate information from the public," including public hearings "whenever appropriate."[17]

The court acknowledged that "NEPA itself does not assign the public any particular role" in the process of preparing an EA/FONSI, and that CEQ regulations requiring some degree of public awareness and opportunity for input "do no clearly define how public involvement requirements might apply where, as here, the agency prepares only an EA (and FONSI) and not an EIS." Nonetheless, it read the case law interpreting these CEQ regulations to require public involvement "to the extent practicable."

15. Brodsky v. NRC, 704 F.3d 113 (2nd Cir. 2013).
16. 40 CFR § 1500.1(b) (2012).
17. 40 CFR § 1506.6(c)-(d) (2012).

The court ruled that "the agency record" in NRC's grant of the exemptions "does not permit a reviewing court to determine whether a reasoned basis exists for the NRC's decision not to afford any…public involvement in the exemption decision." The court recognised that NRC has discretion as to whether and how the public should be informed of its proposed grant of an exemption. But the court ruled that the agency record "fails to provide any agency explanation for why no public participation was deemed practicable or appropriate with respect to the challenged exemption." Accordingly, the court remanded to the district court with instructions to remand to NRC "so that the agency may (1) supplement the administrative record to explain why allowing public input into the exemption request was inappropriate or impracticable, or (2) take such other action as it may deem appropriate to resolve this issue."

Judgment of the Court of Appeals for the first circuit upholding NRC's decision not to reopen or suspend Pilgrim relicensing proceeding

The case involved the Commonwealth of Massachusetts's challenge to the Commission's decision to deny Massachusetts's requests to reopen the Pilgrim nuclear power station (Pilgrim) licence renewal adjudicatory record and suspend the Pilgrim licence renewal proceeding. On 25 February 2013, the United States Court of Appeals for the First Circuit issued a decision denying Massachusetts's petition for review, ruling in the NRC's favour on all points.[18]

The basis for Massachusetts's requests in the NRC proceeding had been that both the severe accident mitigation alternatives (SAMA) analyses in the Pilgrim supplemental environmental impact statement (SEIS) and the analysis of spent fuel pool environmental impacts (specifically as it pertains to spent fuel pool fires) in the generic environmental impact statement for licence renewal (GEIS) required updating because of "new and significant information" from the events at the Fukushima Daiichi nuclear power plant in Japan following the earthquake and tsunami on 11 March 2011, and the associated report issued on 12 July 2011, by the NRC's Near-Term Task Force.[19]

The court began its analysis by declaring that "there is no apparent conflict between the NRC's record reopening and general admissibility standards and NEPA's standard requiring supplementation of an" environmental impact statement (EIS). The court then went issue by issue, addressing the Commission's application of its relevant standards. Among other things, the court upheld the Commission's finding on a waiver-of-regulations question, finding no problem in the Commission's finding that Massachusetts had not shown its spent fuel pool fire claims to be "unique to Pilgrim" so as to justify waiver of the pertinent GEIS finding under 10 CFR § 2.335. In addition, the court rejected Massachusetts's arguments that NRC's use of threshold procedural standards to deny Massachusetts's request for a merits hearing somehow violated the basic grant of hearing rights under the Atomic Energy Act.

The court also held that the Commission had considered the Task Force Report when analysing Massachusetts's requests. The court observed that "[t]he Task Force Report did not make environmental-impact estimates, assess the implementation costs of its recommendations, or engage in any [probabilistic risk assessment], as even Massachusetts's own expert admitted," and so it "did not reveal the type of information used in a NEPA analysis."

18. Massachusetts v. NRC, 708 F.3d 63 (1st Cir. 2013).
19. NRC (2011), "Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Daiichi Accident", 12 July, available at: http://pbadupws.nrc.gov/docs/ML1118/ML111861807.pdf.

Massachusetts had also argued that suspension was required as a matter of law, given the ongoing NRC assessment of Fukushima lessons learnt. The court rejected this argument. The court held – in line with previous First Circuit case law – that "NEPA imposed no obligation on the NRC to withhold the granting of a renewed license here because of the possibility that currently unavailable information might become available in the future." The court also understood that the NRC planned to apply Fukushima lessons learnt to "[a]ll affected nuclear plants…regardless of the timing of issuance of the affected licenses."

Judgment of the Court of Appeals for the DC Circuit vacating the NRC's transfer of authority to the state of New Jersey over clean-up of manufacturing site

This case involved the NRC's transfer to New Jersey of regulatory authority over a contaminated site. Beginning in the 1990s, Shieldalloy engaged in extensive negotiations with the NRC concerning the decommissioning of its metal alloy manufacturing site pursuant to a "restricted" release plan, which would have left radioactive materials on-site. In 2009, after Shieldalloy submitted a fourth such plan to the NRC for review, the NRC designated New Jersey as an "Agreement State", and authority over the site was transferred to the state of New Jersey. Shortly thereafter, New Jersey rejected Shieldalloy's decommissioning plan, finding that the plan did not meet the state's remediation requirements.

Shieldalloy challenged the NRC's transfer decision in the DC Circuit, asserting that the NRC's 2009 entry into an agreement with New Jersey interfered with its then-pending application for approval of its decommissioning plan. In Shieldalloy Metallurgical Corp. v. NRC, 624 F.3d 489 (DC Cir. 2010), the court held that the Commission had not adequately explained how the transfer did not unduly interfere with Shieldalloy's application and, as a consequence, invalidated the transfer and remanded the case back to the Commission. Following a decision by the NRC on remand, Shieldalloy appealed again and, on 19 February 2013, the DC Circuit voted two to one to vacate the transfer for a second time and to remand the case to the Commission for further proceedings.[20] In its latest decision, all three judges deferred to the NRC's conclusions that: (1) the agency lacks authority under Section 274 of the Atomic Energy Act to retain jurisdiction over a site at a licensee's request where the state is willing to assume regulatory authority over the site and meets other applicable criteria; and (2) the NRC's agreement-state assessment criterion 25, which requires that discontinuance of the NRC's regulatory authority not result in interference or interruption of the licensing process, did not compel the NRC to retain jurisdiction over the Shieldalloy site. However, the court, with one judge dissenting, sided with Shieldalloy on a third issue, holding that the agency had failed to explain how New Jersey's rules governing licence termination were compatible with the NRC's restricted release provision. The court remanded the case to the NRC for further explanation of this issue.

A central feature of Shieldalloy's argument was its assertion that "dose comparisons are not only permissible but *required* by the NRC regulations and guidance," and that, pursuant to 10 CFR § 20.1403(a) and agency guidance, the NRC requires adherence to a restricted release decommissioning plan if the dose levels associated with such a plan can be reduced to a level that is lower than what could be achieved through an unrestricted release plan. Shieldalloy contended that New Jersey will allow only unrestricted release decommissioning and that, as a result, complying with New Jersey law could endanger the public. The NRC disagreed with this conclusion, asserting that rather than mandating a comparison of doses between restricted and unrestricted decommissioning scenarios, § 20.1403(a) merely

20. Shieldalloy Metallurgical Corp. v. NRC, 707 F.3d 371 (DC Cir. 2013).

imposes a threshold eligibility requirement for licensees seeking to implement restricted release decommissioning. It explained that this provision requires a determination of whether it is cost-effective to reduce the residual levels of radioactivity at a site to a point where the annual dose to the average member of the critical group does not exceed 25 mrem per year. If it is cost-effective to reduce the residual radioactivity levels this far, then the licensee is not eligible to pursue restricted release decommissioning. By contrast, a site will be eligible to pursue restricted release decommissioning if and only if it is not cost-effective to reduce the residual radioactivity levels further (because these residual levels are already ALARA ("as low as reasonably achievable"). This eligibility test, the NRC explained, reflects the Commission's preference for unrestricted release decommissioning, which, in turn, stems from the NRC's considered judgment that the institutional controls upon which all forms of restricted release plans must rely are inherently uncertain.

The DC Circuit court concluded that it lacked a textual analysis of § 20.1403(a) sufficient to support the Commission's conclusion that the ALARA analysis contemplated by that provision "'neither explicitly nor implicitly require[s] a comparison of the levels of protection afforded by the unrestricted and restricted options.'" Instead, the court considered Shieldalloy's interpretation of § 20.1403(a) – i.e. that the provision mandates a comparison between the dose associated with restricted release and unrestricted release decommissioning and requires selection of the option that yields the lower dose – to derive at least some support from its text. Accordingly, the court vacated the transfer of authority to New Jersey and remanded the case to the NRC so that it can provide a textual analysis of § 20.1403(a) that supports its conclusion.

Judgment of the Court of Appeals for the DC Circuit upholding the US Nuclear Regulatory Commission (NRC)'s issuance of combined operating licence and amended design certification

On 13 May 2013, the US Court of Appeals for the District of Columbia Circuit issued a decision in two consolidated cases, denying petitions to review (1) the NRC's issuance of combined operating licenses for Vogtle Units 3 and 4 and (2) an amended design certification for the Westinghouse AP1000 reactor.[21] The lead petitioner in each case was the Blue Ridge Environmental Defense League. In No.12-1106, petitioners challenged the NRC's compliance with the National Environmental Policy Act (NEPA)[22] in adopting a rule amending NRC's prior certification of the AP1000 reactor design. In No. 12-1151, petitioners challenged NEPA compliance in licensing Vogtle Units 3 and 4, which utilises the AP1000 reactors.

The court rejected petitioners' claim that the Fukushima Task Force Report[23] constitutes "new and significant circumstances or information" requiring supplementation of the Vogtle Environmental Impact Statement (EIS), holding that the EIS in fact considered severe accidents and "precisely the types of harm that occurred as a result of the Fukushima accident." The Court also rejected the argument that the NRC's recognition of Fukushima as a "safety-significant" event automatically rendered it "environmentally significant" for purposes of needing to supplement the EIS. Further, the court concluded that the possibility that the NRC "might impose more stringent safety regulations…does not mean that the agency's

21. Blue Ridge Environmental Defense League v. NRC, Nos. 12-1106, 12-1151 (DC Cir. May 14, 2013).
22. 42 USC 4321-4347.
23. NRC (2011), "Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Daiichi Accident", 12 July, available at: http://pbadupws.nrc.gov/docs/ML1118/ML111861807.pdf.

present actions are inconsistent with NEPA." The Court also rejected the petitioners' NEPA claims pertaining to the amended design certification, observing that the environmental assessment (EA) for a design certification review (here, the Westinghouse AP1000 reactor) considers only severe accident mitigation design alternatives (SAMDA), and that petitioners had neither challenged the NRC's SAMDA analysis nor identified any potential SAMDA from the Task Force Report.

Finally, the court summarily dismissed petitioners' challenge to their exclusion from the mandatory hearing, finding that "there was no need for an additional contested hearing once NRC reasonably denied Petitioners' contentions." The court held that participation in the mandatory hearing was unsupported by statute, regulation or practice.

National legislative and regulatory activities

Armenia

Licensing and regulatory infrastructure

New design safety requirements adopted

Design safety requirements for new nuclear power plant units were approved under Decree No 1411-N adopted by the government of the Republic of Armenia on 8 August 2012. The new regulation defines the safety requirements for new nuclear power plant units and will serve as the basis for formulation of technical requirements. The new regulation also establishes the basis for conducting expertise as well as performing safety assessments during the construction licence application review process.

New seismic hazard assessment guidelines adopted

A new method for seismic hazard assessment for new nuclear unit sites was approved under Decree No 1546-N adopted by the government of the Republic of Armenia on 13 December 2012.

The construction site for the new nuclear power plant unit is considered to be located in an active seismic zone. The site is characterised by a set of properties with respect to seismic hazards which may require design modifications.

This regulation establishes the methods for conducting geological, geophysical, seismological, and geotechnical investigations for the purpose of determining the specific properties of seismic activity in the area. This regulation also establishes procedures for identifying and characterising seismic sources and zones, for conducting a probabilistic seismic hazard assessment for the new nuclear plant site, and for determining any specific design modifications due to possible seismic activity.

France

Licensing and regulatory infrastructure

Decree No. 2012-1248 of 9 November 2012 authorising the ITER Organisation to create the "ITER" basic nuclear installation in Saint-Paul-lez-Durance (Bouches-du-Rhône)[1]

This decree approves the creation of a basic nuclear installation (*installation nucléaire de base* – INB) for conducting nuclear fusion reaction experiments using tritium and deuterium plasmas. The purpose of the International Thermonuclear Experimental Reactor (ITER) facility will be to demonstrate the scientific and technological feasibility of fusion energy.

1. *Décret n° 2012-1248 du 9 novembre 2012 autorisant l'Organisation international ITER à créer une installation nucléaire de base dénommée "ITER" sur la commune de Saint-Paul-lez-Durance (Bouches-du-Rhône), Journal officiel lois et décrets* [Official Journal of Laws and Decrees] *(J.O.L. et D.)*, 10 November 2012, p. 17847, Text No. 14.

The decree regulates in particular:

- the characteristics of the installation;
- the prevention of accidents;
- the main safety functions;
- the protection of the installation against risks, whether internally or environment-generated; and
- the operation of the installation.

This decree establishes a 25-year period within which the facility is to be commissioned.

Nuclear security

Law No. 2012-1473 of 28 December 2012 authorizing the approval of the Amendment to the Convention on the Physical Protection of Nuclear Material[2]

The Convention on the Physical Protection of Nuclear Material (CPPNM), establishing in particular rules in the field of international transport of civilian nuclear materials, was drafted in 1979 under the auspices of the International Atomic Energy Agency (IAEA) and came into force in 1987.

This French law authorised the approval of the Amendment to the Convention on the Physical Protection of Nuclear Material which was adopted in Vienna on 8 July 2005 in order to broaden the scope of the CPPNM and strengthen its main provisions.

The French legal framework had been modified previously to meet the new requirements introduced by the Amendment.

Nuclear safety and radiological protection

Complementary safety assessments. Follow-up of the stress tests carried out on French nuclear power plants. Action Plan of the French Nuclear Safety Authority (Autorité de Sûreté Nucléaire – ASN) – December 2012

This national action plan draws a balance on the actions decided by the French nuclear safety authority after stress tests were conducted on French nuclear power plants in the form of complementary safety assessments in 2011. Additional information regarding the action plan is available at: www.asn.fr/index.php/S-informer/Actualites/2013/Suivi-des-tests-de-resistance-des-centrales-nucleaires.

2. *Loi n° 2012-1473 du 28 décembre 2012 autorisant l'approbation de l'amendement à la convention sur la protection physique des matières nucléaires, J.O.L. et D.*, 29 December 2012, p. 20786, Text No. 3.

International co-operation

Decree No. 2012-1178 of 22 October 2012 publishing the Cooperation Agreement between the government of the French Republic and the government of the Republic of Tunisia for the development of peaceful uses of nuclear energy, signed in Tunis on 23 April 2009[3]

This decree published the co-operation agreement concluded between France and Tunisia for the development of peaceful uses of nuclear energy. This Franco-Tunisian co-operation agreement was concluded for a duration of 20 years and may involve co-operation in areas such as:

- the application of nuclear energy to the generation of electricity;
- fundamental research;
- the training of personnel;
- the development of nuclear energy applications in agronomy, biology or medicine;
- the drafting of legislation and regulation in the nuclear field;
- nuclear safety, radiation protection and the protection of the environment; and
- nuclear security.

Decree No. 2012-1180 of 22 October 2012 publishing the Cooperation Agreement between the government of the French Republic and the government of Mongolia in the field of nuclear energy (with annex), signed in Ulaanbaatar on 14 October 2010[4]

This Decree published the co-operation agreement concluded between France and Mongolia in the field of the uses of nuclear energy for non-explosive purposes. This co-operation was concluded for a duration of 10 years and may involve co-operation in areas such as:

- the exploration, extraction and processing of mineral resources;
- the application of nuclear energy to the generation of electricity;
- fundamental research;
- the training of personnel;
- the development of nuclear energy applications in agronomy, biology or medicine;
- the drafting of legislation and regulation in the nuclear field;
- nuclear safety, radiation protection and the protection of the environment; and
- the prevention and response to emergency situations resulting from radiological or nuclear accidents.

3. *Décret n° 2012-1178 du 22 octobre 2012 portant publication de l'accord de coopération entre le Gouvernement de la République française et le Gouvernement de la République tunisienne pour le développement des utilisations pacifiques de l'énergie nucléaire*, *J.O.L. et D.*, 25 October 2012, p. 16584, Text No. 3.
4. *Décret n° 2012-1180 du 22 octobre 2012 portant publication de l'accord de coopération entre le Gouvernement de la République française et le Gouvernement de la Mongolie dans le domaine de l'énergie nucléaire, J.O.L. et D.*, 25 October 2012, p. 16589, Text No. 5.

Germany

General legislation

Bill to amend the Atomic Energy Act to expedite the retrieval of radioactive waste from and to decommission the Asse II Mine (2013)

A bill is pending in the German Parliament to expedite the retrieval of radioactive waste from the Asse II Mine (*Schachtanlage Asse II*) and to decommission that mine.[5]

Under the relevant provisions of the 10th Amendment (2009)[6] to the Atomic Energy Act,[7] the trial storage facility for radioactive waste, the Asse II Mine, was subject to the provisions applicable to the federal final waste repository. It was determined that the retrieval of the waste from the mine is the safest option for decommissioning the facility.[8] These findings necessitate a respective amendment of Section 57b of the Atomic Energy Act. The suggested amendment, *inter alia*, includes a clarification that the retrieval of the waste from the mine is not subject to the plan approval procedure, provisions on partial licences and on licences with a concentration effect.[9]

Act to amend the Act on Environmental Legal Remedies and other environmental provisions (2013)

The Act of 21 January 2013 on the amendment of the Act on Environmental Legal Remedies and of Other Environmental Provisions was published in *Bundesgesetzblatt* 2013 I p. 95.[10] The Act implements the following EU Directives: Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011,[11] Directive 2001/42/EC of the European Parliament and the Council of 27 June 2001,[12] Articles 3 and 4 of the Directive 2003/35/EC of the European Parliament and the Council of 26 May 2003,[13] Article 25 of the Directive 2010/75/EU of the European

5. *Bundesrats-Drucksache* 795/12, *Bundestags-Drucksachen* 17/12298, 17/11822, 17/12537.
6. *Bundesgesetzblatt*(BGBl.) 2009 I, p. 556, adding Section 57b to the Atomic Energy Act. For additional information on this matter, see *Nuclear Law Bulletin,* No. 85 (2010/1)OECD/NEA, Paris,p. 105.
7. *Gesetzüber die friedlicheVerwendung der Kernenergie und den SchutzgegenihreGefahren (Atomgesetz)* of 15 July 1985 as repeatedly amended (BGBl. 1985 I, p. 1565; BGBl. 2009 I, p. 556).
8. The German Department for Radiation Protection (*BundesamtfürStrahlenschutz – BfS*) had carried out, in 2010, a fact-finding survey to compare the options to decommission the Asse II facility. The conclusions of the survey are available in German at the following address: http://gsb.download.bva.bund.de/BFS/ASSE/Optionenvergleich/Optionenvergleich_Asse.pdf.
9. The bill refers to the German Administrative Procedure Act (*Verwaltungsverfahrensgesetz*), which grants to the plan approval a "concentration effect" (*Konzentrationswirkung*), meaning that the plan approval will substitute itself to any particular authorisations which otherwise would normally be necessary.
10. *GesetzzurÄnderung des Umwelt-Rechtsbehelfsgesetzes und andererumweltrechtlicherVorschriftenvom*, 21. January 2013, BGBl. 2013 I, p. 95.
11. Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment, Official Journal of the European Union (OJ) L 26, 28.1.2012, p. 1.
12. Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes related to the environment, OJ L 197, 21.7.2001, p. 30.
13. Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC, [2003] OJ L156/17.

Parliament and the Council of 24 November 2010.[14] Implementation of these Directives required further amendment of the 2006 Environmental Legal Remedies Act as amended and of a number of other acts related to environmental protection, such as, *e.g.* the 2010 Environmental Impact Assessment Act, the 2002 Environmental Audit Act, and the 2007 Environmental Damage Act.

The amendment of the Environmental Legal Remedies Act was in particular required by the decision of the European Court of Justice in the case of the Trianel coal-fired power-plant project in Lünen, Germany which dealt with the extent of rights of participation in the administrative procedure of non-governmental organisations which promote environmental protection. The Court ruled as follows:

1. Article 10a of Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003, precludes legislation which does not permit non-governmental organisations promoting environmental protection, as referred to in Article 1(2) of that directive, to rely before the courts, in an action contesting a decision authorising projects "likely to have significant effects on the environment'"' for the purposes of Article 1(1) of Directive 85/337, on the infringement of a rule flowing from the environment law of the European Union and intended to protect the environment, on the grounds that that rule protects only the interests of the general public and not the interests of individuals.

2. Such a non-governmental organisation can derive, from the last sentence of the third paragraph of Article 10a of Directive 85/337, as amended by Directive 2003/35, the right to rely before the courts, in an action contesting a decision authorising projects "likely to have significant effects on the environment" for the purposes of Article 1(1) of Directive 85/337, as amended, on the infringement of the rules of national law flowing from Article 6 of Directive 92/43/EC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, as amended by Directive 2006/105/EC of 20 November 2006, even where, on the grounds that the rules relied on protect only the interests of the general public and not the interests of individuals, national procedural law does not permit this.[15]

The amended Act, however, goes beyond the requirements established by the European Court of Justice. Pursuant to Sections 2-4 of the amended Environmental Legal Remedies Act, non-governmental organisations for environmental protection are entitled to base actions not only on laws which derive directly from EU environmental provisions or transpose such EU provisions into domestic law and which are only intended to serve the interest of the general public. Actions of non-governmental organisations for environmental protection may now also be based on purely national environmental provisions which serve only the interest of the general public and not the interests of individuals.[16]

It is expected that this amendment will most probably entail an increase in the number of relevant court proceedings. To a certain extent this increase may be balanced by the new Section 4a of the Act which provides rules to tighten up and

14. Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast), [2010] OJ L334/17.
15. Judgment of 12 May 2011, Case C-115/09, *Bund fürUmwelt und Naturschutz Deutschland v. Bezirksregierung Arnsberg*, [2011] European Court Reports I-03673.
16. See also Bundestags-Drucksache 17/10957 of 20 October 2012, in particular pp. 15 et seq.

expedite the proceedings. In accordance with Article 13 paragraph 3, the revised Environmental Legal Remedies Act entered into force on 29 January 2013.

Radiation protection

General administrative rules on Section 47 of the Radiation Protection Ordinance (2012)

Based on Article 85, paragraph 2, sentence 1 of the Basic Law (Constitution – *Grundgesetz*) in conjunction with Section 47, paragraph 2 of the 2001 Radiation Protection Ordinance as last amended on 24 February 2012,[17] the Federal Government issued on 28 August 2012 General Administrative Rules on Section 47 of the Radiation Protection Ordinance.[18] The Rules apply to the estimation of the radiation exposure pursuant to Section 47 paragraph 2 of the Ordinance. The result of the estimation determines whether the facility is planned in a way such that the radiation exposure resulting from the discharge of radioactive substances into air and water does not exceed the dose limits provided for in Section 47 paragraph 1 of the Ordinance.

The General Administrative Rules shall ensure the uniform application of laws by the authorities and are binding upon them. The Rules do not enjoy general applicability vis-à-vis every individual in the same way that laws do. However, because regulatory bodies must base their decisions on these rules, they have legal relevance also for those to whom administrative decisions, e.g. licences, are directed. In those cases the rules have a direct external effect and concretise the norms which the licence is based upon. For that reason, the Federal Administrative Court ruled that those General Administrative Rules which concretise the norms on the licence must be published.[19]

Nuclear Safety

Safety requirements for nuclear power plants (2012)

The Federal Ministry for the Environment, Nature Conservation and Reactor Safety and the nuclear regulators of the *Länder* (states) agreed to amend and to update the Safety Criteria for Nuclear Power Plants of 21 October 1977[20] and the Incident Guidelines of 18 October 1983.[21] They also agreed to invalidate the Bases for Safety Management Systems at Nuclear Power Plants of 29 June 2004.[22] The Federal Ministry and the *Länder* regulators decided to issue the new Safety Requirements for Nuclear Power Plants of 22 November 2012.[23] The German regulators will apply the new safety requirements and measure the nuclear safety of commercial nuclear power plants against these requirements.

The requirements contain principal and overarching safety requirements within the non-legally binding, "sub-statutory", framework. They are designed to ensure that the necessary precautions against damage required to be taken by the operator of a nuclear installation in accordance with Section 7, paragraph 2 no. 3 of the Atomic Energy Act comply with the state of the art in science and technology. They will also be applied if safety assessments take place in the course of government supervisory activities pursuant to Sections 17 and 19 of the Atomic Energy Act.

17. BGBl. 2012 I, pp. 212, 249. See also *Nuclear Law Bulletin*, No. 89 (2012/1) OECD/NEA, Paris, p. 120.
18. *Bundesanzeiger* AT (5 September 2012), B1, p. 1.
19. Judgement of the *Bundesverwaltungsgericht* of 25 November 2004, BVerwG 5 CN 1.53, available at: www.bverwg.de/entscheidungen/entscheidung.php?ent=251104U5CN1.03.0.
20. *Bundesanzeiger* No. 206 (3 November 1977).
21. *Bundesanzeiger* No. 245a (31 December 1983).
22. *Bundesanzeiger*No. 138 (27 July2004), p. 16275.
23. *Bundesanzeiger* AT (24 January 2013), B3, p. 1.

Section 49, paragraph 1 of the Radiation Protection Ordinance[24] defines the structural and other technical protective measures against design basis accidents in or at a nuclear power plant. According to sentence 3 of this paragraph, "the licensing authority may consider these precautions to have been taken, particularly when the applicant for the design of the facility has used those design basis accidents as a basis that must, in accordance with the published safety criteria and guidelines for power plants, determine the design of a nuclear power plant." Compliance with the new safety requirements confirms that the precautions taken are appropriate.

The regulators agreed to update the Safety Requirements for Nuclear Power Plants at regular intervals.

Transport of radioactive material

International Transport of Dangerous Goods by Road (2010, 2012)

The 22nd Ordinance of 31 August 2012 to Amend the Annexes A and B to the ADR-Agreement, as agreed in Geneva on 26-29 October 2010, 3-5 May 2011, 8-11 November 2011 and 8-10 May 2012, was published in *Bundesgesetzblatt* 2012 II p. 954. The Ordinance made effective the amendments to Annexes A and B to the European Agreement of 30 September 1957 on the International Transport of Dangerous Goods by Road in the version published on 25 November 2010.[25] The version of the Annexes which was made effective by the 21st Ordinance of 7 October 2010[26] was repealed. The 22nd Ordinance entered into force on 1 January 2013.

Regulations on nuclear trade (including non-proliferation)

Export List (2013)

The 110th Ordinance to Amend the Export List – Annex AL to the Foreign Trade Ordinance of 15 January 2013 was published in *Bundesanzeiger AT* 22 January 2013 V1 p. 1. Part I Section C of the list contains the European Union's List of Dual-use Items and Technology category 0 of which lists "Nuclear material, facilities and equipment".

Greece

International co-operation

Law ratifying the agreement between the International Atomic Energy Agency and Greece in the area of education and training[27]

A recent law ratified the long-term agreement between Greece and the IAEA that was signed on 11 July 2011 which established the Greek Atomic Energy Commission (GAEC) as the Regional Training Centre in Europe for Radiation, Transport and Waste Safety.

The agreement specifies the obligations to be undertaken by both parties and the details regarding the organisation of and participation in the educational and training activities that will be organised by GAEC in co-operation with the IAEA, including post-graduate educational courses, specialised training courses, train-the-trainers workshops, and fellowship training.

24. *Verordnung über den Schutz vor Schäden durch ionisierende Strahlen (Strahlen schutz verordnung - StrlSchV)*, BGBl. 2001 I, p. 1739.
25. BGBl. 2010 II, p. 1412; BGBl. 2011 II, p. 1246. See also *Nuclear Law Bulletin*, No. 85, (2010/1), OECD/NEA Paris, p. 106.
26. BGBl. 2010 II, p. 1134.
27. Law 4085, Government Gazette Folio No. 194/A/12.10.2012.

GAEC was recognised in 2011 as the IAEA's Regional Training Centre in Europe for Radiation, Transport and Waste Safety following the successful completion of an IAEA Education and Training Appraisal (EduTA) mission to the GAEC in 2008.

Nuclear safety and radiological protection

Ministerial decision establishing requirements for nuclear safety and regulatory control of research reactors

The Ministerial Decision entitled "Basic requirements – principles of nuclear safety and regulatory control of research reactors" was published in the Official Government Gazette on 26 October 2012.[28]

This Ministerial Decision, aimed at detailing the licensing procedure, regulatory control and the basic nuclear safety requirements for research reactors, stems from article 4 of the Presidential Decree 60/2012 "Transposition in Greek legislation of the Directive 2009/71/Euratom for the establishment of national framework for the nuclear safety of nuclear installations."[29] The Ministerial Decision, together with the Greek Radiation Protection Regulations,[30] is the main legislative framework for radiation protection and nuclear safety relating to research reactors in Greece. The Ministerial Decision consists of 4 chapters, the main content of which is provided below:

Chapter 1 outlines the objective, the scope and the definitions relevant to the decision.

Chapter 2 defines the basic requirements and principles for nuclear safety of research reactors, based upon the provisions of the IAEA's 2005 Safety Standards Series publication on the Safety Requirements of Safety of Research Reactors.[31] The safety requirements enumerated in chapter 2 of this Ministerial Decision cover the basic principles as well as all lifetime phases of a research reactor from siting to decommissioning, including extended shutdown, as listed below:

- licensee's prime responsibility;
- nuclear safety management;
- assessment and verification of safety;
- radiation Protection;
- siting evaluation;
- design and construction;
- commissioning;
- operation, maintenance, modifications, utilisation;
- extended shutdown;
- decommissioning; and
- radioactive waste management.

28. No. P/112/305, Government Gazette Folio No. 2877/B/26.10.2012.
29. Presidential Decree No.60, Government Gazette Folio No.111/A/03.05.2012, transposing Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations.
30. Joint Ministerial Decision No. 1014 (FOR) 94, Government Gazette Folio No. 216/B/06.03.2001.
31. Available at: www-pub.iaea.org/MTCD/publications/PDF/Pub1220_web.pdf.

Chapter 3 outlines the licensing procedure and the necessary documentation from the licensee, with respect to the different stages of the lifetime of a research reactor from siting to decommissioning, covering extended shutdown as well. According to the provisions of this chapter, the construction licence is granted by the competent minister following a two-step process. First, an "establishment" (scoping) licence is issued based upon a feasibility study of the research reactor project. Subsequently, the construction licence is granted on the basis of the review of the submitted safety documents. Additional topics, such as requirements regarding the minimum contents of the safety analysis report, expiration and modification of licences and general provisions in relation to regulatory inspection, review and enforcement are also included in this chapter.

Chapter 4 includes miscellaneous provisions, and, in particular, procedural issues referring to the harmonisation of the existing Greek research reactor (GRR-1) with the safety requirements and the regulatory control procedures provided in the ministerial decision.

Moldova

General legislation

New comprehensive law governing nuclear and radiological activities

Moldova has enacted Law no.132 of 8 June 2012 on the safe development of nuclear and radiological activities. This comprehensive law covers a wide variety of subject matters from safety and security to management of radioactive waste and amends the 2006 legislation which implemented fundamental reform of nuclear regulatory activities in Moldova.[32] The legislation addresses institutional arrangements and authority for regulation and oversight of nuclear installations, establishes the framework for licensing, and defines the responsibilities of individuals and organisations with respect to radioactive material and nuclear installations.

The text of this law is published in this volume of the *Nuclear Law Bulletin*.

United States

Issuance of the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste"

In the fiscal year 2010, the US Secretary of Energy established the Blue Ribbon Commission on America's Nuclear Future (the Blue Ribbon Commission or BRC) composed of experts from government, academia and industry. The charter charged the Blue Ribbon Commission to conduct a "comprehensive review of policies for managing the back end of the nuclear fuel cycle, including all alternatives for the storage, processing, and disposal of civilian and defense used nuclear fuel, high-level waste, and materials derived from nuclear activities… [and to] provide advice, evaluate alternatives, and make recommendations for a new plan to address these issues."[33] The Blue Ribbon Commission issued its final report on 26 January 2012.[34]

32. Law No. 111-XVI of 11 May 2006 on the Safe Deployment of Nuclear and Radiological Activities. For more information see *Nuclear Law Bulletin,* No. 78, (2006/2), OECD/NEA, Paris, pp. 48-50.
33. US Department of Energy (2010), "Blue Ribbon Commission on America's Nuclear Future, US Department of Energy, Advisory Committee Charter", available at: http://cybercemetery.unt.edu/archive/brc/20120620220235/ or http://brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf.

In January 2013, the US Department of Energy (DOE) released the Administration's "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste"[35] (Strategy), which endorses key principles of the Blue Ribbon Commission's report. The strategy lays out plans to implement, with the appropriate authorisations from Congress, a long-term programme that begins operations of a pilot interim storage facility by 2021, advances toward the siting and licensing of a larger interim storage facility by 2025, and makes demonstrable progress on the siting and characterisation of repository sites to facilitate the availability of a geologic repository by 2048.

The strategy addresses several important needs. First, it serves as a statement of administration policy regarding the importance of addressing the disposition of used nuclear fuel and high-level radioactive waste; it lays out the overall design of a system to address that issue; and it outlines the reforms needed to implement such a system. Second, it presents the administration's response to the final report and recommendations made by the Blue Ribbon Commission. It also responds to direction from the US Congress in the Joint Explanatory Statement accompanying the Consolidated Appropriations Act, 2012,[36] to develop a strategy for the management of used nuclear fuel and nuclear waste in response to the BRC's recommendations. Third, this strategy represents an initial basis for discussions among the administration, Congress and other stakeholders on a sustainable path forward for disposal of nuclear waste.

As noted, the Administration's Strategy endorsed the concept of the development of three different, but intimately related facilities. While the strategy provides for the development of one of each of three separate facilities and sites, it is conceivable, as the result of a consent-based siting process, that some or all of these facilities could be co-located and/or more than one of each type could be constructed.

First, consistent with legislation recently under consideration in Congress, the administration supports the development of a pilot interim storage facility with an initial focus on accepting used nuclear fuel from shut-down reactor sites. Acceptance of used nuclear fuel from shut-down reactors provides a unique opportunity to build and demonstrate the capability to safely transport and store used nuclear fuel, and therefore to make progress on demonstrating the federal commitment to addressing the used nuclear fuel issue. In addition, a pilot facility could also take defence waste to demonstrate commitment and progress in addressing the legacy of the Cold War. A pilot facility would also build trust among stakeholders with regard to the consent-based siting process and commitments made with a host community for the facility itself, with jurisdictions along transportation routes, and with communities currently hosting at-reactor storage facilities.

Second, beyond a pilot-scale facility, the administration supports the development of a larger consolidated interim storage facility with greater capacity

34. Blue Ribbon Commission on America's Nuclear Future (2012), "Report to the Secretary of Energy", available at: http://cybercemetery.unt.edu/archive/brc/20120620220235/http://brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf.
35. US Department of Energy (2013), "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste", available at: http://energy.gov/sites/prod/files/Strategy for the Management and Disposal of Used Nuclear Fuel and High Level Radioactive Waste.pdf.
36. Conference Report on H.R. 2055, Consolidated Appropriations Act, 2012, Division B – Energy and Water Development Appropriations Act, 2012 Joint Explanatory Statement of the Committee of the Conference, in Congressional Record (15 December 2011), Vol. 157, No. 193 Book II, p. H9477.

and capabilities that will provide flexibility in operation of the transportation system and disposal facilities. In addition, a larger-scale facility could take possession of sufficient quantities of used nuclear fuel to make progress on the reduction of long-term financial liabilities and could also accept waste generated from defence activities.

Finally, there is international consensus that geologic repositories represent the best known method for permanently disposing of used nuclear fuel and high-level radioactive waste, without putting a burden of continued care on future generations. The administration agrees that the development of geologic disposal capacity is currently the most cost-effective way of permanently disposing of used nuclear fuel and high-level radioactive waste while minimising the burden on future generations. As noted by the BRC, the linkage between storage and disposal is critical to maintaining confidence in the overall system. Therefore, efforts on implementing storage capabilities within the next 10 years will be accompanied by actions to engage in a consent-based siting process and to begin conducting preliminary site investigations for a geologic repository.

No matter how many facilities or what specific form they take, a consent-based approach to siting is critical to success. The administration supports working with Congress to develop a consent-based process that is transparent, adaptive, and technically sound. The BRC emphasised that flexibility, patience, responsiveness and a heavy emphasis on consultation and co-operation will all be necessary in the siting process and in all aspects of implementation. Experiences in other countries indicate that a consent-based process developed through engagement with states, tribes, local governments, key stakeholders, and the public offers a greater probability of success. For example, Sweden and Finland have successfully executed programmes to select a site among multiple volunteers. Other countries such as France, Switzerland, and Canada, have programmes underway that appear to be demonstrating some success. The DOE is currently evaluating critical success factors in the siting of nuclear facilities in the US and abroad to facilitate the development of a siting process.

The strategy highlights the need for a new waste management and disposal organisation to provide the stability, focus, and credibility to build public trust and confidence. Again, there are multiple models that exist along a continuum from a government programme to quasi-private public corporations – entities that report to a secretary who serves in the president's cabinet and those that have their own board of directors that report independently to the President of the United States. A study commissioned by the DOE and conducted by RAND Corporation found that a government corporation and an independent government agency are two models that appear workable for waste management.[37] Whatever form the new entity takes, organisational stability, leadership continuity, oversight and accountability, and public credibility are critical attributes for future success. Further, the authorities and responsibilities of the new organisation are more important than the specific form. The administration will work with Congress to ensure that the authorisation of any new body established for this purpose provides adequate authority and leadership as well as appropriate oversight and controls.

The administration also recognises that providing adequate and timely funding is critical to the success of the nuclear waste mission. The strategy proposes a funding programme that contains three critical elements: discretionary appropriations within existing spending caps to pay for specific, ongoing activities;

37. Davis, L., et al. (2012), *Choosing a New Organization for Management and Disposition of Commercial and Defense High-Level Radioactive Materials*, RAND Corporation, Santa Monica, California, USA, available at: www.rand.org/pubs/monographs/MG1230.html.

reclassification of fee income or spending to make dedicated funds available in sufficient amounts without competing with other government priorities; and access to the existing balance of the Nuclear Waste Fund in the Treasury.[38] Within this approach are many variations that the administration believes can achieve the needed balance between adequate and timely access to funds and oversight and accountability by Congress and the executive branch of the US government.

Full implementation of this programme will require legislation to enable the timely deployment of the system elements noted above. The administration is committed to working with Congress on the specifics of this important issue. In the meantime, the administration is undertaking activities within existing congressional authorisation to plan for the eventual transportation, storage, and disposal of used nuclear fuel.

Ongoing activities

The Blue Ribbon Commission noted the need for near-term actions that can lay the groundwork for the next generation of nuclear waste policies and programmes included in its recommendations:

- continuation of a research and regulatory oversight effort in used fuel and storage system degradation phenomena, vulnerability to sabotage and terrorism, and others;
- moving forward with geologic disposal through valuable, non-site specific activities, including research and development on geological media, work to design improved engineered barriers, and work on the disposal requirements for advanced fuel cycles;
- development of a research, development, and demonstration plan and roadmap for taking the borehole disposal concept to the point of a licensed demonstration;
- performance of system analyses and design studies needed to better integrate storage into the waste management system, including standardisation of dry cask storage systems and development of a conceptual design for a spent fuel storage facility;
- development of a database to capture the experience and knowledge gained from previous efforts to site nuclear waste facilities in the United States and abroad; and
- completion of policies and procedures for providing technical assistance funds to states, tribes, and local jurisdictions which are likely to be traversed by transportation shipments.

The DOE is currently undertaking activities to address these recommendations. For example, the DOE is working with industry to conduct research and development (laboratory, field, and modelling) to further develop the technical bases for continued safe storage. Specifically, the DOE is working with industry to conduct research and development to implement, on a cost-sharing basis, a full-scale storage demonstration project focused on getting full scale, field information on the long-term storage of

38. The Nuclear Waste Fund is "composed of payments made by the generators and owners of [high-level radioactive] waste and spent fuel, that will ensure that the costs of carrying out activities relating to the disposal of such waste and spent fuel will be borne by the persons responsible for generating such waste and spent fuel." Nuclear Waste Policy Act, sec. 111(b)(4), 42 USC §§ 10131(b)(4).

high burn-up fuel. A contract for this demonstration project was awarded in April 2013.[39] The initial output will be a test plan, to be put forth for public comment, which will, within a few years, lead to a more highly instrumented storage system than that which is typical at a utility site, using the utility's fuel, under the utility's Nuclear Regulatory Commission (NRC) licence.

The DOE is also working to analyse the capabilities of various geologic media that had not been looked at since the decision to focus on Yucca Mountain. This process will help show that there is a sound technical basis for disposal in the US in different geologic media, and will help provide confidence in whatever future decisions are made. The DOE is taking advantage of existing analysis related to different geologic settings at disposal sites in other countries to help leverage expertise and minimise costs.

With regard to borehole disposal, the DOE is developing a draft plan and roadmap for a deep borehole demonstration project. The demonstration project would evaluate the safety, capacity, and feasibility of the deep borehole disposal concept for the long-term isolation of nuclear waste. It will serve as a proof of principle, but will not involve the disposal of actual waste. The demonstration project will evaluate the feasibility of characterising and engineering deep boreholes, evaluate safe processes and operations for safe waste emplacement downhole and evaluate geologic controls over waste stability.

In fiscal year 2012, the DOE initiated system-level analyses for the overall interface between at-reactor, consolidated storage and disposal, including the development of supporting logistic simulation tools to better understand ageing of fuel, loading requirements, and opportunities for use of standardised canisters. In addition, the DOE acquired services of industry to develop design concepts for an interim storage facility and is evaluating their submissions in fiscal year 2013.

A database of experiences with siting radioactive materials facilities both in the US and abroad has been developed that will be a public resource and will inform the planning process. A report on the findings of the initial studies and an examination of case studies in the database of siting experience is being prepared and will be available in the summer of 2013. Consistent with the BRC's report, social science studies are being conducted to assess public attitudes towards aspects of siting and transporting radioactive materials, changes in public perception over time, and drivers for any changed perceptions. For transportation planning and engagement with stakeholders, the DOE has convened a working group under the auspices of the National Transportation Stakeholders Forum comprised of federal, state, and tribal governmental representatives to address training-related issues and develop a revised policy for preparing public safety officials along proposed transportation routes, as required by Section 180(c) of the Nuclear Waste Policy Act.[40] The working group will analyse and, when possible, make recommendations on specific issues related to Section 180(c) policy and implementation.

Physical protection of by-product material final rulemaking

On 19 March 2013, the NRC published a final rule amending its regulations to establish security requirements for the use and transport of category 1 and category

39. Additional information regarding this project is available at: http://energy.gov/articles/energy-department-announces-new-investment-nuclear-fuel-storage-research.
40. For additional information, see Lyons, P. (2013), "Statement of Peter Lyons, Assistant Secretary for Nuclear Energy, US Department of Energy Before the Subcommittee on Energy and Water Development, and Related Agencies Committee on Appropriations, US House of Representatives April 11, 2013", p. 5, available at: http://appropriations.house.gov/uploadedfiles/hhrg-113-ap10-wstate-lyonsd-20130411.pdf.

2 quantities of radioactive material.[41] The NRC considered these quantities to be risk significant and, therefore, warranting additional protection. Category 1 and category 2 thresholds are based on the quantities established by the International Atomic Energy Agency in its Code of Conduct on the Safety and Security of Radioactive Sources. The objective of the rule is to provide reasonable assurance of preventing the theft or diversion of category 1 and category 2 quantities of radioactive material. The regulations also include security requirements for the transportation of irradiated reactor fuel that weighs 100 grams or less in net weight of irradiated fuel. The final rule affects any licensee that possesses an aggregated category 1 or category 2 quantity of radioactive material, any licensee that transports these materials using ground transportation, and any licensee that transports small quantities of irradiated reactor fuel.

The rule also addressed a petition for rulemaking submitted by the State of Washington that requested that the NRC adopt the use of global positioning satellite tracking as a national requirement for vehicles transporting highly radioactive mobile or portable radioactive devices. The NRC ultimately did not include a requirement for GPS tracking in the rule. However, the rule does contain a requirement to use a telemetric position monitoring system or an alternative tracking system when transporting category 1 quantities of radioactive material. Use of GPS would be one method to satisfy this requirement. For licensees transporting category 2 quantities of radioactive material, tracking is not required, but the licensee is required to maintain constant control or surveillance during transit.

Update on the NRC's response to the events at the Fukushima Daiichi nuclear site regarding filtered vents and consideration of economic consequences

On 19 March 2013, the Commission directed its staff to amend a 2012 order[42] regarding installation or improvement of venting systems for 31 boiling water reactors with Mark I and Mark II containments similar to the damaged reactors at Fukushima Daiichi in Japan.[43] The original order required the vents to be operational during a design-basis accident, even if a plant lost power for an extended time. The amended order will enhance the vent system's requirements so that they could be operated under the pressures, temperatures, flow rates and radiation levels experienced during a severe reactor accident. The commissioners also directed the staff to begin a formal rulemaking on filtering strategies that may prevent radioactive material from escaping containment in an accident, either through newly installed filter systems or a combination of procedural changes and existing systems. After holding public meetings to obtain input, the NRC staff will develop a technical basis that the Commission will evaluate to determine whether it should issue a proposed rule for public comment.

On 20 March 2013, the Commission directed its staff to update the agency's guidance on considering the economic consequences of a reactor accident in its

41. NRC (2013), "Physical Protection of Byproduct Material", 78 Fed. Reg. 16922, 19 March (to be codified at 10 CFR pts. 20, 30, 32, 33, 34, 35, 36, 37, 39, 51, 71, and 73).
42. NRC (2012), "All Operating Boiling Water Reactor Licensees with Mark I and Mark II Containments: Order Modifying Licenses with Regard to Reliable Hardened Containment Vents", EA-12-050, 77 Fed. Reg. 16098, 19 March (Effective Immediately).
43. NRC (2013), "Consideration of Additional Requirements for Containment Venting Systems for Boiling Water Reactors with Mark I and Mark II Containments", SRM-SECY-12-0157 available at www.nrc.gov/reading-rm/doc-collections/commission/srm/2012/2012-0157srm.pdf.

regulatory decision-making.[44] The agency will examine the information used in comparing the costs and benefits of a potential safety rule change or nuclear power plant modification. For example, the review will examine the costs of replacing a damaged reactor's electricity output, since generation and transmission markets have been deregulated in some cases. The staff will also consider how changes in Federal Energy Regulatory Commission rules have affected transmission costs. The staff will revise or update existing guidance on economic consequences, as appropriate, based on additional data and information learned from recent and ongoing accident analysis (such as last year's State-of-the-art Reactor Consequences Analyses). The staff will develop a subsequent paper that describes and assesses for Commission consideration potential changes to NRC cost-benefit analysis guidance. The staff's paper will include a summary and analysis of how other federal agencies and international nuclear regulatory bodies assess economic consequences.

44. NRC (2013), "Consideration of Economic Consequences within the US Nuclear Regulatory Commission's Regulatory Framework", SRM-SECY-12-0110, 20 March, available at: www.nrc.gov/reading-rm/doc-collections/commission/srm/2012/2012-0110srm.pdf.

Intergovernmental organisation activities

European Atomic Energy Community

Non-legislative instruments

Communication of 8 March 2013 from the Commission to the European Parliament and the Council on the use of financial resources earmarked for the decommissioning of nuclear installations, spent fuel and radioactive waste [COM(2013) 121 final]

In October 2004, the European Commission presented its first report on the use of financial resources earmarked for the decommissioning of nuclear power plants.[1] It was acknowledged within this report that decommissioning was a complex issue and that more detailed reflection was required to understand the funding mechanisms used in the member states of the European Union (EU).

In 2006, the Commission adopted a Recommendation on decommissioning funds[2] following an extensive dialogue with EU member states' experts. In December 2007, it presented its second report to the European Parliament and the Council, comparing EU nuclear operators' and member states' funding practice with the criteria detailed in the Commission Recommendation. One of the conclusions of this second report was that more detailed and better structured information needed to be obtained from EU member states.

The above-mentioned communication, adopted by the Commission on 8 March 2013, provides a third report to the European Parliament and the Council of the European Union.

This report aims to present a comprehensive overview of the situation with respect to financing of decommissioning of nuclear installations in EU member states. The report does not analyse the consequences of the Council Directive 2011/70/Euratom of 19 July 2011, which established a Community framework for the responsible and safe management of spent fuel and radioactive waste in Europe but reviews the continuous work carried out by EU member states and the Commission toward the implementation of the recommendation, in particular with respect to the work of the Decommissioning Funding Group.[3] In particular, the report looks at the advances made with respect to the alignment of national decommissioning and waste management financing regimes with the Commission Recommendation.

1. Communication from the Commission to the European Parliament and the Council of 26 October 2004: Report on the use of financial resources earmarked for the decommissioning of nuclear power plants, COM(2004) 719 final, available at: http://ec.europa.eu/energy/ nuclear/decommissioning/doc/0025_com_2004_719.pdf.
2. Commission Recommendation of 24 October 2006 on the management of financial resources for the decommissioning of nuclear installations, spent fuel and radioactive waste, Official Journal of the European Union (OJ) L 330, 28.11.2006, p. 31.
3. The Decommissioning Funding Group is the only body in the European Union which brings together EU member states and the Commission for discussion of decommissioning funding issues.

Council Conclusions "Towards the Secure Supply of Radioisotopes for Medical Use in the European Union", 18 December 2012[4]

Following the shortages of the key medical radioisotopes molybdenum-99 (99Mo) and technetium-99m (99mTc), the Council of the European Union adopted Conclusions on the Security of Supply of Radioisotopes for Medical Use in 2009[5] and 2010.[6] In addition to addressing ongoing concerns about the long-term reliability of the supply of these radioisotopes, some of the current long-term major 99Mo-producing nations have agreed to convert to using low-enriched uranium (LEU) targets for the production of 99Mo following the issuance of these conclusions.

The conclusions note that while the conversion from high-enriched uranium (HEU) to LEU targets is an additional concern affecting radioisotopes' production cost and capacity, this conversion is important for the long-term security of supply. In this context, the Council adopted a new set of Council Conclusions on 18 December 2012 which call on the Commission to propose a relevant instrument to EU member states that will provide Community support and identify research requirements that might be supported by the Euratom Research and Training Programme.

Other activities

21st plenary meeting of the European Nuclear Safety Regulators Group (ENSREG) – 19 November 2012, Brussels

Following the adoption of the Communication of the Commission to the Council and the European Parliament on the comprehensive risk and safety assessments ("stress tests") of nuclear power plants in the European Union and related activities,[7] ENSREG discussed potential opportunities and conditions for collaboration and consultation with the Commission with respect to the future revision of nuclear safety legislation. ENSREG also discussed the results of the seminar on safety of nuclear power plants against aircraft impact.

22nd plenary meeting of the ENSREG – 23 January 2013, Brussels

The ENSREG members analysed the first draft text for the revision of the current nuclear safety directive as developed by the services of the Commission and gave their first feedback to the Commission on this document. ENSREG agreed upon the formation of an ad hoc working group (AHWG) with the aim of further analysing this draft text in order to formulate a constructive ENSREG position.

4. The draft Council Conclusions of 7 December 2012, 17453/12, which were adopted on 18 December 2012 by the Council of the European Union are available at: http://register.consilium.europa.eu/pdf/en/12/st17/st17453.en12.pdf.
5. Council Conclusions on the Security of Supply of Radioisotopes for Medical Use, 2986th Agriculture and Fisheries Council meeting, Brussels, 15 December 2009, available at: http://ec.europa.eu/health/healthcare/docs/radioisotopes_cou ncil_ccl_en.pdf.
6. Council Conclusions on Towards the Secure Supply of Radioisotopes for Medical Use in the European Union, 3053rd Employment, Social Policy Health and Consumer affairs Council meeting, 6 December 2010, available at: www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/trans/118234.pdf.
7. Communication of the Commission to the Council and the European Parliament of 4 October 2012 on the comprehensive risk and safety assessments ("stress tests") of nuclear power plants in the European Union and related activities, COM (2012) 571 final, available at: http://ec.europa.eu/energy/nuclear/safety/doc/com_2012_0571_en.pdf.

23rd plenary meeting of ENSREG – 6 March 2013, Brussels

The main part of the meeting was dedicated to a second discussion of the draft revision of the nuclear safety directive, with, in particular, an exchange of views between the ENSREG members and Mr Günther Oettinger, the European Commissioner for Energy. ENSREG expressed an initial general agreement with the report of the AHWG which had been established at the previous meeting on 23 January and which had initially met on two occasions on 4 to 5 and on 28 February 2013. Furthermore, in line with its aim of supporting the enhancement of nuclear safety regulation in the EU, ENSREG committed itself to pursue the existing co-operation with the Commission by continuing the AHWG work on the draft legislative text during the coming months. Subsequently, additional AHWG meetings took place from 24 to 26 March and from 3 to 5 April 2013.

Information related to ENSREG activities including meeting reports and statements of the Chairperson is available on the ENSREG website: www.ensreg.eu/news.

First EU-IAEA Senior Officials meeting, 25 January 2013

On 25 January 2013, the first Senior Officials meeting bringing together officials from the European External Action Service, the European Commission and the International Atomic Energy Agency (IAEA) took place in Brussels. The discussions focused on enhancing co-operation in all areas relating to nuclear technologies, including safety and security of nuclear energy production and research activities. For further information, see the relevant Joint Press Statement available at: www.iaea.org/newscenter/mediaadvisory/2013/ma201302.html.

International Atomic Energy Agency

Convention on Nuclear Safety

The Working Group on Effectiveness and Transparency, which was established by the contracting parties to the Convention on Nuclear Safety (CNS) during their 2nd Extraordinary Meeting in August 2012, met in Vienna, from 4 to 6 February and then from 21 to 23 May 2013. The working group will report to the 6th Review Meeting to be held from 24 March to 3 April 2014 on the results of its discussions, including on a list of actions to strengthen the CNS and on proposals to amend, where necessary, the convention.

A CNS Officers' Turnover Meeting was also held in Vienna, on 17 April 2013. The officers for the 5th Review Meeting provided feedback from previous review meetings and extraordinary meetings and shared experience with the officers elected for the 6th Review Meeting.

Joint Convention

The First Inter-Sessional Meeting of the contracting parties to the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention) was held in Vienna, from 16 to 18 April 2013. The purpose of the meeting was to facilitate further consideration of proposals to improve the implementation of the Joint Convention, as requested by the contracting parties at the 4th Review Meeting held in May 2012.

Working Group of Experienced Officers of the CNS and the Joint Convention

A meeting of the Working Group of Experienced Officers of the CNS and the Joint Convention was held in Vienna, from 21 to 23 January 2013, to share experiences and identify potential improvements to the review processes under the said

conventions. Feedback from experienced officers was extensively discussed and a report was prepared for the leadership of the two conventions.

International Expert Group on Nuclear Liability

The 13th meeting of the International Expert Group on Nuclear Liability (INLEX) took place in Vienna, from 15 to 17 May 2013. The group discussed, *inter alia*, liability in the case of transport of nuclear material, with special focus on the rights of non-nuclear transit states; liability issues in respect of transportable nuclear power plants; the impact of the 2012 revision of the IAEA transport regulations on the Board decision excluding small quantities of nuclear material from the scope of the nuclear liability conventions. The group also discussed a paper on the benefits of joining the nuclear liability regime and developed corresponding key messages aimed to be used during legislative assistance activities carried out by the IAEA. The next meeting of INLEX will take place in May 2014.

As part of the implementation of the IAEA Action Plan on Nuclear Safety, preparations are currently under way to conduct IAEA/INLEX missions in a number of interested member states in the course of the year, in order to raise awareness of the international legal instruments relevant for achieving a global nuclear liability regime.

In the context of the implementation of the IAEA Action Plan on Nuclear Safety, the IAEA Secretariat organised a Second Workshop on Civil Liability for Nuclear Damage, in Vienna, on 14 May 2013. The workshop aimed to provide diplomats and experts from member states with an introduction to the international legal regime of civil liability for nuclear damage. To this end, a presentation on INLEX and its role in the implementation of the Action Plan, as well as keynote speeches on the basic principles of nuclear liability and their continuing relevance and on the overview of the international legal instruments on civil liability for nuclear damage were delivered. In the afternoon session of the workshop, the following topical issues of nuclear liability were touched upon during roundtable discussions: the Convention on Supplementary Compensation for Nuclear Damage; the coastal States' perspective; the role of insurance; as well as the IAEA legislative assistance programme. The workshop was attended by 49 participants from 34 member states and it was decided to be repeated annually.

Legislative assistance activities

The IAEA Secretariat continued to support member states, upon request, under its legislative assistance programme. During the period from January to May 2013, eight draft national laws were reviewed and comments were provided to the countries concerned. In addition, preparations are under way to conduct awareness missions in a number of interested member states, in order to inform their policymakers about the importance of adhering to relevant legal instruments adopted under the IAEA's auspices.

Handbook on Nuclear Law – Volume III

The IAEA Secretariat is developing a third volume of the *Handbook on Nuclear Law*, which will cover various areas of nuclear law beyond regulatory matters covered in the first two volumes. Two consultancy meetings were held, from 14 to 16 November 2012 and from 13 to 15 March 2013 respectively, to develop a draft text.

Workshops for diplomats on nuclear law

The IAEA Office of Legal Affairs organised a workshop on nuclear law in Geneva, Switzerland, on 29 April 2013. The workshop provided diplomats working at Permanent Missions of IAEA member states in Geneva with a broad understanding

of all aspects of nuclear law. To this end, presentations on the key international legal instruments relating to nuclear safety, nuclear security and safeguards, as well as to civil liability for nuclear damage, were delivered. In addition, participants were provided with an overview of the IAEA's legislative assistance programme.

A similar workshop on nuclear law will be held in Vienna, Austria on 15 July 2013 for diplomats and experts of all IAEA member states.

OECD Nuclear Energy Agency

The Russian Federation joins the OECD Nuclear Energy Agency

The accession of the Russian Federation to the OECD Nuclear Energy Agency (NEA) and its Data Bank became effective on 1 January 2013. It is now the 31st member country of the NEA and sent its first delegation to the 25 to 26 April 2013 meeting of the Steering Committee for Nuclear Energy, the highest decision-making body at the NEA in which all member countries are represented.

The Russian Federation and the NEA have a long-standing relationship. It became an ad hoc observer in the NEA Nuclear Law Committee in 1996, and a regular observer in the NEA Committee on the Safety of Nuclear Installations and the NEA Committee on Nuclear Regulatory Activities in 1998. The Russian Federation has been a regular observer in all NEA standing technical committees since signing a joint declaration with the NEA in 2007. It is also a contributor to the NEA Data Bank activities and has been involved in the High-level Group on the Security of Supply of Medical Radioisotopes (HLG-MR) since 2010.

The Russian Federation is a member of the Generation IV International Forum (GIF), and its nuclear regulatory authority is a member of the Multinational Design Evaluation Programme (MDEP). The NEA acts as Technical Secretariat for both initiatives.

The Russian Federation is also a member of the International Atomic Energy Agency (IAEA) and party to the main treaties and agreements on the non-proliferation of nuclear weapons and on co-operation with regard to the peaceful uses of nuclear energy.

United Arab Emirates

Federal Law by Decree No. 4 of 2012*

concerning civil liability for nuclear damage

We, Khalifa bin Zayed Al Nahyan, President of the United Arab Emirates,

- Having reviewed the Constitution;
- Federal Law No. 1 of 1972 Concerning the Jurisdictions of the Ministries and the Competences of the Ministers, and the amending laws thereof;
- Federal Law by Decree No. (6) of 2009 Concerning the Peaceful Uses of Nuclear Energy;
- Federal Decree No. 32 of 2012 Ratifying the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage of 1997; and
- Federal Decree No. 33 of 2012 Ratifying the Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention of 1988; and
- Acting upon the proposal of the Minister of Energy and the consent of the Cabinet,

have issued the following Federal Law by Decree:

DEFINITIONS

Article (1)

In the implementation of the provisions of this Law by Decree, and regardless of provisions of any other legislation, the following terms and phrases shall have the meanings set forth below unless the context requires otherwise:

* The text published in this edition of the *Nuclear Law Bulletin* reproduces the unofficial English translation of the Arabic text of Federal Law by Decree No. 4 of 2012 Concerning Civil Liability for Nuclear Damage, which is available at: http://fanr.gov.ae/En/About FANR/OurWork/Documents/Federal-Law-by-Decree-No-4-of-2012-Concerning-Civil-Liability-for-Nuclear-Damage-English.pdf.
The official Arabic text was published in the UAE Official Gazette (26 August 2012) No. 540 (addendum), p. 9. Information about ordering the Official Gazette is available at: http://gsec.abudhabi.ae/Sites/GSEC/Navigation/EN/official-gazette.html. In the event of any discrepancy between the version published here and the official Arabic version, the latter version will take precedence.
A summary of this text was published in the *Nuclear Law Bulletin*, No. 90, (2012/2), OECD, Paris, pp. 128-129. An "Information Sheet" regarding this text is available at the UAE Federal Authority for Nuclear Regulation website at: www.fanr.gov.ae/En/MediaCentre/News/ Documents/Civil_Liability_Nuclear_Damage_Law_Information_Sheet_(SDJ).pdf.

State: The United Arab Emirates.

Authority: Federal Authority for Nuclear Regulation.

IAEA: International Atomic Energy Agency.

Operator: The person licensed by the Authority to operate a Nuclear Installation pursuant to Federal Law by Decree No. (6) of 2009 and designated as the Operator in such license.

Nuclear Fuel: Any material which is capable of producing energy by a self-sustaining chain process of nuclear fission.

Radioactive Products or Waste: Any radioactive material produced in, or any material made radioactive by exposure to the radiation incidental to, the production or utilization of Nuclear Fuel, but does not include radioisotopes which have reached the final stage of fabrication so as to be usable for any scientific, medical, agricultural, commercial or industrial purpose.

Nuclear Material:

1. Any Nuclear Fuel, other than natural uranium and depleted uranium, capable of producing energy by a self-sustaining chain process of nuclear fission outside a Nuclear Reactor either alone or in combination with other material.
2. Radioactive Products or Waste.

Nuclear Reactor: Any structure containing Nuclear Fuel in such an arrangement that a self-sustaining chain process of nuclear fission can occur therein without an additional source of neutrons.

Nuclear Installation:

1. Any Nuclear Reactor other than one with which a means of sea or air transport is equipped for use as a source of power, whether for propulsion thereof or for any other purpose.
2. Any factory using Nuclear Fuel for the production of Nuclear Material, or any factory for the processing of Nuclear Material, including any factory for the re-processing of irradiated Nuclear Fuel.
3. Any facility where Nuclear Material is stored, other than those storehouses used to store Nuclear Material during carriage.
4. Other facilities in which there are Nuclear Fuel or Radioactive Products or Waste as the Board of Governors of the IAEA shall from time to time determine.

Several Nuclear Installations of one Operator which are located at the same site shall be considered as a single Nuclear Installation.

Nuclear Damage:

1. Loss of life or any personal injury;
2. Loss of or damage to property;
3. Economic loss arising from loss or damage not referred to in paragraphs (1) or (2) above, incurred by a person entitled to claim for compensation in respect of such loss or damage;
4. The costs of measures of reinstatement of impaired environment, unless such impairment is insignificant, if such measures are actually taken or to be taken, and insofar as not included in paragraph (2) above;

5. Loss of income deriving from an economic interest in use or enjoyment of the environment, incurred as a result of a significant impairment of that environment, and insofar as not included in paragraph (2) above;
6. The costs of preventive measures, and further loss or damage caused by such measures;
7. Any other economic loss, other than loss caused by the impairment of the environment,

to the extent that the loss or damages referred to in paragraphs 1-5 and 7 above have emerged from or resulted from ionizing radiation emitted from any radiation source within a Nuclear Installation, or emitted from Nuclear Fuel, Radioactive Products or Waste in a Nuclear Installation, or of Nuclear Material coming from, originating in or sent to a Nuclear Installation,, whether arising from the radioactive properties of such material or from a combination of radioactive properties with , toxic, explosive or other hazardous properties of such material.

The Cabinet may issue instructions related to the implementation of the provisions of paragraphs 1-7.

Nuclear Incident: Any occurrence or series of occurrences having the same origin which causes Nuclear Damage or creates a grave and imminent threat of causing such damage only with respect to preventive measures.

Special Drawing Right (SDR): The unit of account as defined by the International Monetary Fund and used by it for its own operations and transactions.

1997 Vienna Convention: The consolidated text of the 1963 Vienna Convention as amended and attached to the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage dated 12 September 1997.

OBJECTIVES OF LAW

Article (2)

The objective of this Federal Law by Decree is to:

1. Regulate the provisions and determine the scope of the civil liability and compensation for Nuclear Damage.
2. Determine the financial security that the Operator must maintain.
3. Apply the 1997 Vienna Convention on Civil Liability for Nuclear Damage wherever no provision is made in this Law by Decree.

SCOPE OF APPLICATION

Article (3)

The Operator of a Nuclear Installation shall be absolutely liable for damages upon proof that such damage has been caused by a Nuclear Incident as described in Article II of the 1997 Vienna Convention.

The Authority may, if the small extent of the risks involved so warrants, exclude any Nuclear Installation or small quantities of Nuclear Material from the application of this Law by Decree, provided that:

1. With respect to Nuclear Installations criteria for such exclusion have been established by the Board of Governors of the IAEA and the Authority issues a resolution that such exclusion satisfies such criteria.

2. With respect to small quantities of Nuclear Material, maximum limits for the exclusion of such quantities have been established by the Board of Governors of the IAEA and the Authority issues a resolution that such exclusion is within such established limits.

LIABILITY FOR NUCLEAR DAMAGE

Article (4)

The Operator is solely liable for any Nuclear Damage caused by a Nuclear Incident, in accordance with the provisions of Article II of the 1997 Vienna Convention.

Article (5)

1. The liability of the Operator to compensate for Nuclear Damage for any one Nuclear Incident shall not exceed 450 million SDRs.

2. The Authority, having regard to the nature of the Nuclear Installation or the Nuclear Material involved and to the likely consequences of an incident originating therefrom, may establish a lower limit for the liability of the Operator for compensating for Nuclear Damage referred to in paragraph (1) of this Article in relation to Nuclear Installations consisting of research reactors, low-power reactors and facilities that process or store Nuclear Material, provided that in no event shall any amount so established be less than 5 million SDRs. The State shall ensure coverage of the difference between the lower limit which the Authority establishes pursuant this paragraph and the higher liability limit set forth in paragraph (1) of this Article.

Article (6)

Upon the request of a carrier of Nuclear Material or a person handling Radioactive Products or Waste, and with prior written consent of the Operator, the Authority may designate or recognize him as an Operator in place of the Operator identified by the Authority, solely for purposes of Article II of the 1997 Vienna Convention and upon compliance with the insurance and financial security coverage requirements set forth in Article 8 of this Law by Decree.

In this event, such carrier or such person referred to in the first paragraph of this Article shall be considered as an Operator of a Nuclear Installation situated in the territory of the State.

Article (7)

If the Operator proves that the Nuclear Damage resulted wholly or partly either from the gross negligence of the person suffering the damage or from an act or omission of such person done with intent to cause damage, the court may relieve the Operator wholly or partly from the obligation to pay compensation in respect of the damage suffered by such person.

FINANCIAL SECURITY AND INSURANCE

Article (8)

1. The Operator shall obtain and maintain insurance and guarantees required by the Authority with respect to its liability for Nuclear Damage.

2. For the purposes of issuing a license to operate a Nuclear Installation, the Operator of the Nuclear Installation shall obtain and maintain insurance or other financial security up to 450 million SDRs, or up to the limit which the

Authority may determine in accordance with the provisions of paragraph (2) of Article 5 of this Law by Decree, to cover his liability for any one Nuclear Incident, provided that this insurance or other financial security shall be of such type and on such terms as approved by the Authority.

3. The Operator may obtain the insurance or the financial security from any sources approved by the Authority within or outside of the State.

4. The provisions of this Law by Decree complies with the priority in the distribution of compensation given to claims for loss of life or personal injury set forth in paragraph (2) of Article VIII of the 1997 Vienna Convention.

5. If the Operator is not able, after exhausting all efforts, to obtain insurance coverage or any part thereof referred to in paragraph (2) of this Article, the Authority may determine that the required insurance under the provisions of this Law by Decree is not available in domestic or international insurance markets, or that the insurance coverage is not available or is temporarily suspended. In these cases, the risks covered under the insurance coverage will be covered directly by the State, up to the limit provided for in paragraphs (1) or (2) of Article 5 of this Law, as the case may be, until such time as the Authority announces the availability of the insurance coverage and gives the relevant parties a period of time set by the Authority, upon it sole discretion, to obtain such insurance.

Article (9)

1. An Operator shall provide the carrier with a certificate issued by or on behalf of the insurer or any other financial guarantor furnishing financial security pursuant to Article 8 of this Law by Decree.

2. The certificate referred to in the first paragraph of this Article shall comply with the requirements set forth in this Law by Decree and with Article III of the 1997 Vienna Convention.

3. This Article shall not apply to transportation which occurs wholly within the territory of the State.

ACTIONS FOR COMPENSATION

Article (10)

1. Actions for compensation for Nuclear Damage shall be brought only against the Operator or the person furnishing insurance or financial security pursuant to paragraph (1) of Article 8 of this Law by Decree.

2. Action for compensation against the Operator shall lapse on the expiry of valid insurance or financial security if it continues to be valid for a period longer than the period set forth in paragraph 1(a) of Article VI of the 1997 Vienna Convention.

3. The rights for claiming compensation of any person who suffered Nuclear Damage shall expire if an action is not brought within three years from the date on which the person suffering damage had knowledge, or ought reasonably to have had knowledge of the damage and of the Operator liable, provided that the periods established pursuant to paragraph 1(a) of Article VI of the 1997 Vienna Convention or paragraph (2) of this Article have not been exceeded.

Article (11)

The Operator shall have the right of recourse in the following two cases:

1. If this is expressly provided for in a contract in writing.
2. If the Nuclear Incident results from an act or omission done with intent to cause damage. In such case the action shall be brought against the person who acted or participated in causing the act or omitted to act with such intent.

The recourse provided for under this Article may extend to benefit the State insofar as it has provided public funds pursuant to 1997 Vienna Convention.

JURISDICTION

Article (12)

1. The Federal Courts in the Emirate of Abu Dhabi shall have exclusive jurisdiction over actions arising pursuant to this Law by Decree.
2. The provisions of this Law by Decree shall apply to actions related to civil liability for Nuclear Damage. The provisions of the 1997 Vienna Convention shall apply wherever no provisions are made in this Law by Decree.
3. Upon the submission of an action for compensation for Nuclear Damage under the jurisdiction of the court referred to in the paragraph 1 of this Article, the court may appoint one or more specialists or experts to assist the court in accordance with the applicable laws and legislation.

COMPETENT AUTHORITY

Article (13)

The Authority shall be the competent authority with respect to implementation of the provisions of this Law by Decree, including:

1. Determining whether to exempt small quantities of Nuclear Material or Nuclear Installations from application of the provisions of the 1997 Vienna Convention and Article 3 of this Law by Decree;
2. Determining the lower limit of liability in the case of Nuclear Installations consisting of research reactors, low-power reactors and facilities that process or store Nuclear Material, pursuant to paragraph (2) of Article 5 of this Law by Decree; and
3. Determining whether the civil liability insurance or any other financial security of the applicant or the Operator is in accordance with the terms of financial protection required by paragraph 1(a) of Article VII of the 1997 Vienna Convention and paragraphs (1) and (2) of Article 8 of this Law by Decree.
4. Issuing rules and regulations relating to the application of provisions of this Law by Decree.

GENERAL PROVISIONS

Article (14)

1. Nothing in this Law by Decree shall be construed as limiting or restricting any right or obligation of any person arising under any scheme or system of

health insurance, employees' compensation or occupational disease compensation.

2. A beneficiary of any scheme or system of insurance or compensation referred to in paragraph (1) of this Article shall be eligible for the compensation provided in this Law by Decree in accordance with its terms.

Article (15)

This Law by Decree shall be published in the Official Gazette and shall come into force on the date of its publication.

Khalifa bin Zayed Al Nahyan

President of the United Arab Emirates

Issued at the Presidential Palace in Abu Dhabi

Date: 25 Ramadan 1433 A.H.

Corresponding to: 13 August 2012 A.D.

India

The Civil Liability for Nuclear Damage Act, 2010*

No. 38 of 2010, 21 September 2010

An Act to provide for civil liability for Nuclear Damage and prompt compensation to the victims of a Nuclear accident through a No Fault Liability Regime channeling liability to the operator, appointment of Claims Commissioner, establishment of Nuclear Damage Claims commission and for matters connected therewith or incidental thereto.

Be it enacted by Parliament in the 61st Year of the Republic of India as follows:

Chapter I. Preliminary

1. Short title, extent, application and commencement

1. This act may be called the Civil Liability for Nuclear Damage Act, 2010.

2. It extends to the whole of India.

3. It also applies to nuclear damage suffered:

a) in or over the maritime areas beyond the territorial waters of India;

b) in or over the exclusive economic zone of India as referred to in section 7 of the Territorial Waters, Continental Shelf, Exclusive Economic Zone and Other Maritime Zones Act, 1976;

c) on board or by a ship registered in India under section 22 of the Merchant Shipping Act, 1958 or under any other law for the time being in force;

d) on board or by an aircraft registered in India under clause (d) of sub-section (2) of section 5 of the Aircraft Act, 1934 or under any other law for the time being in force;

e) on or by an artificial island, installation or structure under the jurisdiction of India.

* This document is an unofficial reproduction of the original text. In the event of any discrepancy between this version and the original version, the latter will take precedence.
The Civil Liability for Nuclear Damage Act, No. 38 of 2010 was published in 47 Gazette of India, pt. II, sec. 1, pp. 1-15 (New Delhi, 21 September 2010), and is available at: www.prsindia.org/billtrack/the-civil-liability-for-nuclear-damage-bill-2010-1042.
A copy of the Civil Liability for Nuclear Damage Act as passed by LokSabha on 25 August 2010, Bill No. 19-C of 2010, was printed in the *Nuclear Law Bulletin*, No. 88, (2011/2), OECD/NEA, Paris, pp. 145-162.
A summary of this text is available in the *Nuclear Law Bulletin*, No. 88, (2011/2), OECD/NEA, Paris, pp. 80-83. An article written by Robert J. Gruendel and ElsReynaersKini on India's civil liability regime for nuclear damage was published in *Nuclear Law Bulletin*, No. 89, (2012/1), OECD/NEA, Paris, pp. 45-66.

4. It applies only to the nuclear installation owned or controlled by the Central Government either by itself or through any authority or corporation established by it or a Government company.

Explanation – For the purposes of this sub-section, "Government" shall have the same meaning as assigned to it in clause (bb) of sub-section (I) of section 2 of the Atomic Energy Act, 1962.

5. It shall come into force on such date as the Central Government may, by notification, appoint; and different dates may be appointed for different provisions of this act, and any reference in any such provision to the commencement of this act shall be construed as a reference to the coming into force of that provision.

2. Definitions

In this act, unless the context otherwise requires:

a) "Chairperson" means the Chairperson of the Commission appointed under sub-section (1) of section 20;

b) "Claims Commissioner" means the Claims Commissioner appointed under sub-section (2) of section 9;

c) "Commission" means the Nuclear Damage Claims Commission established under section 19;

d) "Environment" shall have the same meanings assigned to it in clause (a) of Section 2 of the Environment (Protection) Act,1986

e) "Member" means a member of the Commission appointed under sub-section (1) of section 20;

f) "Notification" means a notification published in the Official Gazette and the term "notify" shall be construed accordingly;

g) "Nuclear damage" means:

   i) loss of life or personal injury (including immediate and long term health impact) to a person; or

   ii) loss of, or damage to, property, caused by or arising out of a nuclear incident, and includes each of the following to the extent notified by the Central Government;

   iii) any economic loss, arising from the loss or damage referred to in sub-clauses (i) or (ii) and not included in the claims made under those sub-clauses, if incurred by a person entitled to claim such loss or damage;

   iv) costs of measures of reinstatement of impaired environment caused by a nuclear incident, unless such impairment is insignificant, if such measures are actually taken or to be taken and not included in the claims made under sub-clause (ii);

   v) loss of income deriving from an economic interest in any use or enjoyment of the environment, incurred as a result of a significant impairment of that environment caused by a nuclear incident, and not included in the claims under sub-clause (ii);

   vi) the costs of preventive measures, and further loss or damage caused by such measures;

   vii) any other economic loss, other than the one caused by impairment of the environment referred to in sub-clauses (iv) and (v), in so far as it is

permitted by the general law on civil liability in force in India and not claimed under any such law,

in the case of sub-clauses (i) to (v) and (vii) above, to the extent the loss or damage arises out of, or results from, ionizing radiation emitted by any source of radiation inside a nuclear installation, or emitted from nuclear fuel or radioactive products or waste in, or of, nuclear material coming from, originating in, or sent to, a nuclear installation, whether so arising from the radioactive properties of such matter, or from a combination of radioactive properties with toxic, explosive or other hazardous properties of such matter;

h) "Nuclear fuel" means any material which is capable of producing energy by a self-sustaining chain process of nuclear fission;

i) "Nuclear incident" means any occurrence or series of occurrences having the same origin which causes nuclear damage or, but only with respect to preventive measures, creates a grave and imminent threat of causing such damage;

j) "Nuclear installation" means:

(A) any nuclear reactor other than one with which a means of transport is equipped for use as a source of power, whether for propulsion thereof or for any other purpose;

(B) any facility using nuclear fuel for the production of nuclear material, or any facility for the processing of nuclear material, including re-processing of irradiated nuclear fuel; and

(C) any facility where nuclear material is stored (other than storage incidental to the carriage of such material).

Explanation – For the purpose of this clause, several nuclear installations of one operator which are located at the same site shall be considered as a single nuclear installation;

k) "Nuclear material" means and includes:

i) nuclear fuel (other than natural uranium or depleted uranium) capable of producing energy by a self-sustaining chain process of nuclear fission outside a nuclear reactor, either by itself or in combination with some other material; and

ii) radioactive products or waste;

l) "Nuclear reactor" means any structure containing nuclear fuel in such an arrangement that a self-sustaining chain process of nuclear fission can occur therein without an additional source of neutrons;

m) "Operator", in relation to a nuclear installation, means the Central Government or any authority or corporation established by it or a Government company who has been granted a licence pursuant to the Atomic Energy Act, 1962 for the operation of that installation;

n) "Prescribed" means prescribed by rules made under this act;

o) "Preventive measures" means any reasonable measures taken by a person after a nuclear incident has occurred to prevent or minimise damage referred to in sub-clauses (i) to (v) and (vii) of clause g, subject to the approval of the Central Government;

p) "Radioactive products or waste" means any radioactive material produced in, or any material made radioactive by exposure to, the radiation incidental to the production or utilisation of nuclear fuel, but does not include radioisotopes which have reached the final stage of fabrication so as to be usable for any scientific, medical, agricultural, commercial or industrial purpose;

q) "Special Drawing Rights" means Special Drawing Rights as determined by the International Monetary Fund.

Chapter II. Liability for nuclear damage

3. Atomic Energy Regulatory Board to notify nuclear incident

1. The Atomic Energy Regulatory Board constituted under the Atomic Energy Act, 1962 shall, within a period of 15 days from the date of occurrence of a nuclear incident, notify such nuclear incident:

Provided that where the Atomic Energy Regulatory Board is satisfied that the gravity of threat and risk involved in a nuclear incident is insignificant, it shall not be required to notify such nuclear incident.

2. The Atomic Energy Regulatory Board shall, immediately after the notification under sub-section (1) is issued, cause wide publicity to be given to the occurrence of such nuclear incident, in such manner as it may deem fit.

4. Liability of operator

1. The operator of the nuclear installation shall be liable for nuclear damage caused by a nuclear incident:

a) in that nuclear installation; or

b) involving nuclear material coming from, or originating in, that nuclear installation and occurring before:

   i) the liability for nuclear incident involving such nuclear material has been assumed, pursuant to a written agreement, by another operator; or

   ii) another operator has taken charge of such nuclear material; or

   iii) the person duly authorised to operate a nuclear reactor has taken charge of the nuclear material intended to be used in that reactor with which means of transport is equipped for use as a source of power, whether for propulsion thereof or for any other purpose; or

   iv) such nuclear material has been unloaded from the means of transport by which it was sent to a person within the territory of a foreign state; or

c) involving nuclear material sent to that nuclear installation and occurring after:

   i) the liability for nuclear incident involving such nuclear material has been transferred to that operator, pursuant to a written agreement, by the operator of another nuclear installation; or

   ii) that operator has taken charge of such nuclear material; or

   iii) that operator has taken charge of such nuclear material from a person operating a nuclear reactor with which a means of transport is equipped for use as a source of power, whether for propulsion thereof or for any other purpose; or

iv) such nuclear material has been loaded, with the written consent of that operator, on the means of transport by which it is to be carried from the territory of a foreign state.

2. Where more than one operator is liable for nuclear damage, the liability of the operators so involved shall, in so far as the damage attributable to each operator is not separable, be joint and several:

Provided that the total liability of such operators shall not exceed the extent of liability specified under sub-section (2) of section 6.

3. Where several nuclear installations of one and the same operator are involved in a nuclear incident, such operator shall, in respect of each such nuclear installation, be liable to the extent of liability specified under sub-section 2 of section 6.

4. The liability of the operator of the Nuclear Installation shall be strict and shall be based on the principle of No Fault Liability.

Explanation – For the purposes of this section:

a) where nuclear damage is caused by a nuclear incident occurring in a nuclear installation on account of temporary storage of material-in-transit in such installation, the person responsible for transit of such material shall be deemed to be the operator;

b) where a nuclear damage is caused as a result of nuclear incident during the transportation of nuclear material, the consignor shall be deemed to be the operator;

c) where any written agreement has been entered into between the consignor and the consignee or, as the case may be, the consignor and the carrier of nuclear material, the person liable for any nuclear damage under such agreement shall be deemed to be the operator;

d) where both nuclear damage and damage other than nuclear damage have been caused by a nuclear incident or, jointly by a nuclear incident and one or more other occurrences, such other damage shall, to the extent it is not separable from the nuclear damage, be deemed to be a nuclear damage caused by such nuclear incident.

5. *Operator not liable in certain circumstances*

1. An operator shall not be liable for any nuclear damage where such damage is caused by a nuclear incident directly due to:

i) a grave natural disaster of an exceptional character; or

ii) an act of armed conflict, hostility, civil war, insurrection or terrorism.

2. An operator shall not be liable for any nuclear damage caused to:

i) the nuclear installation itself and any other nuclear installation including a nuclear installation under construction, on the site where such installation is located; and

ii) to any property on the same site which is used or to be used in connection with any such installation; or

iii) to the means of transport upon which the nuclear material involved was carried at the time of nuclear incident:

Provided that any compensation liable to be paid by an operator for a nuclear damage shall not have the effect of reducing the amount of his liability in respect of any other claim for damage under any other law for the time being in force.

3. Where any nuclear damage is suffered by a person on account of his own negligence or from his own acts of commission or omission, the operator shall not be liable to such person.

6. Limits of liability

1. The maximum amount of liability in respect of each nuclear incident shall be the INR equivalent of SDRs 300 million or such higher amount as the Central Government may specify by notification:

Provided that the Central Government might take additional measures, where necessary, if the compensation to be awarded under this act exceeds the amount specified under this sub-section.

2. The liability of the operator in each nuclear incident shall be:

a) In respect of nuclear reactors having thermal power equal to or above 10 MW, INR 15 billion;

b) In respect of spent fuel reprocessing plant INR 3 billion;

c) In respect of research reactors having thermal power below 10 MW, Fuel cycle facilities other than spent fuel reprocessing plants and transportation of Nuclear Materials, INR 1 billion;

Provided that the Central Government may review the amount of operator's liability from time to time, and specify, by notification, a higher amount in this sub section:

Provided further that the amount of liability shall not include any interest or cost of proceedings.

7. Liability of Central Government

1. The Central Government shall be liable for nuclear damage in respect of a nuclear incident:

a) where the liability exceeds the amount of liability of an operator specified under sub-section (2) of section 6, to the extent such liability exceeds such liability of the operator;

b) occurring in a nuclear installation owned by it; and

c) occurring on account of causes specified in clauses (i) and (ii) of sub-section (1) of section 5:

Provided that the Central Government may, by notification, assume full liability for a nuclear installation not operated by it, if it is of the opinion that it is necessary in public interest.

2. For the purpose of it meeting part of its liability under clause a or clause c of sub-section 1, the Central Government may establish a fund to be called the Nuclear Liability Fund by charging such amount of levy from the operators, in such manner, as may be prescribed.

8. Operator to maintain insurance or financial securities

1. The operator shall, before he begins operation of his nuclear installation, take out insurance policy or such other financial security or combination of both, covering his liability under sub-section (2) of section 6, in such manner as may be prescribed.

2. The operator shall from time to time renew the insurance policy or other financial security referred to in sub-section (1), before the expiry of the period of validity thereof.

3. The provisions of sub-sections (1) and (2) shall not apply to a nuclear installation owned by the Central Government.

Explanation – For the purposes of this section, "financial security" means a contract of indemnity or guarantee, or shares, or bonds or such instrument as may be prescribed or any combination thereof.

Chapter III. Claims Commissioner

9. Compensation for nuclear damage and its adjudication

1. Whoever suffers nuclear damage shall be entitled to claim compensation in accordance with the provisions of this act.

2. For the purposes of adjudicating upon claims for compensation in respect of nuclear damage, the Central Government shall, by notification, appoint one or more Claims Commissioners for such area, as may be specified in that notification.

10. Qualifications for appointment as Claims Commissioner

A person shall not be qualified for appointment as a Claims Commissioner unless he:

a) is or has been a District Judge; or

b) in the service of the Central Government and has held the post not below the rank of Additional Secretary to the Government of lndia or any other equivalent post in the Central Government.

11. Salary, allowances and other terms and conditions of service of Claims Commissioner

The salary and allowances payable to and other terms and conditions of service of Claims Commissioner shall be such as may be prescribed.

12. Adjudication procedure and powers of Claims Commissioner

1. For the purposes of adjudication of claims under this act, the Claims Commissioner shall follow such procedure as may be prescribed.

2. For the purpose of holding inquiry, the Claims Commissioner may associate with him such persons having expertise in the nuclear field or such other persons and in such manner as may be prescribed.

3. Where any person is associated under sub-section (2), he shall be paid such remuneration, fee or allowance, as may be prescribed.

4. The Claims Commissioner shall, for the purposes of discharging his functions under this act, have the same powers as are vested in a civil court under the Code of Civil Procedure, 1908, while trying a suit, in respect of the following matters, namely:

a) summoning and enforcing the attendance of any person and examining him on oath;

b) the discovery and production of documents;

c) receiving evidence on affidavits;

d) requisitioning any public record or copies thereof from any court or office;

e) issuing of commission for the examination of any witness;

f) any other matter which may be prescribed.

5. The Claims Commissioner shall be deemed to be a civil court for the purposes of section 195 and Chapter XXVI of the Code of Criminal Procedure, 1973.

Chapter IV. Claims and awards

13. Inviting application for claims by Claims Commissioner

After the notification of nuclear incident under sub-section (1) of section 3, the Claims Commissioner, having jurisdiction over the area, shall cause wide publicity to be given, in such manner as he deems fit, for inviting applications for claiming compensation for nuclear damage.

14. Persons entitled to make application for nuclear damage

An application for compensation before the Claims Commissioner or the Commission, as the case may be, in respect of nuclear damage may be made by:

a) a person who has sustained injury; or

b) the owner of the property to which damage has been caused; or

c) the legal representatives of the deceased; or

d) any agent duly authorised by such person or owner or legal representatives.

15. Procedure for making application before Claims Commissioner

1. Every application for compensation before the Claims Commissioner for nuclear damage shall be made in such form, containing such particulars and accompanied by such documents, as may be prescribed.

2. Subject to the provisions of section 18, every application under sub-section (1) shall be made within a period of three years from the date of knowledge of nuclear damage by the person suffering such damage.

16. Award by Claims Commissioner

1. On receipt of an application under sub-section (1) of section 15, the Claims Commissioner shall, after giving notice of such application to the operator and affording an opportunity of being heard to the parties, dispose of the application within a period of three months from the date of such receipt and make an award accordingly.

2. While making an award under this section, the Claims Commissioner shall not take into consideration any benefit, reimbursement or amount received by the applicant in pursuance of contract of insurance taken by him or for members of his family or otherwise.

3. Where an operator is likely to remove or dispose of his property with the object of evading payment by him of the amount of the award, the Claims Commissioner may, in accordance with the provisions of rules 1 to 4 of Order XXXIX of the First Schedule to the Code of Civil Procedure, 1908, grant a temporary injunction to restrain such act.

4. The Claims Commissioner shall arrange to deliver copies of the award to the parties within a period of 15 days from the date of the award.

5. Every award made under sub-section (1) shall be final.

17. Operator's right of recourse

The operator of the nuclear installation after paying the compensation for nuclear damage in accordance with section 6, shall have a right to recourse where:

a) Such right is expressly provided for in a contract in writing;

b) The nuclear incident has resulted as a consequence of an act of suppliers or his employees, which includes supply of equipment with material with patent or latent defects or sub-standard services;

c) The nuclear incident has resulted from the act of commission or omission of an individual done with the intent to cause nuclear damage.

18. Extinction of right to claim

The Right to Claim compensation for nuclear damage shall extinguish, if such claim was not made within a period of:

a) 10 years, in the case of damage of property;

b) 20 years, in the case of personal injury to any person

from the date of occurrence of the incident notified under sub-section (1) of section 3:

Provided that where a nuclear damage is caused by a nuclear incident involving nuclear material which, prior to such nuclear incident, had been stolen, lost, jettisoned or abandoned, the said period of 10 years shall be computed from the date of such nuclear incident, but, in no case, it shall exceed a period of 20 years from the date of such theft, loss, jettison or abandonment.

Chapter V. Nuclear Damage Claims Commission

19. Establishment of Nuclear Damage Claims Commission

Where the Central Government, having regard to the injury or damage caused by a nuclear incident, is of the opinion that it is expedient in public interest that such claims for damages be adjudicated by the commission instead of a Claims Commissioner, it may, by notification, establish Commission for the purpose of this Act.

20. Composition of Commission

1. The Commission shall consist of a Chairperson and such other members, not exceeding six, as the Central Government may, by notification, appoint.

2. The Chairperson and other members of the commission shall be appointed on the recommendation of a selection committee consisting of three experts from amongst the persons having at least 30 years of experience in nuclear science and a retired Supreme Court judge.

3. A person shall not be qualified for appointment as the Chairperson of the Commission unless he has attained the age of fifty-five years and is or has been or qualified to be a Judge of a High Court:

Provided that no appointment of a sitting judge shall be made except after consultation with the Chief Justice of India.

4. A person shall not be qualified for appointment as a member unless he has attained the age of fifty-five years and:

a) has held or is holding or qualified to hold, the post of Additional Secretary to the Government of India or any other equivalent post in the Central Government and possesses special knowledge in law relating to nuclear liability arising out of nuclear incident; or

b) has been a Claims Commissioner for five years.

21. Term of office

The Chairperson or a member, as the case may be, shall hold office as such for a term of three years from the date on which he enters upon his office and shall be eligible for re-appointment for another term of three years:

Provided that no person shall hold office as such Chairperson or member after he has attained the age of sixty-seven years.

22. Salary and allowances and other terms and conditions of service of Chairperson and Members

The salary and allowances payable to and other terms and conditions of service, including pension, gratuity and other retirement benefits, of the Chairperson and other members shall be such as may be prescribed:

Provided that no salary, allowances and other terms and conditions of service of the Chairperson or other members shall be varied to his disadvantage after his appointment.

23. Filling up of vacancies

If, for reasons other than temporary absence, any vacancy occurs in the office of the Chairperson or member, as the case may be, the Central Government shall appoint another person in accordance with the provisions of this act to fill such vacancy and the proceedings may be continued before the Commission from the stage at which it was, before the vacancy is filled.

24. Resignation and removal

1. The Chairperson or a member may, by a notice in writing under his hand addressed to the Central Government, resign his office:

Provided that the Chairperson or the member shall, unless he is permitted by the Central Government to relinquish his office sooner, continue to hold office until the expiry of three months from the date of receipt of such notice or until a person duly appointed as his successor enters upon his office or until the expiry of his term of office, whichever is earlier.

2. The Central Government shall remove from office the Chairperson or a member who:

a) has been adjudged an insolvent; or

b) has been convicted of an offence which, in the opinion of the Central Government, involves moral turpitude; or

c) has become physically or mentally incapable of acting as a member; or

d) has acquired such financial or other interest as is likely to affect prejudicially his functions as a member; or

e) has so abused his position as to render his continuance in office detrimental to the public interest:

Provided that no member shall be removed under clause (d) or clause (e) unless he has been given an opportunity of being heard in the matter.

25. Chairperson or Member deemed to retire from service

A person who, immediately before the date of assuming office as a Chairperson or a member, was in service of the Government, shall be deemed to have retired from service on the date on which he enters upon office as such, but his subsequent

service as the Chairperson or a member shall be reckoned as continuing approved service counting for pension in service to which he belonged.

26. Suspension of pension

If a person who, immediately before the date of assuming office as the Chairperson or a member was in receipt of or being eligible so to do, has opted to draw, a pension, other than a disability or wound pension, in respect of any previous service under the Central Government, his salary in respect of service as the Chairperson or a member shall be reduced:

a) by the amount of that pension; and

b) if he had, before assuming office, received, in lieu of a portion of the pension due to him in respect of such previous service, the commuted value thereof, by the amount of that portion of the pension.

27. Prohibition of acting as Arbitrator

No person shall, while holding office as a Chairperson or a member, act as an arbitrator in any matter.

28. Prohibition of practice

On ceasing to hold office, the Chairperson or a member shall not appear, act or plead before the Commission.

29. Powers of Chairperson

The Chairperson shall have the power of superintendence in the general administration of the Commission and exercise such powers as may be prescribed.

30. Officers and other employees of Commission

1. The Central Government shall provide the Commission with such officers and other employees as it may deem fit.

2. The salary and allowances payable to and the terms and other conditions of service of officers and other employees of the Commission shall be such as may be prescribed.

31. Application for compensation before Commission

1. Every application for compensation before the Commission for nuclear damage shall be made in such form, containing such particulars and accompanied by such documents, as may be prescribed.

2. Subject to the provisions of section 18, every application under sub-section (1) shall be made within a period of three years from the date of knowledge of nuclear damage by the person suffering such damage.

32. Adjudication procedure and powers of Commission

1. The Commission shall have original jurisdiction to adjudicate upon every application for compensation filed before it under sub-section (1) of section 31 or transferred to it under section 33, as the case may be.

2. Upon transfer of cases to the Commission under section 33, the Commission shall hear such applications from the stage at which it was before such transfer.

3. The Chairperson may constitute benches comprising of not more than three members of the Commission for the purpose of hearing of claims and any decision thereon shall be rendered by a majority of the members hearing such claims.

4. The Commission shall not be bound by the procedure laid down in the Code of Civil Procedure, 1908 but shall be guided by the principles of natural justice and subject to the other provisions of this act and of any rules made thereunder, the Commission shall have the power to regulate its own procedure including the places and the times at which it shall have its sittings.

5. The Commission shall have, for the purposes of discharging its functions under this act, the same powers as are vested in a civil court under the Code of Civil Procedure, 1908, while trying a suit, in respect of the following matters, namely:

a) summoning and enforcing the attendance of any person and examining him on oath;

b) the discovery and production of documents;

c) receiving evidence on affidavits;

d) requisitioning any public record or copies thereof from any court or office;

e) issuing of commission for the examination of any witness;

f) any other matter which may be prescribed.

6. The Commission shall, after giving notice of application to the operator and after affording an opportunity of being heard to the parties, dispose of such application within a period of three months from the date of such receipt and make an award accordingly.

7. While making an award under this section, the Commission shall not take into consideration any benefit, reimbursement or amount received by the applicant in pursuance of any contract of insurance or otherwise.

8. Where an operator is likely to remove or dispose of his property with the object of evading payment by him of the amount of the award, the Commission may, in accordance with the provisions of rules 1 to 4 of Order XXXIX of the First Schedule to the Code of Civil Procedure, 1908, grant a temporary injunction to restrain such act.

9. The Commission shall arrange to deliver copies of the award to the parties concerned within a period of fifteen days from the date of such award.

10. Every award made under sub-section (6) shall be final.

33. Transfer of pending cases to Commission

Every application for compensation pending before the Claims Commissioner immediately before the date of establishment of the Commission under section 19 shall stand transferred on that date to the Commission.

34. Proceedings before Claims Commissioner or Commission to be judicial proceedings

Every proceeding before the Claims Commissioner or the Commission under this act shall be deemed to be judicial proceeding within the meaning of sections 193, 219 and 228 of, and for the purposes of section 196 of, the Indian Penal Code.

35. Exclusion of jurisdiction of civil courts

Save as otherwise provided in Section 46, no Civil Court (except the Supreme Court and a High Court exercising jurisdiction under articles 226 and 227 of the Constitution) shall have jurisdiction to entertain any suit or proceedings in respect of any matter which the Claims Commissioner or the Commission, as the case may be, is empowered to adjudicate under this act and no injunction shall be granted by

any court or other authority in respect of any action taken or to be taken in pursuance of any power conferred by or under this act.

36. Enforcement of awards

1. When an award is made under sub-section (1) of section 16 or under sub-section (6) of section 32:

a) the insurer or any person, as the case may be, who under the contract of insurance or financial security under section 8 is required to pay any amount in terms of such award and to the extent of his liability under such contract, shall deposit that amount within such time and in such manner as the Claims Commissioner or the Commission, as the case may be, may direct; and

b) the operator shall, subject to the maximum liability specified under sub-section (2) of section 6, deposit the remaining amount by which such award exceeds the amount deposited under clause (a).

2. Where any person referred to in sub-section (1) fails to deposit the amount of award within the period specified in the award, such amount shall be recoverable from such person as arrears of land revenue.

3. The amount deposited under sub-section (1) shall be disbursed to such person as may be specified in the award within a period of fifteen days from the date of such deposit.

37. Annual report

The Commission shall prepare, in such form and at such time in each financial year, as may be prescribed, an annual report giving full account of its activities during that financial year and submit a copy thereof to the Central Government which shall cause the same to be laid before each House of Parliament.

38. Dissolution of Commission in certain circumstances

1. Where the Central Government is satisfied that the purpose for which the Commission established under section 19 has served its purpose, or where the number of cases pending before such Commission is so less that it would not justify the cost of its continued function, or where it considers necessary or expedient so to do, the Central Government may, by notification, dissolve the Commission.

2. With effect from the date of notification of dissolution of Commission under sub-section (1):

a) the proceeding, if any, pending before the Commission as on the date of such notification shall be transferred to the Claims Commissioner to be appointed by the Central Government under sub-section (2) of section 9;

b) the Chairperson and all members of the Commission shall be deemed to have vacated their offices as such and they shall not be entitled to any compensation for premature termination of their office;

c) officers and other employees of the Commission shall be transferred to such other authority or offices of the Central Government, in such manner, as may be prescribed:

Provided that the officers and other employees so transferred, shall be entitled to the same terms and conditions of service as would have been held by them in the Commission:

Provided further that where an officer or an employee of the Commission refuses to join the services in such other authority or office, he shall be

deemed to have resigned and shall not be entitled to any compensation for premature termination of contract of service;

d) all assets and liabilities of the Commission shall vest in the Central Government.

3. Notwithstanding the dissolution of the Commission under sub-section (1), anything done or any action taken or purported to have been done or taken including any order made or notice issued or any appointment, confirmation or declaration made or any document or instrument executed or any direction given by the Commission before such dissolution, shall be deemed to have been validly done or taken.

4. Nothing in this section shall be construed to prevent the Central Government to establish the Commission subsequent to the dissolution of the Commission in accordance with the provisions of this act.

Chapter VI. Offences and penalties

39. Offences and penalties

1. Whoever-

a) contravenes any rule made or any direction issued under this act; or

b) fails to comply with the provisions of section 8; or

c) fails to deposit the amount under section 36,

shall be punishable with imprisonment for a term which may extend to five years or with fine or with both.

2. Whoever fails to comply with any direction issued under section 43 or obstructs any authority or person in the exercise of his powers under this act shall be punishable with imprisonment for a term which may extend to one year or with fine or with both.

40. Offences by companies

1. Where an offence under this act has been committed by a company, every person who at the time the offence was committed, was directly in charge of, and was responsible to, the company for the conduct of the business of the company, as well as the company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly:

Provided that nothing contained in this sub-section shall render any such person liable to any punishment under this act, if he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence.

2. Notwithstanding anything contained in sub-section (1), where any offence under this act has been committed by a company and it is proved that the offence has been committed with the consent or connivance of, or is attributable to any neglect on the part of, any director, manager, secretary or other officer of the company, such director, manager, secretary or other officer shall also be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

Explanation — For the purposes of this section,—

a) "company" means anybody corporate and includes a firm or other association of individuals;

b) "director", in relation to a firm, means a partner in the firm.

41. Offences by Government Departments

Where an offence under this act has been committed by any Department of the Government, the Head of the Department shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly:

Provided that nothing contained in this section shall render such Head of the Department liable to any punishment if he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence.

42. Cognizance of offences

No court inferior to that of a Metropolitan Magistrate or a Judicial Magistrate of the first class shall try any offence under this act:

Provided that cognizance of such offence shall not be taken except on a complaint made by the Central Government or any authority or officer authorised in this behalf by that Government.

Chapter VII. Miscellaneous

43. Power to give directions

The Central Government may, in exercise of its powers and performance of its functions under this act, issue such directions, as it may deem fit, for the purposes of this act, to any operator, person, officer, authority or body and such operator, person, officer, authority or body shall be bound to comply with such directions.

44. Power to call for information

The Central Government may call for such information from an operator as it may deem necessary.

45. Exemption from application of this Act

The Central Government may, by notification, exempt any nuclear installation from the application of this act where, having regard to small quantity of nuclear material, it is of the opinion that the risk involved is insignificant.

46. Act to be in addition to any other law

The provisions of this act shall be in addition to, and not in derogation of, any other law for the time being in force, and nothing contained herein shall exempt the operator from any proceeding which might, apart from this act, be instituted against such operator.

47. Protection of action taken in good faith

No suit, prosecution or other legal proceedings shall lie against the Central Government or the person, officer or authority in respect of anything done by it or him in good faith in pursuance of this act or of any rule or order made, or direction issued, thereunder.

48. Power to make rules

1. The Central Government may, by notification, make rules for carrying out the purposes of this act.

2. In particular, and without prejudice to the generality of the foregoing powers such rules may provide for:

a) the other financial security and the manner thereof under sub-section (1) of section 8;

b) the salary and allowances payable to and the other terms and conditions of service of Claims Commissioner under section 11;

c) the procedure to be followed by Claims Commissioner under sub-section (1) of section 12;

d) the person to be associated by Claims Commissioner and the manner thereof, under sub-section (2) of section 12;

e) the remuneration, fee or allowances of associated person under sub-section (3) of section 12;

f) any other matter under clause (f) of sub-section (4) of section 12;

g) the form of application, the particulars it shall contain and the documents it shall accompany, under sub-section (1) of section 15;

h) the salary and allowances payable to and other terms and conditions of service of Chairperson and other members, under section 22;

i) the powers of Chairperson under section 29;

j) the salary and allowances payable to and the terms and other conditions of service of officers and other employees of the Commission, under sub-section (2) of section 30;

k) the form of application, the particulars it shall contain and the documents it shall accompany, under sub-section (1) of section 31;

l) any other matter under clause (f) of sub-section (5) of section 32;

m) the form and the time for preparing annual report by Commission under section 37;

n) the manner of transfer of officers and other employees of the Commission under clause (c) of sub-section (2) of section 38.

3. Every rule made under this act by the Central Government shall be laid, as soon as may be after it is made, before each House of Parliament, while it is in session, for a total period of 30 days which may be comprised in one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or successive sessions aforesaid, both Houses agree in making any modification in the rule or both Houses agree that the rule should not be made, the rule shall thereafter have effect only in such modified form or be of no effect, as the case may be; however, any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule.

49. Power to remove difficulties

1. If any difficulty arises in giving effect to the provisions of this act, the Central Government may, by order published in the Official Gazette, make such provisions, not inconsistent with the provisions of this act, as appear to it to be necessary or expedient for removing the difficulty:

Provided that no order shall be made under this section after the expiry of three years from the commencement of this act.

2. Every order made under this section shall, as soon as may be after it is made, be laid before each House of Parliament.

V.K. BHASIN,
Secy. to the Govt. of India

Republic of Moldova

PARLIAMENT

LAW No. 132 of 08.06.2012*

on the safe conduct of nuclear and radiological activities

Published: 02.11.2012 in the Official Gazette No. 229-233 art. no: 739

For the purpose of regulating nuclear and radiological activities in accordance with the international requirements in this field arising out of the Treaty on the Non-Proliferation of Nuclear Weapons of 1 July 1968, which the Republic of Moldova ratified pursuant to Parliament Decision no. 1623-XII of 26 October 1993, the Agreement between the Republic of Moldova and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons and the Protocol thereto, which was ratified by way of Law No. 41-XVI of 2 March 2006, the Convention on Nuclear Safety adopted in Vienna on 17 June 1994 (Official Journal of the European Communities L318/20, 11.12.1999), EU Council Directive 96/29/EURATOM of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionising radiation (Official Journal of the European Communities L 159/1) and the International Atomic Energy Agency Safety Standards Series GSR Parts 1–3, Parliament adopts this organic law.

Section I
GENERAL PROVISIONS

Article 1. Subject of the law

The subject of this law is the safe conduct of nuclear and radiological activities for exclusively peaceful purposes, in accordance with the obligations arising out of the international treaties to which the Republic of Moldova is a party.

Article 2. Aims of the law

The aims of this law are:

* The text published in this edition of the *Nuclear Law Bulletin* is an unofficial translation of the official Romanian version of Republic of Moldova Law No. 132 of 8 June 2012 on the safe conduct of nuclear and radiological activities. The law was published in Romanian and Russian in Moldova's Official Gazette (2 Nov. 2012) No. 229-233, art. no. 739, which is available at: http://lex.justice.md/viewdoc.php?action=view&view=doc&id=345210&lang=1 and http://lex.justice.md/viewdoc.php?action=view&view=doc&id=345210&lang=2. In the event of any discrepancy between this translation and the original Romanian version, the latter will take precedence.
A summary of this text is available in this edition of the *Nuclear Law Bulletin*.

a) to prevent the proliferation of nuclear weapons, materials and equipment associated with the proliferation of nuclear weapons and other explosive devices containing radioactive material;

b) to establish mechanisms to ensure the safety of nuclear and radiological activities and maintain them at an adequate level in all sectors where ionising radiation sources are used;

c) to prevent the unauthorised conduct of nuclear and radiological activities;

d) to protect personnel, the public, property and the environment against the adverse impact of ionising radiation, in accordance with international standards concerning radiation protection and the safety of nuclear and radiological activities;

e) to prevent the misappropriation and illegal trafficking of nuclear and radioactive materials and to protect the physical security of nuclear and radiological facilities.

Article 3. Scope of the law

The provisions of this law apply to the following nuclear and radiological activities:

a) the study, design, siting, construction, assembly, commissioning, operation, modification, repair and decommissioning of nuclear and radiological facilities;

b) the manufacture, supply, rental, transfer, handling, possession, processing, treatment, use, temporary or permanent storage, transport, transit, import, export, re-export and temporary admission of ionising radiation sources, including nuclear materials, nuclear fuel and radioactive waste;

c) the supply and use of equipment for the measurement (radiometric etc.) of the parameters of ionising radiation fields, materials and devices providing protection against ionising radiation which are used to monitor or inspect and oversee nuclear and radiological activities, and materials for the packaging and containerisation or transportation of radioactive materials which have been specially adapted for this purpose;

d) the placing on the market of products and provision of services intended for the safe activity of nuclear and radiological facilities;

e) the detection and recovery of orphan radioactive sources.

Article 4. Key concepts

For the purposes of this law, the following key concepts mean:

nuclear/radiation accident – an event which affects a nuclear/radiological installation and leads to irradiation or contamination of the public or the environment with radioactive substances above the limits permitted by the applicable standards;

National Agency approval documents – radiation licences, including partial ones, safety certificates and permits to operate on the basis of which nuclear and radiological activity is conducted;

nuclear and/or radiological activity – any human practice which additionally introduces ionising radiation sources or ionising radiation exposure pathways;

National Agency – National Agency for the Regulation of Nuclear and Radiological Activities;

IAEA – International Atomic Energy Agency;

quality assurance – planned and systematic actions necessary to provide full confidence that the installations, procedures and operation of the nuclear or radiological facility will satisfy the requirements laid down in the relevant legislation;

authorisation – procedure for evaluating compliance by an individual or legal entity in terms of radiation protection and nuclear and radiological safety, at their request, for the safe conduct of nuclear and radiological activity, followed by the issue of a radiation licence;

radiation licence – an approval document issued for activities which are not exempt from the authorisation procedure, following assessment of compliance with and adherence to the requirements for the conduct of nuclear and/or radiological activities pursuant to art. 20;

partial radiation licence – a radiation licence issued for the implementation of a phase of nuclear or radiological activity within the established field and timeframe;

nuclear and radiological databank – an automated information system made up of at least two nuclear and radiological databases and systems enabling information to be searched for, stored and processed;

nuclear and radiological database – a body of data structured in a particular manner on a physical medium, in written, graphic, visual or electromagnetic form, which are permanently accessible to users of information who are authorised in the relevant field;

safety certificate – an approval document which certifies that the installation (or equipment) which contains ionising radiation sources, means of transportation of radioactive sources and packaging and transportation container comply with the technical standards, rules, norms and technical requirements governing the safe operation of nuclear or radiological installations;

nuclear fuel – radioactive substances used in nuclear reactors to generate energy;

spent nuclear fuel – nuclear fuel which has been irradiated in the active part of a reactor and has been permanently removed from the reactor;

nuclear and radiation safety culture – all characteristics and attitudes in individuals and legal entities which prioritise radiation protection and nuclear and radiation safety;

radioactive waste – materials, items, installations, all kinds of objects in any form which contain or are contaminated with radionuclides at concentrations greater than exemption levels for which no further use has been or will be envisaged;

nuclear and radiation safety assessment – analysis of compliance with radiation protection and nuclear and radiation safety requirements, analysis of the aspects of the design and operation of a nuclear or radiological installation which are relevant to the protection of persons and the physical protection of the radioactive source or nuclear material, including analysis of radiation protection and physical security provisions made for the design, handling and use of nuclear or radiological facilities, and analysis of the associated risks and dangers under normal working conditions and in incident and accident situations;

certified expert – a person who holds a permit to operate issued by the National Agency confirming that they have the knowledge and training necessary to carry out instrumental or radiochemical tests with a view to the safe conduct of nuclear and radiological activities;

phase – a successive stage of a nuclear or radiological activity process for which a partial radiation licence is issued;

own financial means fund – the value of the insurance or other financial guarantee of the licence applicant or licensee, which is proportionate to the potential cost of remediating a nuclear or radiation incident or accident or of managing radioactive waste arising out of its own activities;

nuclear/radiation incident – an event which affects a nuclear/radiological facility and leads to an increase in the level of exposure of personnel above the permitted level and/or leads to the presence of radioactive substances in areas where they are not intended to be present and which necessitate remedial actions;

nuclear installation – any installation in which nuclear materials are stored, excluding storage for transportation purposes;

radiological installation – a generator of ionising radiation, item of equipment or device which extracts, produces or processes radioactive materials; premises or an area where there are radioactive materials, including radioactive waste;

radioactive waste management – all administrative and operational measures associated with the handling (management), transportation, pre-treatment, treatment, conditioning, interim storage and permanent storage of radioactive waste emanating from nuclear or radiological facilities;

special fissionable material – plutonium, uranium-233, uranium enriched in the isotope 233 or the isotope 235, any material artificially enriched in any of the aforementioned isotopes;

material of nuclear interest – heavy water, graphite, zirconium and other materials which, due to specific nuclear properties, are of particular interest for the nuclear sector;

nuclear material – any nuclear raw material and any special fissionable material;

radioactive material – any material, in any physical state, which is radioactive, including radioactive waste;

nuclear source material – uranium containing the mixture of isotopes occurring in nature; uranium depleted in isotope 235; thorium; any form thereof: metal, alloy, chemical compound or concentration;

enforcement measure – suspension or revocation of a radiation licence, including a partial one, revocation of a safety certificate or a permit to operate, cessation of unauthorised activities;

modification of a radiological installation – activity entailing the replacement of certain subassemblies with others which are not recommended by the manufacturer, and/or changing certain technical parameters, including operations entailing the restoration, reinstatement or improvement of technical parameters;

exemption levels – values established by the National Agency, expressed in terms of overall or specific activity or dose rate (in the case of ionising radiation generators) below which an activity (or practice) is exempt from the authorisation requirements of this law;

notification – a written document with an established format by way of which an individual or legal entity informs the National Agency of an intention to conduct or cease nuclear and/or radiological activities;

nuclear/radiological facility – premises, a site or a zone where nuclear or radiological activities are conducted or where there are installations containing ionising radiation sources or any other nuclear installations other than those within the nuclear cycle;

permit to operate – a document issued on the basis of an examination and assessment of knowledge, in accordance with current legislation, which allows a person handling a particular item of equipment or device containing ionising radiation sources, a radiation protection officer or a certified expert to engage in authorised activities in the field;

category A personnel – employees or persons operating independently who are subject to exposure at their workplace which can generate levels in excess of 5 microsieverts per year due to an activity falling under the scope of this law;

ionising radiation – any corpuscular or electromagnetic radiation that is capable of producing ions (electrostatically-charged particles), directly or indirectly, in its passage through matter or any alpha rays, beta rays, gamma rays or X-rays, neutrons, electrons, protons, other charged or neutral particles (except electromagnetic waves: radio, visible light, infrared, ultraviolet, laser radiation, ultrasound, etc.);

radiation protection – protection of professionally-exposed personnel, the public, property and the environment against the effects of radiation generated by ionising radiation sources, prevention of contamination with radionuclides, including the provision of protection which, during the course of various activities, would keep the risk of irradiation to a minimum;

radiation protection officer – a person who is appropriately trained and qualified in the field of radiation protection and nuclear and radiation security and holds a permit to operate, appointed by order within the organization to monitor adherence to radiation protection and nuclear and radiation safety requirements with a view to the safe use of ionising radiation sources;

cybersecurity – all technical and administrative measures intended to safeguard the security of the cyberspace component of nuclear or radiological data of national importance, which forms an integral part of the physical security system;

physical security – all technical and administrative measures to be taken when using, transporting and storing nuclear and radioactive materials to prevent misappropriation or loss thereof and to counteract acts of sabotage against nuclear and radiological installations and facilities, and to regain control over these materials in the event of their loss or misappropriation;

nuclear and radiation security – all technical and organizational measures intended to ensure that nuclear or radiological installations operate safely, to prevent and limit damage thereto and to protect personnel, the public, property and the environment against irradiation or radioactive contamination;

ionising radiation source – an emitter of ionising radiation, any radioactive material;

orphan radioactive source – a radioactive source which is not subject to regulatory control either because it has never been subject to regulatory control or because it has been abandoned, lost, stolen or placed or transferred without authorisation;

licensee – an individual or legal entity authorised by the National Agency to undertake types of activity within the nuclear or radiological sector;

illegal trafficking – any act which involves unauthorised nuclear or radiological activity entailing the holding, transfer, importation and exportation of nuclear materials, materials of nuclear interest, radioactive materials or equipment and devices associated with the proliferation of nuclear weapons;

treatment and conditioning of radioactive waste – a series of technological processes that transform radioactive waste into a stable and non-dispersible form which prevents it from being reused and which is suitable for lengthy storage or final disposal;

nuclear or radiation emergency – an event occurring at a nuclear or radiological installation which is classified, in accordance with legal provisions, as an incident or accident;

use of ionising radiation sources – a process entailing the use, operation, exploitation or functioning, including storage and routine maintenance, of ionising radiation sources.

Article 5. Primary regulatory principles

The primary regulatory principles for nuclear and radiological activities are as follows:

a) preventing the maximum permitted level of exposure to ionising radiation from being exceeded;

b) reducing irradiation levels to a minimum;

c) justification of any activities (or practices) which entail the use of ionising radiation sources;

d) maintenance of nuclear and radiation safety;

e) physical protection of nuclear and radioactive materials;

f) licensee accountability;

g) monitoring of nuclear and radiological activities.

Article 6. Regulatory functions

Provision is made for the following regulatory functions in the field of nuclear and radiological activities:

a) authorisation;

b) development and approval of the framework of laws and regulations in the field of nuclear and radiation security and physical security;

c) keeping records of ionising radiation sources and nuclear materials;

d) state inspections and oversight;

e) implementing enforcement measures for breaches of current legislation;

f) monitoring non-proliferation of nuclear weapons and compliance with international treaties.

Article 7. Statutory regulation

The provisions of this law and the international treaties to which the Republic of Moldova is a party shall be implemented by way of:

a) statutory instruments regulating nuclear and radiation security, physical security of nuclear and radiological facilities and physical protection of nuclear materials and radioactive sources, and regulating radiation protection, personnel

qualification requirements, the management of radioactive waste and spent nuclear fuel and the transportation of nuclear and radioactive materials, drawn up by the National Agency and approved by the Government according to the established procedure;

b) other statutory instruments regulating nuclear and radiation safety and physical security (such as regulations, instructions, guides, technical standards) for the enforcement of laws, drawn up and approved pursuant to decisions of the National Agency according to the procedure established by law;

c) statutory instruments which set values for radiation factors and irradiated products which have an impact on the health of personnel and the public and on the environment, drawn up and issued by other public authorities empowered by law and countersigned by the National Agency.

Article 8. Actors in the nuclear and radiological activities sector

(1) The infrastructure of the nuclear and radiological activities sector is made up of all actors who contribute to the pursuit of nuclear and radiological activity.

(2) The actors in the nuclear and radiological activities sector are:

a) the National Agency;

b) authorities which have powers over the nuclear and radiological activities sector, and other specialised central public authorities or administrative authorities which are not referred to in article 13;

c) individuals and legal entities that are authorised in the nuclear and radiological activities sector;

d) certified experts, other human resources who are appropriately qualified in the field, including within the research, training and professional development system;

e) technical support organisations, irrespective of their legal form of organisation.

Article 9. Special provisions

(1) The following are prohibited in the Republic of Moldova:

a) importation, exportation, re-exportation, transiting and temporary admission of ionising radiation sources (including as part of medical, measuring or calibration equipment) without authorisation from the National Agency;

b) importation of radioactive waste.

(2) Within the nuclear and radiological activity regulation sector, it is not permitted to perform regulatory functions concurrently with functions relating to the promotion, management and use of ionising radiation sources.

Section II
THE NATIONAL AGENCY

Article 10. Status

(1) The National Agency is an administrative authority established by the Government attached to the Ministry of the Environment, with the status of a legal entity subject to public law, which has a stamp bearing the image of the State Coat of Arms, a name in the state language and treasury accounts.

Pursuant to current legislation, the National Agency has the necessary level of independence in the exercise of its functions as specified in this law.

(2) The structure and regulations of the National Agency shall be approved by the Government.

(3) The National Agency shall be financed from the State Budget and from other sources in accordance with current legislation.

(4) As category A personnel, employees of the National Agency who are involved in assessment, authorisation, state inspections and oversight and responding to nuclear or radiation incidents or accidents are classified as persons exposed to ionising radiation who work in conditions hazardous to health and life. The list of category A personnel shall be submitted by the National Agency and approved by the Ministry of Health and the Ministry of Work, Social Protection and the Family.

Article 11. Task and basic functions

The task and basic functions of the National Agency are as follows:

a) to develop and implement state policy in the nuclear and radiation sector, consulting public authorities in accordance with their areas of competence, to draw up draft national policies and national strategies and the legal framework, proposing them according to the procedure established by law and adopting measures for the effective regulation of nuclear and radiological activities;

b) to monitor the implementation and enforcement of the provisions of the international treaties governing this sector to which the Republic of Moldova is a party and of national legislation governing this sector;

c) to draw up and propose, according to the procedure established by law and by article 7 of this law, legislative instruments and other statutory instruments governing this sector;

d) to keep a record of nuclear and radiological activities on the basis of notifications, authorising these activities on the basis of assessment of applications for radiation licences and compliance with requirements in terms of radiation protection, nuclear and radiation security, physical security of nuclear and radiological facilities and nuclear guarantees;

e) to conduct state inspections and oversight in order to check nuclear and radiation security conditions and physical security conditions at nuclear and radiological facilities;

f) to draw up certificates of inspection and issue the necessary stipulations, to draw up and examine reports concerning infringements within the nuclear and radiological activities sector, and to take mandatory enforcement measures against individuals and legal entities;

g) to ensure that the decision-making process in the regulation of nuclear and radiological activities is transparent;

h) to issue and/or recognise security certificates for installations with ionising radiation sources (equipment, packaging, containers or means of transportation for radioactive sources, including radioactive waste) in accordance with this law;

i) to certify or recognise nuclear and radiation experts by issuing level III permits to operate;

j) to assess knowledge and to issue or recognise level I and II permits to operate issued by entities recognised by the National Agency to personnel operating in the nuclear or radiation sector and to radiation protection officers;

k) to propose amendments and/or additions to statutory instruments when it is necessary to bring them into line with international treaties and standards in this sector;

l) to manage the National Register of Ionising Radiation Sources and Authorised Individuals and Legal Entities;

m) to provide assistance free of charge for the detection of orphan radioactive sources;

n) to recognise technical support organisations, national and international experts and staff certification and training institutes by adding them to the relevant register and publishing it on the webpage of the National Agency;

o) to coordinate and monitor the implementation of international technical support projects for the nuclear and radiation safety and physical security sectors;

p) to sign, as stipulated by law, bilateral or multilateral agreements with similar authorities in this field in third countries;

q) to prepare and submit national reports to the competent international bodies in accordance with the international treaties to which the Republic of Moldova is a party;

r) to participate as an integral part of the national response system in the event of a nuclear or radiation emergency;

s) representation as the national regulatory body – the national point of contact with the IAEA pursuant to international nuclear and radiation treaties, with nuclear regulatory bodies in third countries.

Article 12. Rights and obligations

(1) The National Agency has the right:

a) to have access, in accordance with its powers as established by law, to any location where nuclear and radiological activities subject to authorisation and control are conducted;

b) to demand that individuals and legal entities subject to control fulfil the provisions of this law, regulatory instruments governing the nuclear and radiation activities sector and authorisation requirements;

c) to take measurements and install the necessary surveillance and control equipment and to receive technical support from international and national competent bodies;

d) to demand that samples of materials directly or indirectly subject to control are taken and sent off;

e) to have access to records regarding ionising radiation sources and nuclear materials, other information, and technical and contractual data concerning authorised persons which are necessary to fulfil control objectives;

f) to require individuals and legal entities holding radiation licences:

- to submit reports, information and notifications to the National Agency in accordance with legislation;
- to keep records of nuclear and radioactive materials, ionising radiation sources and activities subject to control and to check these records;
- to demonstrate that the necessary protective equipment is present;

g) to suspend or revoke radiation licences, including partial radiation licences, and to revoke security certificates and permits to operate in the event that the holder contravenes legal provisions and the requirements for the issue of the relevant approval document, in accordance with articles 21 and 24.

(2) The National Agency is obliged to:

a) maintain the confidentiality of commercial information obtained in the process of performing its duties;

b) promptly inform the competent central government authorities of instances of non-compliance which may lead to undue irradiation of personnel and the public and radioactive contamination of the environment;

c) immediately halt any nuclear or radiological activity where any undue irradiation of personnel, patients or the public or radioactive contamination of the environment is detected, and initiate the applicable enforcement measures;

d) update and propose, whenever necessary, levels of exemption from the authorisation procedure and statutory instruments;

e) cooperate effectively with the public authorities that govern the sector of the regulated activities.

Section III
FUNCTIONS OF AUTHORITIES WHICH HAVE POWERS WITHIN THE NUCLEAR AND RADIOLOGICAL ACTIVITIES SECTOR

Article 13. Authorities which have powers within the nuclear and radiological activities sector

(1) In accordance with their individual remits, authorities which have powers within the nuclear and radiological activities sector shall pursue nuclear, radiological or related activities and notify the National Agency of all instances where changes are identified in the nuclear or radiological situation and developments therein which fall under the jurisdiction of the relevant authority.

(2) The authorities with responsibility for the nuclear and radiological activities sector are as follows:

a) the central public authority responsible for health protection;

b) the administrative authority responsible for civil protection and emergency situations;

c) the central public authority responsible for the environment;

d) the central public authority responsible for the agro-industrial sector;

e) the administrative authority responsible for customs control;

f) organisations which research or promote nuclear or radiological technologies.

Article 14. Functions of the central public authority responsible for health protection

The central public authority responsible for health protection shall:

a) monitor and conduct hygiene assessments of the content of radionuclides in food products along the entire food chain, in drinking water, including in drinking water sources, in construction materials and in other consumer goods

intended for the public, and shall issue hygiene certificates for products from the Republic of Moldova or imported products;

b) monitor the placing into economic and social circulation for human consumption of products which have been irradiated or contain radioactive materials, and use, for medical diagnosis or treatment purposes, radioactive sources, ionising radiation generators and pharmacological products which contain radionuclides and come into contact with the human body and which are used for the first time in the country, on the basis of state registration documents issued in accordance with the law;

c) monitor the impact of nuclear and radiological activities on public health, and issue opinions in this regard;

d) set hygiene standards for radiation factors;

e) conduct state public health monitoring of nuclear and radiological facilities, and issue sanitary permits in accordance with the law;

f) estimate doses received by patients during medical investigations and treatment, and monitor exposure of the public to ionising radiation in cases of nuclear or radiation accidents;

g) conduct medical monitoring of category A personnel;

h) conduct scientific research on the medical and biological effects of ionising radiation.

Article 15. Functions of the administrative authority responsible for civil protection and emergency situations

The administrative authority responsible for civil protection and emergency situations shall:

a) draw up and implement, jointly with the National Agency and central and specialist public authorities, the National Nuclear and Radiation Accident Intervention Plan;

b) coordinate the implementation of the provisions of international agreements concerning the physical protection of nuclear material, swift notification of nuclear accidents and assistance in the event of nuclear or radiation accidents;

c) implement, in its capacity as the IAEA point of contact, the provisions of international agreements on swift notification and assistance in the event of a nuclear or radiation accident;

d) plan and implement, jointly with the Customs Service, the National Agency and other institutions responsible for combating illegal trafficking of nuclear and radioactive materials, actions to protect the public and the environment;

e) organise and conduct the activity of the national observation and laboratory control network for the monitoring, observation and laboratory control of contamination of the environment with radionuclides in the event of a nuclear or radiation accident.

Article 16. Functions of the central public authority responsible for the environment

The central public authority responsible for the environment, via the State Hydrometeorological Department, shall:

a) monitor and collect and analyse information concerning background radioactive pollution of the environment;

b) research the trend in radioactive pollution of environmental components;

c) forecast the dispersion and movement of radioactive contaminants;

d) research the impact of radioactive contaminants and possible effects on environmental components.

Article 17. Functions of the central public authority responsible for the agro-industry sector

The central public authority responsible for the agro-industry sector, via the institutions subordinate to it, shall:

a) conduct radiation monitoring and assess the radiation safety of tilled soil, products of animal and plant origin and animal feed;

b) conduct departmental oversight of nuclear and radiological activities in the agro-industry sector.

Article 18. Functions of the administrative authority responsible for customs control

The Customs Department monitors and permits, solely on the basis of licences from the National Agency, the exportation, importation and temporary admission or transiting of ionising radiation sources, equipment containing ionising radiation sources, nuclear or radioactive materials and information associated with the proliferation of nuclear arms or other explosive nuclear devices.

Section IV
AUTHORISATION PROCEDURE. NATIONAL AGENCY APPROVAL DOCUMENTS

Article 19. Authorisation of nuclear and radiological activities

(1) Individuals and legal entities who pursue or intend to pursue nuclear or radiological activities must obtain authorisation, provided that they satisfy the requirements of this law and statutory instruments regulating nuclear and radiological activities.

(2) Authorisation is given by the National Agency when it is notified of an intention to conduct activity in this field from individuals and legal entities, on the basis of assessment of the conditions in which the nuclear and radiological activities will be conducted, by drawing up an assessment report, and is compulsory for any nuclear and radiological activity referred to in article 3 which is not exempt from the authorisation procedure pursuant to this law.

(3) Authorisation is given by issuing a radiation licence, which is valid for 5 years.

(4) The holder of a radiation licence may conduct nuclear and radiological activities solely within the field for which it has been issued, provided that the limits and requirements stipulated on it are complied with, and only with the use of nuclear or radiological facilities which have valid safety certificates.

(5) Radiation licences shall be requested and issued simultaneously or successively, separately for each field of activity.

(6) The holder of a partial radiation licence may conduct nuclear and radiological activities solely for the phases for which it was issued, provided that the limits and requirements stipulated on it are complied with, and only with the use of nuclear or radiological facilities which have valid safety certificates.

(7) Partial radiation licences are issued for the following phases:

a) design;

b) siting;

c) relocation and transfer;

d) construction and/or assembly;

e) commissioning;

f) operational testing;

g) repair and/or maintenance;

h) modification;

i) conservation;

j) decommissioning;

k) importation or exportation;

l) temporary admission;

m) transportation.

(8) The National Agency shall issue approval documents free of charge.

Article 20. Authorisation requirements

Authorisation shall only be given where the applicant satisfies the following requirements:

a) they demonstrate that their personnel are professionally qualified for the relevant posts by holding the relevant qualification certificates recognised by the National Agency and designate, by way of an administrative decision, a person responsible for radiation protection;

b) they take measures to prevent and limit the consequences of nuclear or radiation incidents and accidents with possible adverse effects on the life and health of personnel, the public, the environment, the property of third parties or state assets, in accordance with the provisions of current legislation;

c) they ensure that personnel responsible for the safe operation of the installation hold a permit to operate for the relevant activity, in accordance with the provisions of this law;

d) they take all steps to prevent damage due to the construction or operation of an installation or item of nuclear or radiological equipment or transportation of nuclear or radioactive materials;

e) they hold insurance or any other financial guarantee to compensate them for possible damage; the amount, nature and stipulations of the insurance or other guarantee shall be in accordance with the international treaties to which the Republic of Moldova is a party;

f) they ensure that the necessary measures are taken to prevent interference of any kind or to eliminate disruption due to any third parties in the decision-making process during the construction and operation of an installation or item of nuclear or radiological equipment;

g) they propose and/or have a location for the nuclear or radiological installation or item of equipment which satisfies technical requirements and current statutory instruments in the field of radiation protection and nuclear and radiation safety, and public interests with regard to the non-contamination of water, air and soil, and which does not affect the operation of other installations (or facilities) located nearby. This location must be agreed on with the National Agency;

h) they have an own financial means fund adequate to decommission and manage radioactive waste generated by their own activity;

i) they use nuclear or radiological installations or equipment or individual radioactive sources which have a security certificate issued by the National Agency, and appropriate measuring equipment (including for ionising radiation quantities) which has been legally validated and has undergone metrological checks as stipulated by law;

j) they establish and maintain an adequate ionising radiation protection system;

k) they establish and maintain an adequate system for the protection of nuclear and radiological materials, radioactive products and waste and the physical security of the nuclear or radiation installation or equipment, including nuclear and radioactive material storage units, in accordance with current statutory instruments in the field of radiation protection and nuclear and radiation safety;

l) they establish a physical protection system which safeguards the inviolability of the nuclear or radioactive material managed;

m) they establish and maintain, in their own activity, a nuclear and radiological activity quality assurance and control system approved by the National Agency;

n) they establish and maintain their own control system in accordance with requirements concerning radiation protection, nuclear and radiation safety, physical security of the facility and readiness for emergency intervention in the event of nuclear or radiation incidents or accidents which may occur in respect of the installations or equipment and ionising radiation sources;

o) they establish and maintain, where necessary, an adequate system for the implementation of nuclear guarantees, in accordance with the international treaties to which the Republic of Moldova is a party;

p) they hold the documents required by law which are necessary for the authorised pursuit of nuclear and radiation activity;

q) they establish and maintain an adequate system to inform the public of the nuclear and radiation situation, in accordance with current statutory instruments governing the radiation protection and nuclear and radiation safety sector.

Article 21. Stipulations concerning the suspension, revocation and surrender of radiation licences

(1) Where an authorised individual or legal entity is found to have breached the provisions of legislation and requirements concerning authorisation, the National Agency shall take a decision to suspend or revoke the radiation licence. The decision shall be communicated to the licensee within two working days.

(2) Within three working days following the date on which the licensee becomes aware of the decision to suspend or revoke the radiation licence, the National Agency shall refer the matter to a court in accordance with the procedures laid down in current legislation. The decision by the National Agency to suspend or revoke the radiation licence shall apply until the court's decision becomes final.

(3) The radiation licence shall be suspended or revoked by the issuer within two days after the court's decision becomes final.

(4) Radiation licences shall be revoked in all cases where it is found that the licensee:

a) is not complying with the provisions of current legislation concerning the safe pursuit of nuclear and radiological activities, in accordance with the stipulated limits and requirements;

b) is not fully complying in due time with the stipulations of the National Agency regarding the rectification of infringements and irregularities identified on the basis of a report during the course of state inspections and oversight;

c) fails to declare a new technical or other situation which was not known about on the date when the radiation licence was issued and which may affect the safe pursuit of nuclear and radiological activities;

d) fails to perform its obligations with regard to the creation of an own financial means fund for the management and decommissioning of radioactive waste or with regard to insurance for civil liability towards third parties for possible damage in the event of a nuclear or radiation incident or accident which may arise in connection with the relevant installations (or equipment) and ionising radiation sources;

e) ceases to exist legally;

f) has lost their capacity to practise, in the case of individuals.

(5) Revocation of a radiation licence shall oblige the licensee:

a) to cease nuclear or radiological activities immediately;

b) to take measures to protect the physical security of the nuclear and radiological installations and nuclear and radiation safety.

(6) Suspension of a radiation licence shall apply to infringements which can be rectified within a period of six months. If this requirement is not met within the stipulated time-limit, a decision to revoke the radiation licence shall be taken. Where the seriousness of the infringements makes it impossible to rectify them within six months, a decision to revoke shall be enforced immediately by the state inspector on the basis of the National Agency certificate of inspection. Suspension of a radiation licence shall oblige the licensee:

a) to cease the nuclear or radiological activity immediately;

b) to take measures to protect the radiation safety of the ionising radiation sources and physical safety of the nuclear and radiological installations, and the physical protection of nuclear and radioactive material;

c) to submit, within five working days, a plan of measures, identifying the time-limits for implementation and the persons responsible, to resolve the problems that triggered the suspension.

(7) Suspension shall be lifted by notifying the licensee on the basis of a further certificate of inspection stating that all of the irregularities which led to the decision to suspend have been rectified or on the basis of a final judicial decision.

(8) Authorised persons may surrender their radiation licences by contacting the National Agency in writing.

(9) The amendment, suspension, revocation and surrender of licences shall take legal effect once the holder has been notified in writing of the National Agency's decision, within two days.

(10) Radiation licencees may challenge decisions of the National Agency in accordance with current legislation.

Article 22. Loss of validity of radiation licences

A radiation licence shall cease to be valid in the event of:

a) expiry of the period for which it was issued;

b) loss of status as a legal entity or entrepreneur;

c) surrender, if the requirements regarding cessation of activity have been met;

d) documented abandonment or disposal of the authorised activity (or practice);

e) revocation.

Article 23. Requirements for the issue of safety certificates and permits to operate

(1) Safety certificates shall be requested for each separate type of radioactive material, nuclear or radiological installation, including devices which generate ionising radiation, material or equipment used to protect against ionising radiation, packaging, means of containerisation or specially-adapted means of transport.

(2) Safety certificates shall be issued free of charge on the basis of assessment by the National Agency of technical documentation and the conditions of use of nuclear and radiological installations and devices containing ionising radiation sources. The technical documentation forming part of the application which is necessary to obtain a safety certificate must contain, where applicable, sufficient information concerning:

a) a certificate of conformity for the product or another document certifying the conformity of the product, issued by a notified body and published in the Official Journal of the European Communities;

b) design and manufacture (operating manual);

c) the testing programme and its results;

d) the quality assurance system (quality manual);

e) the purpose for which it was designed;

f) installation, assembly, maintenance;

g) operation/use;

h) labelling, marking;

i) guarantee period, lifespan of the installation, period for which the manufacturer shall provide spare parts;

j) service, repair;

k) accompanying documentation;

l) arrangements for decommissioning or disposal as waste;

m) irradiation risk;

n) other risks which it may give rise to.

(3) Safety certificates shall be valid for 5 years. In the event of repair or modification of an installation, item of equipment, device, container for a radioactive source or means of transporting radioactive materials which has caused a change to the technical data specified by the manufacturer, a reasoned request shall be made for reissue of the safety certificate.

(4) In their activities, radiation licencees shall exclusively use personnel holding permits to operate which are valid for these activities.

(5) Permits to operate shall be issued by the National Agency to specially-trained persons, radiation protection officers and experts on the basis of assessment by the National Agency, or another competent institution recognised by the National Agency, of the applicant's knowledge of the field.

(6) Obtaining a medical certificate on the basis of the regulations issued by the Ministry of Health is a precondition for the issue of a permit to operate.

(7) Permits to operate shall be issued for a period of 5 years.

Article 24. Revocation or surrender of safety certificates and permits to operate

(1) The National Agency shall revoke safety certificates and permits to operate where the holder:

a) has not complied with the provisions of this law and other statutory instruments in the field of nuclear and radiological activities or the stipulations of the radiation licence;

b) has not implemented the quality control and assurance system in the nuclear or radiological activities in accordance with the requirements stipulated on the radiation licence, if it is a legal entity;

c) has lost its capacity to operate.

(2) Holders shall surrender safety certificates by writing to the National Agency.

Article 25. Extension and reissue of radiation licences and safety certificates, issue of duplicate radiation licences, safety certificates and permits to operate

(1) Extensions of radiation licences and safety certificates shall be requested 90 days prior to their expiry.

(2) Licensees shall request that their radiation licences are reissued in the event of:

a) a change in the name or address of the individual or legal entity or other changes in the deeds of incorporation in relation to the information on the basis of which the radiation licence was issued;

b) a change in the limits and stipulations specified on the radiation licence;

c) other changes which may affect the radiation safety of ionising radiation sources or the radiation protection of exposed personnel, the public or the environment.

(3) Requests for the reissue of a safety certificate shall be made in the cases specified in article 23(3).

(4) Requests for reissue shall be made by submitting to the National Agency an application for an amendment with numbered pages which comprises:

a) a request to amend the radiation licence or safety certificate;

b) the documentation necessary to substantiate the requested amendments arising as per paragraph (2).

(5) Reissue of a radiation licence or safety certificate shall not change its previous period of validity.

(6) In the event that a radiation licence, safety certificate or permit to operate is lost, misappropriated or damaged, the holder shall make a written request for a

duplicate, which shall be issued by the National Agency within three days following the date of receipt of the request. The duplicate shall have the same expiry date as the original document.

Article 26. Nuclear and radiological activities exempt from the authorisation procedure

Nuclear and radiological activities involving the use of materials with a low total or specific concentration (by mass) of radionuclides (activities and special activities), generators of ionising radiation of the type approved by the National Agency and all cathode ray tubes which comply with the limits and criteria for exemption set forth in Appendix No. 1, so that the risks inherent in these activities are the minimum permitted, shall be exempted by the National Agency from the authorisation procedure stipulated in this law. This shall not exempt the individual or legal entity from the obligation to notify the National Agency.

Article 27. Authorisation of the importation, exportation, re-exportation and temporary admission of ionising radiation sources

(1) The importation, exportation, re-exportation and temporary admission of ionising radiation sources shall be authorised where the applicant:

a) holds a safety certificate appropriate to the nuclear or radiological installation or equipment, packaging with radioactive material, transportation container or means of transport;

b) demonstrates the competence and probity of persons with decision-making powers over the operations for which the licence is requested, in accordance with this law and other current statutory instruments;

c) undertakes, in the case of importation, to ensure compliance with the provisions of current legislation concerning radiation protection, nuclear and radiation safety and the physical protection of radioactive materials, and compliance with the international atomic energy treaties to which the Republic of Moldova is a party, to supply products and information solely to recipients who are authorised to this end and to inform the National Agency of the entry of the relevant products into the country and the address and other contact details of the recipient;

d) adopts the measures necessary for the radiation protection, nuclear and radiation safety and physical protection during transportation of nuclear or radioactive materials in order to keep the radiation exposure of personnel, the public, property and the environment below the permitted limits during and after the auxiliary operations entailed by the transportation of these materials;

e) obtains, in the case of exportation, guarantees from its external partner to the effect that the latter shall not use products and information for purposes prejudicial to the international obligations assumed by the Republic of Moldova or national security and demonstrates that the exportation complies with the provisions of this law and other current statutory instruments in the field of nuclear and radiological activities. The exporter shall inform the National Agency within five working days of the departure from the country of the relevant products and information associated with the proliferation of nuclear weapons.

(2) The importation, exportation and temporary admission of materials of nuclear interest classified as strategic goods shall be authorised by the Interdepartmental Committee for the Control of the Exportation, Re-exportation,

Importation and Transit of Strategic Goods in accordance with current statutory instruments.

Article 28. Informing service beneficiaries

(1) The holders of radiation licences, safety certificates and permits to operate must display copies of these documents in a visible location so that service beneficiaries are accurately informed. In addition, copies of decisions by the National Agency to suspend or revoke radiation licences or revoke safety certificates or permits to operate shall be displayed in a location visible to beneficiaries.

(2) Failure to comply with the provisions of paragraph (1) shall lead to the enforcement by the National Agency of infringement penalties against the manager of the organisation.

Section V
STATE INSPECTIONS AND OVERSIGHT OF NUCLEAR AND RADIOLOGICAL ACTIVITIES

Article 29. Stipulations regarding state inspections and oversight of nuclear and radiological activities.

Rights and responsibilities of state inspectors:

(1) State inspections and oversight of nuclear and radiological activities shall be conducted in order to protect personnel, the public, property and the environment against the adverse impact of ionising radiation and to keep state-level records in nuclear and radiation databases of ionising radiation sources, nuclear material, radioactive waste, authorised individuals and legal entities, individual doses, etc.

(2) State inspections and oversight of compliance with the provisions of statutory instruments shall be conducted on a planned, unannounced and repeat basis by state inspectors from the National Agency separately or jointly with representatives of other monitoring authorities, within the limits and in accordance with the powers stipulated in this law and legislation regarding state inspections.

(3) The Director of the National Agency is *ex officio* chief state inspector for nuclear and radiological activities, and the deputy director is *ex officio* deputy chief state inspector.

(4) To ensure that they have access to the premises of individuals and legal entities who conduct or intend to conduct nuclear and radiological activities, state inspectors shall hold accreditation of a single format approved by the chief state inspector.

(5) Any interference in the activity of state inspectors which may affect the safety of nuclear and radiological activities is prohibited.

(6) Inspections shall be conducted on the premises where the individual or legal entity conducts the activities subject to authorisation or in any other location which may be connected with these activities, in accordance with the law, in any of the following situations:

a) during the period of validity of the radiation licence (planned or repeat inspection);

b) on the basis of notification and/or a demand made to the individual or legal entity (planned or repeat inspection);

c) where there is information to suggest that activities referred to in article 3 are being conducted without authorisation (unannounced inspection).

(7) Where, as a result of an inspection, requirements relating to nuclear or radiation safety or the physical security of nuclear or radiological materials are found to have been breached, the National Agency shall order that the activity is suspended and that access to the nuclear or radiation installations, nuclear and radioactive materials, materials of nuclear interest, other materials, devices, equipment and information associated with the proliferation of nuclear weapons or other explosive nuclear devices which pose a risk when operated or held is sealed off.

(8) State inspectors shall perform their duties on the basis of an inspection warrant and accreditation.

(9) The chief state inspector, or in his absence, his deputy, has the following powers:

a) to halt unauthorised nuclear or radiological activities;

b) to take decisions to suspend or revoke radiation licences or to revoke safety certificates or permits to operate where the holder breaches the provisions of current legislation and authorisation requirements;

c) to forward reports regarding infringements drawn up by state inspectors to the competent bodies for examination and the enforcement of the appropriate penalties;

d) to notify the criminal prosecution authorities in the event that breaches which may constitute offences contrary to the Penal Code are identified.

(10) State inspectors are responsible for:

a) abiding by laws and other current statutory instruments and respecting the rights and legitimate interests of individuals and legal entities subject to state inspections and oversight;

b) fulfilling their obligations in a competent, impartial and responsible manner;

c) informing the management of the National Agency and other competent bodies promptly of identified breaches which may lead to undue irradiation of personnel, the public and the environment;

d) protecting state and trade secrets and maintaining the confidentiality of other information obtained during the course of their activity;

e) the accuracy of information given on certificates of inspection and the lawfulness of conclusions and penalties proposed for enforcement;

f) taking appropriate and swift action in emergencies while conducting state inspections and oversight.

Article 30. Conducting state inspections and oversight

(1) State inspections and oversight shall be conducted in accordance with the provisions of current legislation and annual and quarterly plans approved by the chief state inspector. The priorities and frequency of state inspections and oversight shall be determined by the nuclear and radiation risk that may be posed by the relevant activities and installations, in accordance with the provisions of current legislation and international recommendations.

(2) Where breaches which do not pose a serious risk to the life and health of persons or the environment (which generate irradiation amounting to less than

1.0 microsieverts per hour at a distance of 0.1 metres away from the source or surface of the radiological installation) and can be rectified during the inspection are identified, the state inspector shall give instructions for their rectification, shall check that they have been rectified and, if they have been, shall not reflect them in certificates of inspection.

(3) Where breaches of requirements concerning nuclear and radiation safety or the physical protection of nuclear or radioactive materials (except those covered by paragraph (2)) are identified, the state inspector shall forward to the chief state inspector proposals to suspend or revoke the radiation licence or to revoke the safety certificate or permit to operate and seal off the equipment or premises whose use may harm human health or the environment.

(4) If breaches which constitute contraventions are identified during state inspections and oversight, the state inspector shall draw up a record of the offence, in accordance with the procedure set forth in the Code of Offences, and attach it to the certificate of inspection.

(5) If breaches which may constitute offences contrary to the Criminal Code are identified during state inspections and oversight, the National Agency shall notify the criminal prosecution authorities which are competent to investigate such cases.

Article 31. Presentation of inspection findings

The findings arising out of state inspections and oversight (except those covered by article 30(2)) shall be recorded on the certificate of inspection in accordance with the legislation concerning state inspections.

Section VI
NUCLEAR GUARANTEES

Article 32. Peaceful use undertakings

(1) Nuclear and radioactive materials shall be used in the Republic of Moldova solely for peaceful purposes and in accordance with the obligations arising out of the international treaties to which the Republic of Moldova is a party. The list of materials, devices, equipment and information associated with the proliferation of nuclear weapons and other explosive nuclear devices is set forth in Appendix no. 2.

(2) The following are prohibited in the Republic of Moldova:

a) researching, testing, developing, manufacturing, importing, temporarily admitting, exporting, transiting, holding, distributing, selling, repairing, commissioning, handling, hiring, placing or detonating nuclear weapons or any explosive nuclear device or explosive device containing radioactive material;

b) importing, exporting, re-exporting, transiting or temporarily admitting nuclear fuel, including spent nuclear fuel;

c) importing, exporting, re-exporting, transiting or temporarily admitting nuclear material without authorisation from the National Agency and the competent public authorities.

Article 33. Nuclear guarantee system

(1) Pursuant to the provisions of the Treaty on the Non-Proliferation of Nuclear Weapons and the Agreement between the Republic of Moldova and the IAEA for the Application of Safeguards in Connection with the Treaty on the Non-

Proliferation of Nuclear Weapons and the Protocol thereto (hereinafter referred to as the Agreement), the National Agency:

a) coordinates, at national level, the implementation of nuclear guarantees, other activities, in particular those relating to authorisation, inspections and oversight, and the approval of actions related to the implementation of guarantees;

b) provides assistance to facilitate access for IAEA inspectors within the Republic of Moldova so that the necessary checks may be carried out;

c) oversees the implementation by authorised individuals and legal entities of the system for keeping records of and inspecting nuclear and radioactive materials, materials of nuclear interest and measures for their physical protection;

d) gathers information necessary to implement guarantees;

e) draws up and updates the detailed list of materials, devices, equipment and information associated with the proliferation of nuclear weapons and other explosive nuclear devices and submits it to the Government for approval.

(2) The public authorities, individuals and legal entities are obliged to cooperate with IAEA representatives in the implementation of measures relating to guarantees, including by means of:

a) submitting information relevant to the implementation of the provisions of the Agreement;

b) providing access to locations falling under the scope of the Agreement;

c) providing support required by inspectors from the National Agency and the IAEA in order to conduct inspections;

d) enabling inspectors from the National Agency and the IAEA to take necessary measures, in accordance with the Agreement.

(3) The National Agency is responsible for approving or giving reasoned rejections of inspectors proposed by the IAEA.

(4) Research and development activities relevant to the nuclear fuel cycle which fall under the scope of the Agreement may only be commenced where the National Agency has been notified and authorisation has been obtained from it beforehand.

Article 34. State inspections of nuclear materials

The National Agency implements guarantee measures in relation to nuclear materials by:

a) establishing a system for inspecting and keeping records of nuclear material within the country;

b) implementing inventory-taking and reporting procedures for quantities of nuclear material;

c) implementing authorisation and monitoring procedures for the movements of nuclear material;

d) implementing procedures for reporting quantities of nuclear material to the IAEA;

e) maintaining and annually updating the national register of nuclear materials (in electronic format or on paper).

Section VII
PHYSICAL SECURITY OF NUCLEAR AND RADIOLOGICAL FACILITIES. ILLEGAL TRAFFICKING OF NUCLEAR AND RADIOACTIVE MATERIALS

Article 35. Regulation of the physical security of nuclear and radiological facilities and the physical protection of nuclear and radioactive materials

The National Agency shall develop and propose for adoption to the Government requirements for the physical security of nuclear and radiological facilities and the physical protection of nuclear and radioactive materials by:

a) categorising nuclear facilities and nuclear and radioactive materials on the basis of assessment of vulnerability, potential damage, consequences of subversion, acts of sabotage or misappropriation;

b) identifying measures to protect physical security according to the category of the nuclear material or facility;

c) introducing state record-keeping and inspections of nuclear and radioactive materials;

d) issuing stipulations, as part of authorisation requirements, with regard to physical security, including cybersecurity as an integral component;

e) implementing measures for state inspections and oversight and checking the results of inventories which have been taken;

f) implementing enforcement measures in accordance with legal provisions in the event of a breach of legislation and authorisation requirements.

Article 36. Combating illegal trafficking of nuclear and radioactive materials

(1) For the purpose of prevention, detection and responding in the event of attempted or actual illegal trafficking of nuclear and radioactive materials, the Customs Service shall establish and implement appropriate border controls.

(2) Individuals or legal entities who have identified attempted illegal trafficking of nuclear or radioactive material shall inform the National Agency of this within 24 hours after the time at which they identified it.

Article 37. Responsibility of authorised persons for the physical protection of nuclear or radioactive material

Radiation licensees shall be solely responsible for the physical protection of the managed nuclear or radioactive material and for notifying the National Agency and other competent authorities of actual or attempted misappropriation of this material within the time-limit laid down in article 36.

Section VIII
RESPONDING TO A NUCLEAR OR RADIATION INCIDENT OR ACCIDENT. TRANSPORTATION OF RADIOACTIVE MATERIALS

Article 38. Notification and regulation in the event of a nuclear or radiation incident or accident

(1) In the event of loss of control over nuclear or radioactive material which may affect third countries, the National Agency shall, in accordance with the procedures agreed between the parties, notify the IAEA and third countries of the relevant event, including in cases where illegal trafficking of nuclear or radioactive materials has been identified.

(2) The National Agency, together with the central and specialist public authorities, shall establish the statutory framework and initiate and perform work to detect and identify nuclear or radioactive material in respect of which control has been lost.

(3) The National Agency shall request, where necessary, international technical assistance in order to resolve the situation, in accordance with the international treaties to which the Republic of Moldova is a party.

(4) The competent authorities shall be notified of the incident or accident by the first person who identified the situation, in accordance with the diagram and procedures set out in the regulations approved by the Government.

Article 39. Response

Authorised persons must have:

a) effective response plans to deal with design basis threats through interaction between the relevant departments in the event of nuclear or radiation emergencies;

b) personnel who are prepared and trained for response activities;

c) their own intervention plans for nuclear or radiation incidents or accidents;

d) their own quality assurance and control system for the maintenance of nuclear or radiation safety and physical security in the activities conducted;

e) a system for notifying the National Agency within the time-limits established by current statutory instruments of nuclear or radiation incidents or accidents which take place and cause harm to individuals or legal entities, economic losses and radioactive contamination of the environment, and of the possibility that a nuclear or radiation incident or accident may occur.

Article 40. Transportation of nuclear and radioactive materials

(1) Nuclear and radioactive materials shall be transported solely by holders of the appropriate radiation licence.

(2) All transportation across territory of radioactive sources of nuclear materials which are not exempt from the authorisation procedure shall require a partial radiation licence for transportation to be obtained in the prescribed manner.

Section IX
NATIONAL POLICY AND PRINCIPLES FOR THE MANAGEMENT OF RADIOACTIVE WASTE

Article 41. National policy for the management of radioactive waste

(1) In accordance with the obligations assumed at international level by the Republic of Moldova as a member state of the IAEA, the Government shall promote the radioactive waste management policy in accordance with the following principles:

a) protection of human health: radioactive waste is managed in such a way as to ensure an acceptable level of protection of human health;

b) environmental protection: radioactive waste is managed in such a way as to offer an acceptable level of protection of the environment, including natural resources;

c) protection beyond the borders of the Republic of Moldova: radioactive waste is managed in a way which takes possible effects on human health and the environment beyond national borders into account;

d) protection of future generations: radioactive waste is managed in such a way as to ensure that the impact on the health of future generations will not be greater than the relevant impact levels which are acceptable today;

e) burden for future generations: radioactive waste is managed in such a way as not to place an undue burden on future generations;

f) national legal framework: radioactive waste is managed within an adequate national legal framework, with responsibilities and powers in relation to the independent regulation of these activities being clearly defined;

g) control over the generation of radioactive waste: the generation of radioactive waste shall be kept to a minimum;

h) nuclear and radiation safety, physical security of facilities where radioactive waste is present: nuclear and radiation safety and the physical security of installations for the management of radioactive waste shall be adequately protected at every stage of the life cycle of the installation.

(2) Radioactive waste management policy and principles shall be implemented in close association with the objective of sustainable national development which meets the needs of the current generation without compromising the capacity of future generations to meet their own needs.

(3) Within the Republic of Moldova, radioactive waste shall be managed in accordance with the following principles and approaches:

a) polluter pays: the financial burden for the management of radioactive waste shall be borne by the generator of the radioactive waste;

b) transparency regarding all aspects of radioactive waste management: all radioactive waste management activities shall be conducted in an open and transparent manner and the public shall have access to information regarding radioactive waste management where this does not compromise the physical security of the nuclear or radiological facility;

c) transparency of decision-making based on scientific research, risk analysis and optimisation of resources: the decision-making process shall be based on scientifically-grounded information and results obtained and presented by competent national and international institutions dealing with this field;

d) precaution: where there is uncertainty about the nuclear or radiation safety of an activity relating to radioactive waste management, a conservative approach shall be adopted;

e) prohibition of the importation of radioactive waste;

f) international cooperation: the Government accepts its responsibility towards other countries for global and regional radioactive waste management issues. The principles of national policy and those arising out of the relevant regional and international treaties to which the Republic of Moldova is a party shall be respected in this activity;

g) participation: the interests and concerns of all affected or interested parties shall be taken into account in decision-making regarding radioactive waste management;

h) educating the public: the Government shall create opportunities for education and fostering tolerance of activities associated with the safe management of radioactive waste.

Article 42. Technical requirements for radioactive waste management

The technical requirements for the safe management of radioactive waste and the classification of radioactive waste shall be established and submitted by the National Agency and approved by the Government

Article 43. Responsibility

Responsibility for radioactive waste management shall be borne by the generator of the waste, and after it has been transferred to a specialist institution – by the holder of the radiation licence for radioactive waste management, in accordance with current legislation.

Article 44. Radioactive waste disposal plan

Holders of radiation licences for radioactive waste management must have a radioactive waste disposal plan which makes provision for active and passive controls after final disposal and after final closure of the storage facility.

Article 45. Responsibility of licensees

Holders of radiation licences for the management of radioactive waste are responsible for:

a) the nuclear and radiation safety and physical security of the facility;

b) in-situ categorisation of radioactive waste;

c) sorting, processing, conditioning and storing radioactive waste in accordance with legal requirements;

d) creating and managing a register (or database) of stored radioactive waste;

e) drawing up an annual radioactive waste management report and submitting it to the National Agency by 30 December;

f) ongoing radiation monitoring of adjacent territory with regard to the content of radionuclides in the air, soil and groundwater, with data to be submitted to the National Agency and the competent authorities;

g) notifying the National Agency within 24 hours, on paper or in electronic format, of the acceptance of unusable radioactive waste, radioactive sources or nuclear materials, giving a full description of them using a form approved by the National Agency.

Section X
RIGHTS, OBLIGATIONS AND LIABILITY OF INDIVIDUALS AND LEGAL ENTITIES

Article 46. Rights of physical persons in the nuclear and radiological activities sector, individuals within the territory of the Republic of Moldova have the right:

a) to safe working conditions and to live in a favourable environment;

b) to receive accurate, swift and competent information about the nuclear or radiation situation;

c) to social protection (financial compensation) and free medical rehabilitation in the event of accidental overexposure to ionising radiation which is harmful to health.

Article 47. Rights of authorised individuals and legal entities

Authorised individuals and legal entities against whom enforcement measures have been taken have the right to challenge them and receive compensation in accordance with current legislation.

Article 48. Obligations of individuals

In the nuclear and radiological activities sector, individuals within the territory of the Republic of Moldova are obliged to take the precautionary measures stipulated by standards, regulations and rules concerning radiation protection, nuclear and radiation safety and the physical security of nuclear and radiological facilities.

Article 49. Obligations of authorised individuals and legal entities

(1) Authorised individuals and legal entities are obliged:

a) to maintain nuclear and radiation safety, protection against ionising radiation and the physical protection of nuclear and radioactive materials;

b) to keep meticulous records of nuclear and radioactive materials and all ionising radiation sources used or produced in their own activity;

c) to comply with all of the requirements on their radiation licence and report any deviations from the limits and requirements stated on the licence to the National Agency;

d) to conduct the activities for which they have been authorised;

e) to devise their own system of requirements, regulations and instructions to ensure that the authorised activities are conducted without incurring risks of any kind.

(2) Authorised persons who conduct nuclear and radiological activities and generate or have generated radioactive waste are obliged: a) to be responsible for the proper management of the radioactive waste generated by their own activity;

a) to be responsible for the proper management of the radioactive waste generated by their own activity;

b) to bear the costs of collecting, handling, transporting, treating, decommissioning, conditioning and temporarily or permanently storing the waste, for which purpose they shall establish an own financial resources fund for the management of the radioactive waste, the amount of which shall cover the necessary expenses. This fund shall be intended solely for these purposes;

c) to devise their own decommissioning programme and submit it to the National Agency for approval;

d) to make it possible for used radioactive sources and radioactive waste to be transferred to the supplier or user.

(3) The expiry, suspension of revocation or a radiation licence shall not exempt its holder or the person who has taken ownership of the nuclear or radiological materials, facilities and installations or equipment from the obligations set forth in this law or those arising out of the stipulations of the radiation licence.

(4) During inspections, authorised individuals and legal entities subject to inspections are obliged to take all measures necessary to enable them to be properly carried out.

(5) In the event of non-compliance with an inspection or any legal instruction given by the National Agency, the latter may request that the competent public order maintenance authorities intervene, in accordance with current legislation.

Article 50. Liability

(1) Breaches of the provisions of statutory instruments regulating nuclear and radiological activities shall incur disciplinary, civil, contraventional or criminal liability, as applicable.

(2) Radiation licencees shall be fully liable for breaches of requirements concerning nuclear and radiation safety and physical security, and for breaches of this law and other statutory instruments applicable to this sector.

(3) Unauthorised pursuit of nuclear and radiological activities or illegal trafficking of nuclear and radioactive materials, nuclear or radiological installations or facilities, explosive nuclear devices or components thereof which may cause harm to the public or environment shall trigger cessation of the activity, seizure or the enforcement of other measures provided for by law.

(4) Seized ionising radiation sources shall be kept at the expense of the authorised individual or legal entity at a safe location sealed off by the National Agency, in accordance with nuclear and radiation safety and physical security requirements, so as not to endanger the life and health of the public, cause radioactive contamination of property or the environment or facilitate illegal trafficking, until legal measures have been taken.

(5) The holder of the radiation licence shall, in accordance with the Civil Code or Penal Code, be solely liable for damage caused during or after nuclear or radiation incidents or accidents which have led to the death, injury or harm to the health of one or more persons or the destruction, damage or temporary unusability of any item of property.

(6) Liability for damage caused to persons within the territory of the Republic of Moldova as a result of the transiting of nuclear material or nuclear or radiation incidents or accidents which occur outside the territory of the Republic of Moldova shall be enforced on the basis of the Convention on Civil Liability for Nuclear Damage of 21 May 1963, to which the Republic of Moldova is a party.

Section XI
FINAL PROVISIONS

Article 51

(1) On the date when this law enters into force, Law no. 111-XVI of 11 May 2006 on the safe pursuit of nuclear and radiological activities (Official Journal of the Republic of Moldova, 2006, no. 98-101, art. 451), as subsequently amended and supplemented, shall be repealed.

(2) Within 9 months, the Government:

a) shall submit proposals to Parliament regarding the bringing of current legislation into accordance with this law;

b) shall bring its statutory instruments into accordance with this law.

SPEAKER OF PARLIAMENT Marian LUPU

No. 132. Chişinau, 8 June 2012.

Appendix 1
Appendix 2
[Not Translated]

News briefs

The 2013 Carnegie International Nuclear Policy Conference, 8-9 April 2013, Washington DC

The biennial Carnegie International Nuclear Policy Conference, one of the largest regular gatherings in the field, convened in Washington 8-9 April 2013. Over 800 experts and officials from more than 45 countries and international organisations gathered to discuss emerging trends in non-proliferation, deterrence, disarmament, and nuclear energy.

The first Carnegie conference took place in 1989 and focused primarily on proliferation challenges. Over time, the programme broadened to cover the full range of nuclear policy issues. This conference, the 15th in the series, addressed not only the latest flash points like the Democratic People's Republic of Korea and Iran, but also challenges facing nuclear industry after the nuclear accident at the TEPCO Fukushima Daiichi nuclear power plant. It is thus one of the few fora in which experts from both sides of the nuclear equation can share perspectives.

The conference featured both high-level addresses and panel conversations. It began with remarks by International Atomic Energy Agency Director General Yukiya Amano, who highlighted the technical and political challenges of safeguarding nuclear programmes. It closed with a discussion featuring Swedish Foreign Minister Carl Bildt on the efficacy of sanctions as a non-proliferation tool.

Attendees also listened to a plenary discussion on the challenges of managing nuclear power operations after the accident at the TEPCO Fukushima Daiichi nuclear power plant featuring US Deputy Secretary of Energy Dan Poneman, Tatsujiro Suzuki of the Japan Atomic Energy Commission, and George Felgate from the World Association of Nuclear Operators, as well a luncheon address from US Nuclear Regulatory Commission Chairman Allison Macfarlane on the role and importance of regulatory agencies for safe and secure nuclear energy.

In one of the more provocative sessions, M. J. Chung, a seven-term member of the National Assembly of the Republic of Korea, argued that as it considers options to try to resolve the nuclear crisis with North Korea, "South Korea may exercise the right to withdraw from the nuclear non-proliferation treaty as stipulated in Article X of the treaty."

Videos, audio, and transcripts of the keynote speeches, plenaries, and various panels are available on the conference webpage at: www.carnegieendowment.org/NPC2013.

Recent publications

Evropské spolecenství pro atomovou energii (2012) by Jakub Handrlica[1]

The book represents not only the first comprehensive source of information on the Euratom Treaty in the Czech language, but also one of very few publications on Euratom from the newer member countries of the European Union. Its publication is timely, given the nuclear programme of the Czech Republic. In the first part, the author presents a very detailed overview of historical developments, leading to the signing of the Euratom Treaty in 1957.

In the second part, the main issues of the European Community's functioning are analysed, in particular its institutions, legislative powers, legislative procedure, and judicial structure. A detailed analysis is provided of those provisions that were originally intended as *temporary* (Art. 76, 85 and 90). The author also points out the existing decision-making authority of the Court of Justice concerning the scope of application of the Euratom Treaty with regard to military (defence) installations. The second part deals with the difficulties involved in the relationship among the three existing treaties (the European Union Treaty, the Treaty on Functioning of the European Union, and the Euratom Treaty) and points out complications arising from the overlap of some powers and competencies.

In the third section, different areas of the European Community's decision making are subject to detailed analysis: research, information, health and safety, investments, joint undertakings, supply policy, safeguards, ownership rights, common market, and foreign relations. The author deals with developments in each of these areas since 1957 and points out the main secondary legislation in these fields. Special attention is given to those issues that are important for "new" member states: the legal framework of supply and enrichment contracts with third countries, the "grandfathering" of certain international conventions and the issue of export of radioactive waste to third counties.

The book is based on a careful study of the existing literature and of the decisions of the European Court of Justice. The appendix presents a list of all available European Courts decisions made with respect to Euratom matters.

The author is an Assistant Professor at the Department of Administrative Law of the Faculty of Law of Charles University in Prague. He is an alumnus of the International School of Nuclear Law (2007), and was awarded the International Nuclear Law Association Prize for his study on nuclear liability harmonisation in the European Union (2009). He is also a member of the Czech Association for International Law, the Czech Nuclear Association and the Czech Association for European Studies.

1. *Evropskéspolecenství pro atomovouenergii* (Euratom) [European Atomic Energy Community (Euratom)] is published by the Charles University of Prague, Faculty of Law in 2012, 196 pages, ISBN 978-80-87146-61-3.

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