2010 年核安全评论

GC(55)/INF/3

2010 年核安全评论

IAEA/NSR/2010

国际原子能机构在奥地利印制
2011 年 8 月

前　言

《2010 年核安全评论》载有对世界范围内为加强核安全、辐射安全、运输安全和放射性废物安全以及应急准备所作努力状况的分析性概述。分析性概述辅以两个附录：“2010 年世界范围内与安全有关的事件和活动”（附录一）和“国际原子能机构的安全标准：2010 年的活动”（附录二）。

《2010 年核安全评论（草案）》曾以 GOV/2011/4 号文件提交 2011 年 3 月理事会会议。《2010 年核安全评论》的最后文本系根据理事会的讨论结果编写。

目 录

正 文 摘 要

作为促进成员国间开展国际合作的一个主要组织，国际原子能机构通过与制订和实施安全标准和安保导则有关的各种广泛的活动，在研究核安全和核安保领域的全球趋势、问题和挑战方面处于一个独特的地位。本“核安全评论”的内容反映了 2010 年出现的核安全趋势、问题和挑战，并扼要阐述了原子能机构在核安全、辐射安全、废物安全和运输安全所有领域开展的旨在进一步加强全球核安全和核安保框架的活动。

对 2011 年 3 月 11 日袭击日本的地震和海啸这种异常灾害引起的福岛第一核电站事故继续进行评定。由于本报告侧重于 2010 年的发展情况，因此，这次事故及其影响在此不作涉及，而将在原子能机构今后的报告中加以论述。

国际核能界 2010 年保持了高水平的安全实绩。核电厂的安全实绩依然保持高水平，并在紧急停堆数以及停堆期间可利用的能源水平方面呈现出不断改进的趋势。此外，还有越来越多的国家开始探索核电计划或扩大对核电计划的兴趣，并且也有越来越多的国家面临着建立对核装置和电离辐射应用的必要监管基础结构、监管性监督和安全管理的挑战。

有关辐射防护和放射生态学的问题 2010 年继续着以往的趋势。例如，随着公众对天然存在的放射性物质照射及其环境影响以及遗留核场址认识的提高，公众的关切度也在增加。此外，由于专家退休和转移到其他领域，辐射防护和放射生态学方面的人力资源也在不断流失。因此，很显然，安全仍然是一项进行中的工作。

全球核电业继续需要设计者、制造商、营运者、监管者和其他利益相关方作出实质性的努力，才能符合各种质量和安全要求及许可证审批程序，同时，业内和监管机构之间也已公认有必要实现这些要求和程序的标准化和统一。在一些情况下，有关核电计划发展的规划比建立必要的监管和安全基础结构和能力推进得要快。为了协助成员国做好这项工作，2010 年 6 月建立了“监管合作论坛”。“监管合作论坛”是一个监管者之间的论坛，其目的是使拥有先进核电计划的成员国向作为新加入者的成员国或应请求向正在扩大核电计划的国家提供的监管支持达到最优化。原子能机构正在积极参与制订一个强有力的和技术上一致的核电厂和其他核和辐射装置及活动框架的安全目标。这需要从整体上考虑各种定量和定性标准，以确保按照原子能机构的《基本安全原则》（国际原子能机构《安全标准丛书》第 SF-1 号）的规定不让任何个人承担不可接受的辐射风险。

燃料循环设施带来不同程度的各种危害和独特的核安全挑战（如临界控制、化学危害、火灾和爆炸），这种设施涵盖从采矿、浓缩、制造、后处理直至贮存或处置的广泛多样的装置和程序。其中许多设施依靠运行人员的干预和行政控制来确保核安全。2010 年向原子能机构“燃料事件通报和分析系统”报告的事件表明，发生这些事件的主要根源与组织因素和人为因素有关。

在全世界目前在运的 441 座反应堆中，有许多反应堆建于 20 世纪 70 年代和 80 年代，平均寿期约 35 年。这些反应堆将在 2020 年至 2030 年间出现退役高峰，而对于开展核退役活动的这些国家而言，这将是一项巨大的管理、技术、安全和环境挑战。发展进行早期规划、提供适当资金和制订长期战略的国家和国际机制的必要性不仅适用于退役，而且也适用于放射性废物管理和乏燃料管理，包括处置安排和清理作业，以及保存确保这些活动安全的作业知识和经验。这其中许多问题已在 2010 年 5 月在原子能机构举行的“核动力堆乏燃料管理国际会议”上进行了深入的讨论。

随着全世界如 2010 年所报告的那样扩大利用辐射开展医学诊断和治疗，工作人员和患者的集体剂量有可能大幅度提高。医务工作者每天都要进行 1000 多万次医学程序，他们占接受电离辐射照射工作人员的最大比例。此外，还有越来越多的报告显示，有些患者在几年甚至在一年的时间内就多次接受诊断性的计算机断层照相扫描，个别患者的累积剂量超过了 100 毫希沃特，某些病例甚至超过了 1 希沃特。

国际放射防护委员会（放射防护委）最新的建议已经纳入经修订的《国际电离辐射防护和辐射源安全的基本安全标准》草案。这方面的一个关键问题是发展一个协调一致的系统，同时对规划、现有和应急照射情况下的辐射防护以及非人类物种的照射实施放射防护委建议的辐射防护原则。

尽管放射性物质运输依然保持杰出的安全记录，但拒绝和拖延运输放射性物质的现象仍在继续发生，而最明显增加的拒绝运输事件都是由于国家条例的变更所引起。拒绝运输放射性物质问题国际指导委员会正在协调为找到解决拒绝运输相关问题的办法所作的努力。

2010 年，原子能机构完成了一份基准文件，其中确定了中亚铀生产遗留场址环境影响评定的需要和优先事项。该文件已被各种国际组织用于向该地区的恢复项目提供援助。

2010 年 10 月，在维也纳举行的一次技术会议上，原子能机构与挪威辐射防护管理局合作发起成立了“遗留场址监管性监督国际工作论坛”。该论坛将通过交流想法、信息和方法向解决遗留场址问题的监管者提供支持。该论坛最初将注重中亚铀矿开采遗留场址的恢复问题，但其范围将扩大到包含其它各类遗留场址和设施。

2010 年，应急准备和响应领域继续开展地区和国际合作努力，成员国参加由原子能机构举办的培训班、讲习班和活动就证明了这一点。对应急准备和响应标准、导则和培训的实施工作进行协调将有助于对核和放射性事件和紧急情况作出高效和有效的反应。

总干事于 2003 年设立的国际核责任问题专家组（核责任问题专家组）继续起到原子能机构处理核责任相关问题的主要论坛的作用。核责任问题专家组旨在促进更好地理解和遵守国际核责任文书。2010 年，在核责任问题专家组第十次会议上，核责任问

题专家组报告了国际核责任公约的批准状况以及欧洲委员会关于在欧洲联盟范围内统一民事核责任制度的法律研究情况。

技术和科学支持组织继续为监管机构的安全相关决策和活动提供技术和科学依据，但仍有必要加强技术和科学支持组织、监管机构、学术界和工业界之间的交流和合作，以加强安全和能力建设。

许多成员国一直努力建设能力和转让核安全知识，以应对职工队伍的日益老化和核科学技术专业学生入学率下降的问题。因此，发展适当的资源、培训和教育网络以及分享知识和经验的计划成为了 2010 年高度优先的能力建设努力，而且也将成为未来数年的高度优先工作。

分析性概述

A. 导言

1. 《2010 年核安全评论》概述了世界范围内在核安全、辐射安全、运输安全和放射性废物安全以及事件和应急准备方面的趋势、问题和挑战，并突出强调了 2010 年的发展情况。可通过 GOVATOM 网站查阅《2010 年核安全评论》的其它辅助文件。为本文件的目的，“核安全”一词的涵义中包括核装置安全、辐射安全、运输安全以及乏燃料和放射性废物管理安全。本报告还将讨论核安保问题，但仅在与核安全有关的范围内进行。2011 年 9 月将单独发表一份有关核安保的报告。

2. 随着全球对能源需求的加强，以及更加迫切需要抵御气候变化，许多国家正在探索核电计划或扩大对核电计划的兴趣，亚洲国家更是一马当先。此外，全世界对放射源和辐射相关技术的应用方兴未艾，与它们相伴而来的各种挑战更是层出不穷。总之，这使得必须通过加强和改善国际宣导活动、能力建设、知识网络建设、交流和合作，才能确保这种增长的关键方面即安全和安保基础结构及文化跟上世界需求的步伐。

3. 对 2011 年 3 月 11 日袭击日本的地震和海啸这种异常灾害引起的福岛第一核电站事故继续进行评定。由于本报告侧重于 2010 年的发展情况，因此，这次事故及其影响在此不作涉及，而将在原子能机构今后的报告中加以论述。

4. 在过去的一年中，原子能机构继续除其他外，特别通过核安保咨询组和安全标准委员会特别联合工作组加强协同作用和在合理情况下对其全球核安全和核安保框架的整合。该特别联合工作组设立于 2009 年，所赋予的工作范围是作为长期目标研究建立涵盖核安全和核安保单一标准的可行性。预计特别联合工作组将在 2011 年向总干事提交关于这一问题的报告。

5. 全球核安全和核安保框架包括国际法律文书、安全标准、安保导则、同行评审、咨询服务和知识网络，它们为支持和加强国家、地区和国际现有安全和安保基础结构提供协同作用，目的是防止核事故和恶意行为，以及在发生任何这类事故或行为的情况下提供更好的应对和减缓措施。

6. 全球安全和核安保框架的一个主要组成部分是全球专家团体，在这方面已经取得了相当大的进展，尤其在技术支持组织领域。为了进一步促进这一领域的工作，原子能机构组织了“技术和科学支持组织在加强核安全和核安保工作中面临的挑战国际会议”。日本原子力安全组织于 2010 年 10 月在东京主办了这次会议。这次会议的重点是集中阐述了政府在发展技术支持组织能力和政策方面的作用和职责以及原子能机构在促进通过技术支持组织知识网络发展全球专家团体方面的作用。（见秘书处 2011/Note 2 号文件）。

B. 核安全的趋势、问题和挑战

B.1. 开展国际合作和新协调，以促进新的和扩大的核电计划

B.1.1. 导言

7. 为新的和扩大的核电计划提供支持的国际合作努力继续侧重于以下等关键领域：确定和弥补国家安全基础结构方面的差距；安全和安保的协同作用和合理情况下的整合；以及核电计划中各类人员的安全责任和能力。

8. 若干国家已扩大其当前核电计划。在原子能机构对核电的最新预测中，低值预测预期到 2030 年全球核电装机容量约为 546 吉瓦（电），比当前约 375 吉瓦（电）的装机容量增长 46%。高值预测预期的装机容量约为 803 吉瓦（电），是当前装机容量的两倍多，因而给世界核能界带来了显著的安全挑战。此外，有关新核电计划的规划比建立必要的安全基础结构和能力推进得要快。

9. 2010 年为加强国际合作所作的一个重要努力是设立了“监管合作论坛”。原子能机构以其安全标准和安保导则、同行评审和咨询服务（见第 15 段）为基础促进“监管合作论坛”的活动。

B.1.2. 为促进安全要求和许可证审批过程的标准化和统一性所作的国际努力

10. 当今核业务的日益多国性导致设计者、制造商、营运者、监管者和其他利益相关方进行了大量的努力，以满足各种质量和安全要求及许可证审批过程。其结果是，多国和地区组织与有关团体目前正在继续寻求实现这些要求和过程的标准化和统一性。原子能机构在制订国际安全标准和促进国际合作方面所作的长期努力对这项工作起到了至关重要的作用。目前正在为统一国家核安全要求作出更多的努力，以促进部署基于原子能机构安全标准的标准化反应堆设计及提高这种部署的效率。

11. 欧洲核能界 2010 年在标准化和统一性领域表现得特别活跃。欧洲核安全监管者小组和西欧核监管者协会在根据原子能机构安全标准确定安全基准水平和拟订欧洲关于安全统一性的指令方面迈出了重要的步骤，从而加强了安全水平并为国家监管过程带来了利益。此外，制订了欧洲电力公司要求，以便为欧洲今后部署的反应堆设计确定一套统一的安全和实绩目标。关于欧洲电力公司，欧洲原子公会提出了欧洲核装置安全标准倡议，该倡议将工业界和监管者召集在一起，对标准及标准的统一问题进行了讨论。

12. 原子能机构与正在经济合作与发展组织核能机构（经合组织核能机构）的支持下实施的“多国设计评价计划”进行了互动，以便加强和扩大原子能机构安全标准和安保导则的适用。这项工作统一了新反应堆设计的审查和许可证审批监管方案。更广泛的努力包括在世界核协会内设立了“反应堆设计评价和许可证审批合作工业工作组”，以便与监管者合作促进统一性对反应堆供应商和电力公司的益处。

13. 原子能机构的“反应堆通用安全评审”服务继续对安全论证文件提供早期的统一评价，以作为许可证审批过程个案评价的潜在依据。自 2007 年设立以来，已完成了六个新反应堆设计评审，其他两个新设计评审目前正在进行中，这些新设计包括法国的欧洲压水堆、加拿大的 ACR1000、美国的 AP1000、美国/日本的经济简化沸水堆、法国/日本的 ATMEA1 和大韩民国的 APR1400。从这些评审中汲取的经验教训构成了统一设计评审和安全评定领域教育和培训的极好基础，目前正在被纳入原子能机构的“安全评定教育和培训计划”，并主要提供给正在发展新核电计划安全基础结构的国家。

14. 原子能机构正在积极参与制订一个强有力和具有技术一致性的安全目标框架，以广泛确定核电厂装置和其他核装置可接受的放射性危险水平。该框架需要从整体上考虑各种定量和定性标准，以确保不使任何个人承担正如原子能机构《安全标准丛书》第 SF-1 号原子能机构《基本安全原则》中所述不可接受的辐射危险。

B.1.3. 监管合作

15. 2009 年 12 月在南非开普敦举行的“有效核监管体系国际会议”的一个成果是一致同意设立一个监管者论坛，以便以有效和协调一致的方式交流监管知识和经验。2010 年设立了“监管合作论坛”，以便优化监管资源和协助成员国建立独立、有效和健全的核电计划监管机构。“监管合作论坛”汇集了拥有先进核电计划的国家和首次考虑扩大或制订核电计划的国家（见秘书处 2011/Note 2 号文件）。

16. 自评定和同行评审在有关监管实践和政策的有效独立的持续改进、知识共享和相互学习中起着重要的作用。《核安全公约》和《乏燃料管理安全和放射性废物管理安全联合公约》均要求缔约国提交国家报告以进行同行评审，从而为持续改进提供了机会。为交流在执行《放射源安全和安保行为准则》方面的信息和经验而举行的会议（见 N.2 节）也为开展所建立的国家监管体系的自评定提供了极好机会。人们广泛同意，根据原子能机构标准和导则开展的国家监管安全基础结构自评定和同行评审是提升专门知识和加强技术、管理和政策能力以及评定监管机构有效独立性的有益工具。积极参加这类会议和原子能机构的“综合监管评审服务”是全世界的核监管机构以合作方式加强各自有效性和独立性的主要机制。

17. 为努力与成员国合作加强核装置监管基础结构和放射源控制，原子能机构在 2010 年 2 月向全体成员国推出了《自评定方法学》和《自评定工具》的第一版。为促进它们的使用，组织了地区讲习班和国家专家工作组访问。该自评定方法学和工具包括以“如何…”的方式完整阐述了基于安全标准开展国家安全监管基础结构自评定的方案和方法学。其中包括一个根据该方法学使自评定自动化的软件程序，该软件生成带有定性和定量评价结果的自评定报告。

18. 为了保持经济和能源供应的增长以及环境质量，一些成员国已开始考虑将其核电厂的运行期延长到最初预期的期限之后，即实施长期运行。延长核电厂寿期涉及许多

相互关联的问题，包括技术、监管和法律问题。长期运行的一个先决条件是定期系统地开展全面和综合性电厂特定安全评定。

19. 原子能机构继续促进成员国监管机构和核电厂之间交流老化管理领域技术信息的过程。这种交流取得的成果将为今后为特定系统、结构和部件确定可接受的计划以及确定老化效应/机理提供指导，并为评定现行电厂继续运行计划提供工具。此外，这种交流还将进一步帮助核电厂业主和监管机构了解和合作应对与延期运行相关的问题和挑战。

20. 电力公司的私有化和对电力市场取消监管继续是今年全球能源和电力部门的主要趋势。这种竞争日益激烈的环境对核电有着显著影响，这说明通过核电厂的长期运行进行电力生产，利润可能更高，因为初始投资业已进行。因此，电力公司似乎更倾向于寿期延长而不是建造新的核电厂。这种趋势将要求核电厂业主和监管机构在现在和今后若干年中合作解决与正式延寿过程相关的重要技术和监管问题。

B.2. 放射性物质和核材料的长期管理

B.2.1. 导言

21. 与放射性物质、核材料、乏燃料、核废物和放射性废物的安全和可靠长期管理有关的技术问题继续构成挑战。

B.2.2. 放射源的长期管理

22. 2010 年 11 月，欧洲委员会提出了一项建议，要求欧洲理事会制订关于乏燃料和放射性废物管理的指令。该建议在很大程度上是根据《基本安全原则》（原子能机构《安全标准丛书》第 SF-1 号）和《乏燃料管理安全和放射性废物管理安全联合公约》所载的义务拟订的。

23. 由于许多国家仍在寻找处置弃用密封放射源的解决方案，因此，从未系统地对这类放射源的全寿期管理问题进行过考虑。正如原子能机构 2009 年开展的一项调查所显示的那样，只有极少数国家运行接收弃用密封放射源的处置设施。今后，至关重要的是，所有国家都应在其关于放射性废物管理的国家政策和战略中处理弃用密封放射源的长期管理问题，并应鼓励实施弃用密封放射源处置，以增强密封放射源使用的可持续性。只有通过承诺在放射源寿期的每个阶段对其进行持续控制并实施这种控制，才能确保放射源的安全和安保。

24. 原子能机构安全标准和安保导则继续强调有必要建立确保放射源在整个寿期内的安全和安保的国家系统。除其他外，特别是 2010 年 10 月出版的最新“安全要求”出版物《促进安全的政府、法律和监管框架》（原子能机构《一般安全要求》第一部分）又对此作了规定。这些安全标准在被纳入国家法律和条例中后，并在国际文书和详细的国家要求的补充下，将为放射源的长期管理奠定基础。

25. 截至 2010 年 11 月，已有 100 个国家明确表示致力于利用《放射源安全和安保行为准则》作为它们制订和统一其政策、法律和条例时的导则。但仍然非常有必要加强国际合作和促进“行为准则”的更广泛和更充分地执行。

B.2.3. 乏核燃料和放射性废物的管理

26. 虽然成员国在安全管理其放射性废物方面取得了显著进展，但一些国家仍然需要努力制订包括处置在内的国家综合战略和相应地加强国家基础结构。启动或扩大核能计划的成员国需要从一开始就制订放射性废物和乏燃料管理政策。

27. 乏燃料和放射性废物管理方面最大的持续挑战之一是制订和实施处置战略。特别是，放射性废物和乏燃料的地质处置仍然是一个令人关切的问题。但是，已经在一些层面特别是技术和社会政治层面取得了进展。已汲取的经验教训显示，若要在实施处置战略方面取得进展，除了需要开展基础坚实的科学调查和利用适当的技术外，还需要在有关各方之间开展公开和透明的对话。

28. 乏燃料和高放废物的处置是一个特别挑战，许多国家都已推迟了处置的实施。这表明需要提高贮存能力，而且燃料将要贮存比最初预期更长的时间。不过，尤其是瑞典、芬兰和法国已在处置方面取得进展，在这些国家，预计将分别于 2011 年、2012 年和 2014 年提出许可证申请。

B.3. 能力建设

B.3.1. 导言

29. 2010 年，原子能机构继续努力为成员国发展人力资源和建设核安全和核安保基础结构提供有效的能力建设支持。核安全和核安保方面的能力建设被确定为成员国发展和持续加强实现和保持高水平核安全和核安保所需的人员、组织和监管能力的系统性综合方案。能力建设工作涉及核安全和核安保基础结构发展的各个方面，包括核安全、辐射安全、运输安全和废物安全。

B.3.2. 教育和培训

30. 若干成员国制订了某种形式的核安全和核安保教育和培训计划，但制订了国家能力建设战略的国家并不多，而这对于维持核安全至关重要。为应对这一挑战，原子能机构印发了经更新的“2011－2020 年辐射安全、运输安全和废物安全教育和培训战略方案”（见秘书处 2010/Note 44 号文件）。该方案规定，国家战略应当考虑现有的以及可预见的需求，并应当考虑国家能力和资源以及利用地区或国际资源的可能性。

31. 在这方面，设立了原子能机构开展辐射安全教育和培训的地区培训中心，并通过教育和培训评价工作组访问定期监测这些中心的活动。对教育和培训评价工作组访问的兴趣不断增加，2010 年对阿尔及利亚、巴西、埃及、加纳、摩洛哥和南非开展了共计六次这种工作组访问。现已收到大韩民国在 2011 年接受这种工作组访问的请求。

32. 依照“战略方案”中提供的建议，并根据 GC(54)/RES/7 号决议除其他外特别是欢迎秘书处在根据教育和培训评价工作组的评价结果缔结长期协定方面取得进展的第九部分，2010 年，具体与巴西、希腊和马来西亚讨论了关于与培训中心合作向成员国提供可持续支助总体框架的协定。

33. 向成员国提供了讲座和讲习班的交互式视频录像。2010 年期间，原子能机构分发了数千张培训用 DVD。编制了关于安全基础结构、安全文化、新核电厂选址和建造方面监管经验的新教程，并在课堂上向成员国提供了这些教程，许多时候还将这些教程作为视频讲座张贴在了网上。

34. 2010 年期间，设计并推出了集有原子能机构全部培训资源的中心网页。这改进了成员国对原子能机构培训服务、材料和资源的利用[1]。

35. “教育和培训协调问题核安全和安保工作组”继续共享编制课程、进行教学大纲标准化和编制培训材料的方法和良好实践，并开发了一个教育和培训知识库。该工作组还协调向若干教育和培训活动提高了核安全和核安保方面的输入，例如，核能管理学院（2010 年 11 月，意大利）、“引进和扩大核电计划人力资源发展国际会议”（2010 年 3 月，阿拉伯联合酋长国）和欧洲核安全培训和指导学院暑期班（2010 年 7 月至 8 月，法国和德国）。

B.3.3. 建立国家核安全基础结构

36. 2010 年，核准了关于建立核电计划安全基础结构的安全导则草案，该导则现正处于印制阶段。为进一步协助成员国发展所需的安全基础结构，原子能机构目前正在为考虑和启动核电计划的成员国开发一个安全包。该安全包包含 11 个专门模块以及一个提供核安全基础专业培训教程的背景模块。

37. 此外，原子能机构还继续开发了基于该安全导则草案的自评定工具，以便成员国对照据认为建立核安全基础结构所需采取的 200 个行动评价所取得的进展。

B.4. 加强全球和地区网络建设活动

B.4.1. 导言

38. 2010 年，原子能机构建立知识网络的活动侧重于随着新建立的“阿拉伯核监管人员网”和“欧洲技术安全组织网”的进一步发展，整合来自全球核安全和核安保框架中不同来源和领域的信息。此外，不同信息技术网络和人力资源网络之间的协调和合作取得了显著进展，为国家、地区和全球的能力建设和基础结构发展提供了支持。但仍需要进一步加强全球和地区网络之间的协调和合作。

---

[1] http://www-ns.iaea.org/training

B.4.2. 全球和地区网络建设

39. 在 2010 年 9 月原子能机构大会第五十四届常会期间正式推出了“全球核安全和核安保网”和“国际监管网”。“全球核安全和核安保网”和“国际监管网”将教育和培训、《国际核和放射性事件分级表》和“综合监管评审服务”以及其他信息资源整合为两个主要的在线领域，使用户能够方便地获取所需信息。2010 年 12 月举行了一次技术会议，以促进“全球核安全和核安保网”和“国际监管网”的进一步发展。

40. 2010 年 4 月，“亚洲核安全网”制订了亚洲建立地区能力建设体系的通用行动计划，该计划将作为执行 2009 年 4 月制订的“亚洲核安全网 2020 年构想”的路线图。这一通用行动计划还提供了正在开发中的最新信息技术网络的详细情况。这将包括一个能力建设模块，该模块由一个动态和交互式电子图书馆、一个专家资源数据库和一个在线规划系统组成。该模块将有助于通过“亚洲核安全网”网站进行因特网视频通讯。

41. 2010 年 10 月，“亚洲核安全网”主办了关于建立核安全知识网络的圆桌讨论会，以及在日本东京举行的“亚洲 21 世纪能力建设和虚拟科技支助组织地区会议”。该地区会议侧重讨论了亚洲在 21 世纪发展核安全能力建设体系和安全基础结构的挑战，并促进了全球和地区知识网络之间的外展和协作。

42. 2010 年设立了“阿拉伯核监管者网”。该网络目前包括 18 个阿拉伯国家的核监管机构。为 2010－2013 年制订了一个三阶段项目，这包括：(1) 编制阿拉伯文的相关条例和准则；(2) 制订工作人员教育和培训计划；(3) 通过专家工作组访问和会议活动交流信息和知识。

43. “伊比利亚-美洲放射性和核监管机构论坛”是一个促进伊比利亚-美洲一些成员国即阿根廷、巴西、智利、古巴、墨西哥、秘鲁、西班牙和乌拉圭利用放射性物质或核材料的所有实践保持高水平安全的协会。在 2010 年 9 月原子能机构大会第五十四届常会期间，该论坛现任主席和负责核安全和安保司的副总干事签署了加强该论坛和原子能机构之间关系的正式安排。这一安排将有助于促进对该论坛技术计划的支助。此外，在 2010 年完成了一个有关核电厂延寿监管问题的项目，最后报告将登载在该论坛网站上。

44. 参加 2010 年 11 月在阿根廷马德普拉塔举行的“第二十届伊比利亚-美洲国家峰会”的拉丁美洲各国家元首和政府首脑对该论坛在为该地区创建一个拉丁美洲共同工作空间以加强拉丁美洲的核安全和辐射安全方面所做的工作表示欢迎。

45. 2009 年设立了“非洲核监管机构论坛”，该论坛包括 33 个非洲核监管机构。“非洲核监管机构论坛”由九个主题工作组组成。在 2010 年 9 月原子能机构大会第五十四届常会期间，“非洲核监管机构论坛”和韩国核安全研究所签署了一项协议，以便在非洲之外寻求更多的支助和援助。（见秘书处 2011/Note 2 号文件）。

C. 事件和应急准备与响应

C.1. 趋势、问题和挑战

46. 2010 年，一些成员国有效地致力于改进和维持了应急准备和响应计划。六个成员国（阿塞拜疆、白俄罗斯、菲律宾、卡塔尔、罗马尼亚和泰国）从应急准备评审服务受益，而去年有两个国家。这项服务独立地评价了这些国家对辐射事件和应急事件的准备情况。今后，应当继续努力维护和进一步增强在应急准备和响应领域的国家、地区和国际安排，因为目前仍未以全球统一的方式实施国际标准、导则和培训。继续鼓励开展建立应急准备和响应能力的地区合作。

47. 事件和应急中心与成员国的对口方和国际组织举行了例行演习。就 ConvEx-1a 型演习而言，2010 年的参演者数量增加了 13%，但对于 ConvEx-2b 型演习，2010 年的参演者数量要比 2009 年有所减少。此外，一些成员国向原子能机构通报它们开展了国家演习。在若干情况下，事件和应急中心工作人员应邀对这些演习进行了观摩，并就响应系统的优点和不足提供了反馈。

48. 2010 年，事件和应急中心直接收到或获悉了 148 起涉及或怀疑涉及电离辐射的事件。原子能机构对 18 起事件采取了行动，它与外部对口方一道鉴别和核实了信息，共享和提供了正式信息和（或）提供了原子能机构服务。在发生在拉丁美洲的三起事件中，事件和应急中心应请求对有关医疗咨询和治疗以及放射源安全回收和可靠贮存的援助工作组进行了协调，并为此利用了“响应和援助网”。

49. 废金属中发现无看管源或疏忽之后的严重辐射烧伤和工业射线照相源操作不当等各种辐射事件继续不断发生。此外，有一点变得很明显，自然灾害总是需要原子能机构对辐射设施的安全和受影响国家的实践作出响应。

50. 三个新成员国在“响应和援助网”登记了其国家援助能力，它们是：奥地利、日本和俄罗斯联邦。这使得“响应和援助网”登记成员国的总数增加到 19 个。即便通过“响应和援助网”开展地区合作的情况已经增加，但仍强烈地鼓励成员国作出更大的承诺。

C.2. 国际活动

51. 2010 年举办了 38 次国家、地区和跨地区培训班和讲习班，以加强成员国的应急准备和响应能力。

52. “事件和紧急情况信息交流统一系统”取代和合并了现行的两个报告系统，即“及早通报公约”和“紧急援助公约”网站和“网基核事件系统”。“事件和紧急情况信息交流统一系统”于 2010 年底提供所有用户试用。在该系统正式发布后，将中止使用“及早通报公约”和“紧急援助公约”网站和“网基核事件系统”。这项工作定于 2011 年 3 月 31 日进行。

53. 事件和应急中心建议以“欧洲放射性数据交换平台”为基础建立全球应急辐射监测信息系统。能够在线、全球共享数据监测的新系统的正式运行定于 2012 年，将邀请成员国加入该系统。

54. 联合国反恐执行工作队的预防和应对大规模毁灭性武器攻击工作组编写并印发了一份题为“核或放射性恐怖主义攻击情况下的应急协调：当前状况、未来前景”（2010 年 8 月《联合国反恐执行工作队出版物丛书》）的报告。该报告确认了原子能机构在预防、准备和响应这类核相关事件中的重要作用。特别是，该报告指出了事件和应急中心继续作为协调员的机构间放射性应急和核应急委员会的重要性。

55. 事件和应急中心在 2010 年举办了两次《紧急通报和援助技术工作手册》讲习班。这些讲习班的目的是按照《紧急通报和援助技术工作手册》增进成员国对口方与事件和应急中心之间的交流。第一次讲习班于 2010 年 9 月 20 日至 22 日在南非比勒陀利亚为六个非洲国家的与会者组织。第二次讲习班于 2010 年 10 月 27 日至 29 日在维也纳为亚洲和拉丁美洲地区的 10 个成员国组织。

D. 核损害民事责任

D.1. 趋势、问题和挑战

56. 落实有效的民事责任机制对核损害造成的人体健康和环境损害以及实际经济损失进行保险的重要性仍然是各国增加关注的一个主题。

57. 作为总干事的一个咨询机构的国际核责任问题专家组（核责任问题专家组）自 2003 年以来一直起到作为原子能机构处理核责任相关问题主要论坛的作用，并旨在促进更好地理解和遵守相关国际核责任文书。

D.2. 国际活动

58. 核责任问题专家组在其 2010 年 5 月 12 日至 14 日第十次会议讨论的主题包括国际核责任公约的批准状况；欧洲委员会关于在欧洲联盟范围内统一民事核责任制度的法律研究；德国关于允许缔约方将正在退役的某些小型研究堆和核装置排除在核责任文书适用范围之外的建议；以及核责任问题专家组今后的宣导活动。

59. 核责任问题专家组成员重申了对促进建立全球核责任制度的支持，并就此对在国家一级为实现该目标所作的最新努力提出了一些深入见解。他们注意到为建立成员国国家法律数据库之目的由秘书处向成员国索要各自国家核责任法律副本的效用。

60. 关于欧洲委员会的法律研究，考虑了在核责任问题专家组以前的会议上就欧盟采用单独的核责任制度的可能性提出的关切，专家组得到的通报和再保证是欧洲委员会

将不继续采取将妨碍今后通过《核损害补充赔偿公约》建立全球制度的任何方案，并且欧洲委员会的任何提案都将在现行核责任原则的基础上运作。在欧洲委员会和布鲁塞尔核法律协会组织并于 2010 年 6 月 17 日至 18 日在布鲁塞尔举办的一次关于欧盟框架内民事核责任制度的前景的讲习班期间，原子能机构重申了核责任问题专家组的这种关切并突出强调了与非欧盟国家建立法律联系对欧盟的重要性，随着“核复兴”以及核领域国际贸易和经济关系的不断增加，这个问题将变得比以往任何时候都更具相关性。

61. 原子能机构相关技术咨询委员会（辐射安全标准委员会和废物安全标准委员会）设立的一个工作组审议了德国关于允许缔约方将正在退役的某些小型研究堆和核装置排除在相关核责任文书（经 1997 年“议定书”修正的《核损害民事责任维也纳公约》和 1997 年《核损害补充赔偿公约》）适用范围之外的建议。该工作组随后与辐射安全标准委员会和废物安全标准委员会在 2010 年 6 月 28 日至 7 月 1 日举行的联席会议上核可了就德国提议的三个具体排除标准的立场文件草案。作为下一步，核责任问题专家组将在其 2011 年 5 月会议上审议这个问题，此后，如根据上述核责任文书所预见的那样，将向理事会提交该问题以供审议。

62. 作为核责任问题专家组例行宣导活动的一部分，2010 年 7 月 5 日至 7 日在莫斯科为东欧和中亚国家举办了一次关于民事责任的地区讲习班。在这次讲习班期间，对国际核责任制度的各个方面作了介绍，并就一个统一的国际核责任制度的必要性和如何在相应的国家法律中最好地反映这一制度的问题进行了广泛的讨论。

63. 随着莫斯科讲习班的举办，核责任问题专家组的地区宣导活动宣告结束，此前曾分别于 2005 年 11 月在澳大利亚悉尼为亚洲及太平洋地区成员国、2006 年 12 月在秘鲁利马为拉丁美洲地区成员国、2008 年 2 月在南非太阳城为非洲地区成员国、2009 年 12 月在阿拉伯联合酋长国阿布扎比为表示有兴趣启动核电计划的成员国举办了活动。目前，核责任问题专家组将采取向各国或较小国家组派出工作组等更具针对性的方案继续开展宣导活动。

E. 核电厂安全

E.1. 趋势、问题和挑战

64. 随着一些国家表示有兴趣发展核电的趋势持续增加，发展必要的核安全和核安保监管基础结构并确保在做出选址和许可证审批决定之前予以落实的挑战亦是如此。本年度汲取的教训再次表明有必要进一步探讨从成熟核电国家获取知识的方法，以便与那些正在着手核计划的国家共享。

65. 2010 年，编制了两份关于在核电计划的各个许可证审批阶段适用原子能机构安全

标准的新导则文件，即《核装置的许可证审批过程》（特定安全导则第 SSG-12 号）和《建立国家核电计划的安全基础结构》（将在 2011 年出版）。

66. 2010 年，原子能机构的“综合监管评审服务”协助成员国监管机构开展了更多的自评定，以评价在其安全条例中适用原子能机构安全标准的程度。提出了少量意见和建议，确定并与成员国共享了大量良好实践。全面自评定意味着在“综合监管评审服务”工作组访问期间，可以获得总体概述以及对监管机构具体问题和挑战的深入关注。新加入国家更多的监管者也开始利用自评定“综合监管评审服务”工作组访问对其安全基础结构进行评价。

67. 在 2010 年期间，核电厂安全实绩仍然保持在高水平。如图 1 所示，从“动力堆信息系统”在运动力堆数据库获得的原子能机构汇编的实绩指标表明非计划自动紧急停堆的次数呈现改善的趋势。

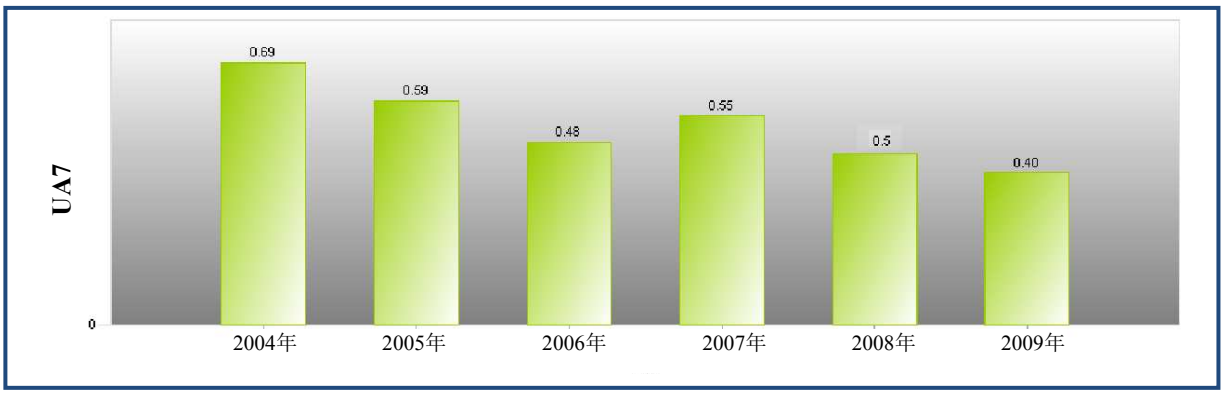

图 1. 每 7000 小时非计划自动紧急停堆次数
（来源：世界核电营运者联合会 2010 年实绩指标）。

68. 图 2 所示的强迫损失率可定义为，由于非计划停堆或减负荷等非计划能量损失，电厂在非停机期间不能向电网提供发电量的百分比。与非计划自动紧急停堆的次数一样，低值表明重要的电厂设备得到良好的维护并正在可靠地运行。

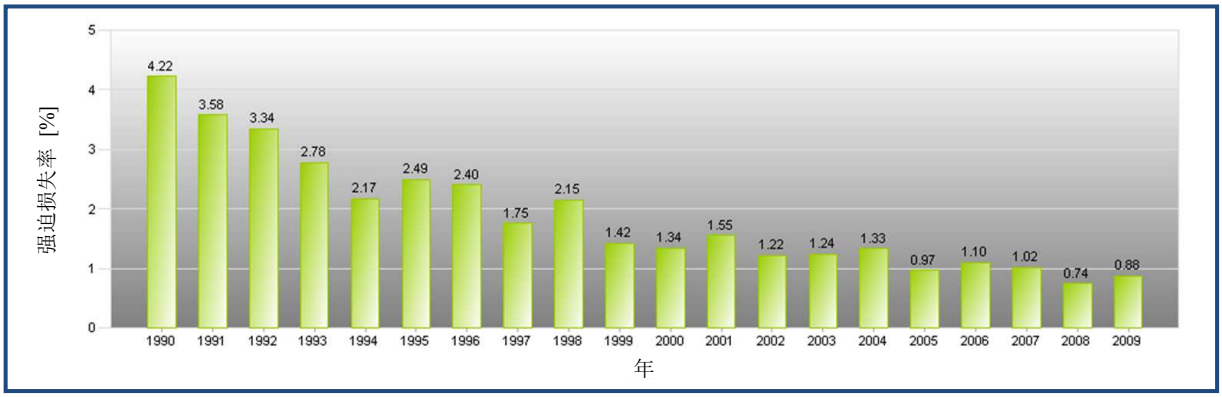

图 2. 强迫损失率数据（来源：世界核电营运者联合会 2010 年实绩指标）。

69. 对世界上许多核电厂而言日益重要的一个领域涉及长期运行和老化管理。根据“动力堆信息系统”数据库，截至 2010 年底，在全世界正在运行的 441 座核电厂中，运行时间超过 30 年的有 152 台机组，超过 20 年的有 358 台机组。有资格延长运行寿期的核电厂的数量不断增多，因此，必须在与安全有关的各个方面对长期运行问题进行系统化处理和整合。定期系统地开展全面和综合性电厂特定安全评定是确保长期运行期间安全的一个关键要素。

70. 在“运行安全评审组”工作访问中，原子能机构协调国际专家小组对核电厂的运行安全实绩进行评审。“运行安全评审组”的评审范围已经扩大：迄今，该评审组已访问了几乎每一种重要类型的核反应堆，自该计划于 1982 年启动以来已开展了 159 次审查。“运行安全评审组”的评审结果已开始呈现出在工作组访问期间确定的建议和意见有所减少，这反映接受评审的电厂遵守原子能机构安全标准的程度增加。每次工作组访问确定的良好实践的平均数量也减少，这归因于存在着将良好实践纳入并将其视为当今标准实践的趋势。

71. 2010 年期间，成员国在“国际运行经验报告系统”中所报告的“运行安全评审组”的评审结果和事件评审表明了良好的核安全实绩，未报告发生严重事故或对工作人员或公众的显著辐射照射。但是，运行现场工作人员并没有以系统的方式确定和报告现场存在不足。一些电厂还需要改进其维护计划和加强这些计划的实施，以确保系统和设备得到良好的维护。此外，防止污染扩散的措施不充分，而且化学控制计划往往不全面。

72. 大多数电力公司都实施了从各电厂或该国其他电厂发生的事件中汲取经验教训的有效运行经验计划。在一些情况下，这还包括对低水平事件和险发事件进行分析和从中汲取经验教训。成员国间通过“国际运行经验报告系统”共享运行经验以及利用来自其他成员国的外部运行经验资料的情况似乎比较有限。一些成员国则公开共享事件信息和利用外部事件资料。但许多成员国并不共享重要事件，而且外部资料的利用并非总是有效。

73. 为了对新反应堆统一安全目标和安全宗旨进行了广泛的努力。西欧核监管者协会在此领域依然非常活跃，并发布了“2010 年 11 月西欧核监管者协会关于新核电厂安全目标的说明”。该文件的目的是通过在新电厂的设计中更有效地实施纵深防御概念来进一步提高新核电厂的安全。在“多国设计评价计划”倡议下也在开展工作，以期提出新反应堆统一安全宗旨的建议。

74. 原子能机构通过国际核安全组的工作参与了类似的活动。所有这些活动以及原子能机构核电厂安全标准的拟订和更新都为在世界范围内统一设计要求和许可证审批条例作出了贡献，这仍是一项迫切需求。就此而言，《核电厂安全：设计》（《安全标准丛书》第 NS-R-1 号）的修订已获得核安全标准委员会的核准，将于 2011 年 5 月提交安全标准委员会。

75. 近年来，一些严重的自然事件如地震、海啸和火山喷发同样引起了世界核工业界的关注。作为向收集地震事件数据迈出的第一步，继续发展“外部事件通报系统”。该系统收集来自世界各地现有地震学网络的有关世界范围内地震发生情况的实时资料，然后提供对核电厂场址震动情况的预测估计。这种工具将供所有成员国使用，并向它们提供有关国家、地区和全球规模地震活动的资料。

E.2. 国际活动

76. 2010 年 6 月在维也纳举行了“核电厂和燃料循环设施运行安全经验和实绩国际会议”。就安全管理、安全文化、运行经验、新加入国、国际同行评审、原子能机构安全标准的适用和长期运行提出了建议并得到与会者的接受（见秘书处 2011/Note 2 号文件）。

77. 分别于 2010 年 8 月 23 日至 27 日和 8 月 30 日至 9 月 3 日在芬兰赫尔辛基举办了“核电厂监管问题培训班”和“核电厂建造和监管监督经验讲习班”。这两次活动都是芬兰辐射和核安全管理局与原子能机构合作组织的。组织这次培训班是为了处理核电厂安全和监管方面的重要问题，并对在第一次启动核电的国家建立核安全基础结构问题给予了特别的关注。组织这次讲习班的目的是介绍有关新核电厂的安全原则和要求、新核电厂的可行性研究、建造阶段的关键问题和汲取的经验教训。讲习班进一步突出强调了原子能机构的相关活动，包括关于新核电厂建造的监管性监督的安全报告草案。

78. 原子能机构与日本原子力安全组织于 2010 年 11 月 24 日至 26 日在位于日本新泻县柏崎的新泻工科大学共同主办了“第一次柏崎核装置地震安全国际专题讨论会”。来自 28 个国家的 568 名代表出席了这次专题讨论会。这次专题讨论会的主题是“面向下一代的技术创新使命”，并侧重于传播柏崎的地震经验和减轻地震后果的创新工作。这导致许多成员国实施了为更好地估计地震危害所制订的程序。

F. 研究堆安全

F.1. 趋势、问题和挑战

79. 全世界的研究堆在 2010 年继续安全运行，没有发生重要事件。尽管在一些老化管理计划方面有所改进，但仍需要进一步作出改进。

80. 全世界的许多设施仍处于“延期关闭”状态，尚无关于其今后利用或退役的明确计划。对这些设施的安全进行适当管理和财政资源缺乏仍是两个重要问题。一些成员国正在规划建造它们的第一座研究堆，这将涉及在启动核电计划前发展必要的国家技术和安全基础结构。

81. 在 2010 年下半年，荷兰佩滕高通量堆和加拿大乔克河国家多用途研究堆（世界上五座主要放射性同位素生产堆中的两座）在停堆检修后再次投入运行。全世界医用同位素特别是钼-99 的供应有所改善。但放射性同位素生产需要继续加以关注，因为如果五个主要生产商中的一个或多个意外长期停堆，就可能再次出现短缺。

F.2. 国际活动

82. 原子能机构就约旦、黎巴嫩、沙特阿拉伯和苏丹建造新研究堆的问题对这些成员国进行了评定工作组访问。为评定需求和建立必要的安全和技术基础结构提供了有针对性的特别援助。

83. 在“减少全球威胁倡议”和“俄罗斯研究堆燃料返还计划”的支持下，原子能机构对塞尔维亚温萨核科学研究所进行了八次安全工作组访问，目的是就乏燃料返还俄罗斯联邦的重新包装、装载和运输的安全提供咨询意见。该乏燃料已于 2010 年 12 月底成功运抵其最终目的地。

84. 就与医用放射性同位素生产有关的安全问题而言，为了对最后维修计划进行评审，原子能机构对荷兰佩滕高通量堆进行了国际同行评审工作组访问。向埃及 ETRR-2 号反应堆派遣了另一个安全评审工作组，对相关的医用同位素生产计划的安全问题进行了评审。

85. 2010 年 5 月 31 日至 6 月 4 日在维也纳举办了“研究堆安全与安保之间协同作用问题国际讲习班”。该讲习班探讨了更好地管理与研究堆核安全和核安保有关风险的途径，并促进更好地了解了在改进安全和安保方面加强协同作用同时在这一过程中不对其中任一方面造成危害的必要性。

86. 从 2010 年 7 月 5 日至 9 日，原子能机构在澳大利亚举办了“研究堆老化管理问题地区讲习班”。该讲习班确定了亚洲成员国当前存在的与老化管理有关的问题和挑战，并提出了根据原子能机构的安全标准处理这些问题和应对这些挑战的建议。

87. 从 12 月 13 日至 17 日，原子能机构举行了“研究堆试验安全技术会议”。会议探讨了研究堆利用方面的所有安全相关问题。

G. 燃料循环设施安全

G.1. 趋势、问题和挑战

88. 燃料循环设施涵盖各种不同的装置，包括转化、浓缩、燃料制造、乏燃料贮存、后处理和相关的废物管理设施。这些设施存在不同程度的危害，在实施安全要求时需要采取分级方案。一些燃料循环设施带来了独特的核安全挑战，例如临界控制、化学危害以及易发生火灾和爆炸，其中许多设施严重依赖运行人员干预和行政控制来确保

核安全。对运行人员控制的依赖在燃料循环设施的安全运行方面仍很显著。向原子能机构“燃料事件通报和分析系统”报告的事件表明，大多数这类事件的根源与组织因素和人为因素有关。运行安全将继续需要通过传播运行经验和良好实践包括报告安全相关事件及其原因和所汲取的教训来加以改进。成员国对“运行期间燃料循环设施的安全评价”同行评审工作组和“燃料事件通报和分析系统”的利用仍然有限。涵盖全部各类燃料循环设施的安全配套标准仍不健全。原子能机构将继续宣传这些服务的好处和支持开展这些服务，并致力于完成余下的安全导则。

G.2. 国际活动

89. 原子能机构与经合组织核能机构合作运行“燃料事件通报和分析系统”，并于2010 年 10 月 5 日至 6 日举行了该系统国家协调员联席会议。会议确定安全文化贫乏和依靠手动操作是促成大多数事件发生的重要因素。“燃料事件通报和分析系统”的国家协调员们确认了该系统作为惟一的国际燃料循环设施报告系统的重要性，并承诺加大使用该系统的力度。

90. 2010 年 10 月，原子能机构对雷森迪巴西燃料制造设施进行了“运行期间燃料循环设施的安全评价”后续工作组访问，目的是对最初于 2007 年 4/5 月开展该项评价的工作组提出的建议的执行情况作出评定。为了筹备 2011 年对皮特什蒂燃料制造设施的“运行期间燃料循环设施的安全评价”全面工作组访问，2010 年 9 月还向罗马尼亚派出了一个“运行期间燃料循环设施的安全评价”预备工作组。

91. 2010 年，原子能机构举行了两次燃料循环相关问题国际会议。“核动力堆乏燃料管理国际会议”探讨了监管核技术事项以及与临时贮存期限延长有关的战略问题。2010 年 6 月，“核电厂和燃料循环设施运行安全经验和实绩国际会议”首次将交流核电和燃料循环设施工业的安全运行经验结合在一起。会议涉及了领导问题、安全文化和利用国际同行评审问题。在两个会议期间，原子能机构都对涵盖燃料循环设施安全的活动作了介绍（见秘书处 2011/Note 2 号文件）。

H. 职业辐射照射

H.1. 趋势、问题和挑战

92. 天然辐射源照射和患者在医学诊断和治疗中的照射达到全世界所有辐射来源集体剂量的 95%以上。余下的贡献来自人工辐射源和可能由于辐射和放射源用于医疗、工业和研究引起的职业照射。尽管这些照射途径的集体剂量相比其他贡献并不大，但受到照射的总人数却占到人口的一定比例，而且这些工作人员作为其工作的一部分可能接受了高于其他来源的辐射剂量。这将继续要求通过对所接受的剂量不断进行的评定和监测时刻保持警惕。

93. 医务工作者占接受人工辐射源照射工作人员的最大比例。新的和正在出现的医疗程序往往比传统技术对患者施用更高的辐射剂量，因而，便出现了医学专业人员的照射量相应增加的可能性。随着全世界扩大利用辐射开展医学诊断和治疗，工作人员由于这种应用所接受的集体剂量有可能大幅度提高。对医学专业人员进行适当培训，并不断开发和使用将剂量最小化的工具和技术，这对于这一不断扩大领域的职业辐射防护至关重要。

94. 工作人员受天然存在的放射性物质照射问题继续成为正在出现的一个工业问题，例如在稀土提取、锆石和锆工业、燃煤发电业和磷酸盐工业。根据联合国原子辐射效应科学委员会（辐射科学委）的报告，目前约有 1300 万工作人员受天然辐射源的照射。从历史上看，这些行业并不总是如人工源那样受到严格的监管制度约束，但采用标准职业保健程序如穿着防护服和戴防护面罩可以大幅度减少辐射剂量。随着这些行业的监管基础结构和监管控制得到进一步加强，减少个人剂量将成为一个重要问题。

H.2. 国际活动

H.2.1. 职业辐射防护行动计划

95. 2010 年 2 月在维也纳举行了“职业辐射防护行动计划”指导委员会第四次会议。指导委员会决定将该行动计划再延长 18 个月，以便能够完成预定活动和尚未采取的行动。与会者讨论了职业辐射防护领域出现的新挑战，并就今后的重要活动和应对这些新挑战所需采取的步骤向原子能机构提出了建议。

H.2.2. 职业照射信息系统

96. 原子能机构对 2010 年 11 月在英国剑桥举行的 2010 年职业照射信息系统“可合理达到的尽量低原则”国际专题讨论会提供了支助。该专题讨论会的亮点包括接受一个国家监管机构即中国国家核安全局作为“职业照射信息系统”的成员。还就不仅在设施运行寿期内而且在其设计、建造和退役期间的职业辐射防护问题和挑战进行了讨论。

H.2.3. 职业辐射防护网

97. 2010 年 9 月，根据“职业辐射防护行动计划”启动了充当职业辐射防护协调中心的“职业辐射防护网”。地区性“可合理达到的尽量低原则”网络在欧洲和亚洲开始全面运行，但在非洲和拉丁美洲地区尚未建立。

H.2.4. 欧洲和中亚地区性“可合理达到的尽量低”网络

98. 欧洲和中亚地区性“可合理达到的尽量低”网络完成了各种专题的六个年度讲习班，2010 年 9 月在塞浦路斯拉纳卡举办了关于开展基础教育和培训以促进职业辐射防护的的第六个讲习班。2011 年底将举办为格鲁吉亚规划的关于执行天然存在的放射性物质行业职业辐射防护计划的第七个讲习班。

H.2.5. 亚洲地区“可合理达到的尽量低”网络

99. 2010 年 10 月在澳大利亚阿德莱德举办了亚洲地区“可合理达到的尽量低”网络医学应用职业照射讲习班，并举行了一次指导委员会会议，目的是分享知识和专门技能，并重点涉及了医学应用职业照射方面感兴趣的专题。

H.2.6. 医疗、工业和研究领域职业照射信息系统

100. 医疗、工业和研究领域职业照射信息系统的实施进入第二年，成立了与介入性心脏病学工作组形成互补的工业射线照相工作组。医疗、工业和研究领域职业照射信息系统提供十分具体领域的国际职业照射数据库，以便开展正在进行的数据分析工作，并提供反馈，以促进职业辐射防护的最优化。

H.3. 其他国际活动

101. 2010 年 3 月在希腊雅典举行了“欧洲电离辐射个人监测会议”，来自所有地区 40 多个国家的 273 名与会者出席了会议。在欧洲委员会的赞助下，希腊原子能委员会与原子能机构和欧洲辐射剂量测定组合作组织了这次会议。会议讨论了问题和挑战，分享了知识，交流了经验并推广了个人监测领域的新概念。

102. 国际辐射防护协会与原子能机构合作于 2010 年 10 月在哥伦比亚麦德林举行了拉丁美洲地区代表大会，来自拉丁美洲、北美洲和欧洲 20 多个国家的 321 名与会者出席了会议。医疗实践中的职业辐射防护问题圆桌讨论会分析了该地区当前的形势，并确定了今后的行动。

103. 在 2010 年 11 月在奥地利维也纳举行的“医用辐射剂量学领域的标准、适用和质量保证国际专题讨论会”框架内组织了一次医学应用中的辐射防护会议。提高医务工作者的认识、工作人员安全和最大程度减少工作人员在医疗程序中利用辐射的危险是这次会议期间讨论的一些专题（见秘书处 2011/Note 2 号文件）。

I. 医疗辐射照射

I.1. 趋势、问题和挑战

104. 最近以来，医疗辐射照射的范围大幅度增加，所用的剂量比职业照射还要大。在一些国家，医疗照射的群体剂量与天然本底辐射剂量相当，在全世界范围内占到所有人工源所作贡献率的 98%以上。据估计，利用电离辐射的医疗程序的数量从 1980 年的约 17 亿个增加到 2007 年的近 40 亿个。据联合国原子辐射效应科学委员会（辐射科学委）估计，由医疗照射引起的全球人均有效剂量从 1993 年的 0.3 毫希沃特增加到 2000 年的 0.4 毫希沃特，并达到超过 0.6 毫希沃特的当前值（2008 年）。这些数字可以看作

是全球民众接受医疗辐射增加的迹象。但发达国家中约占世界人口 25%的人接受了近75%利用电离辐射的医疗程序。

105. 全球每天开展约 1000 多万次诊断放射学程序，其中涉及射线照相程序、荧光检查程序、计算机断层照相扫描和干预程序。在全球范围内，计算机断层照相扫描仪越来越多地用于放射成像程序。计算机断层照相对全球诊断放射学集体有效剂量的贡献率为 43%，这一数字是过去数年急剧上升的结果。还有越来越多的报告显示，有些患者在几年甚至在一年的时间内就多次接受计算机断层照相扫描，个别患者的累积有效剂量超过了 100 毫希沃特，某些病例甚至报告超过了 1 希沃特。

106. 全球每天开展近 10 万次核医学程序，其中涉及为诊断或治疗目的施用非密封放射性药物。临床实践中正越来越多地将正电子发射断层照相法/计算机断层照相法混合扫描机和单光子发射计算机断层照相法/计算机断层照相法混合扫描机等诊断和核医学设备（即混合设备）结合起来使用。

107. 每年都要讲授 500 多万个完整的放射治疗课程，这些课程的内容均涉及使用外部辐射设备或内置密封放射源。放射疗法为达到治疗目的故意使用很高的剂量。尽管这种复杂治疗方式由于不利事件导致伤亡的相关风险较低，但确保放射治疗的安全将继续成为主要关切。

图 3. 印度韦洛尔教会医学院的两名放射科医师在荧光镜导引下进行非手术性干预。

I.2. 国际活动

108. 2010 年 3 月在维也纳举行了“患者放射防护国际行动计划”指导小组第四次会议。若干国际组织和专业组织（世卫组织、辐射科学委和欧洲委员会）的代表聚集一

堂，对进展情况进行了评审，并提出了关于继续采取行动的建议，其中包括：创建电子社会媒体，进一步加强对患者辐射防护网站所载导则的宣传；宣传辐射成像循证转诊指南；开展提高认识、适当性和审计即 3A 的国际活动，以加强医疗照射在诊断成像中的正当性[2]。

109. 在原子能机构大会第五十四届常会期间于 2010 年 9 月在维也纳举行的科学论坛重点关注了发展中国家的癌症问题。其中一个单元会议专门涉及了在新环境中安全和适当利用新辐射医学技术问题，这次会议提请注意在制订放射治疗计划时在确保安全性和有效性方面面临的真正挑战，特别是在存在能力和基础设施制约因素的情况下面临的挑战。若干知名的科学家与监管者们讨论了引进新技术时的循证和成本效益问题，以及在涉及教育和培训及医疗安全文化时政府的承诺问题。

J. 公众和环境的辐射防护

J.1. 趋势、问题和挑战

110. 放射防护委最新的建议已被纳入《国际电离辐射防护和辐射源安全的基本安全标准（修订草案）》。这方面的一个关键问题是发展一个协调一致的系统，同时对规划、现有和紧急照射情况下的辐射防护以及非人类物种的照射实施放射防护委建议的辐射防护原则。由于放射防护委有关估计对非人类物种的放射学影响的建议框架相对复杂，必须采取一些具体步骤来促进遵守关于环境辐射防护的标准。原子能机构正在就这一主题与放射防护委和辐射科学委密切协作。

111. 在许多成员国，发展核能的计划已经实施。此外，对来自天然存在的放射性物质和遗留场址的公众照射和环境影响的认识也在提高，从而导致增加了对公众和环境照射相关问题的兴趣。在这种复兴之前的岁月里，辐射防护和辐射生态学领域的专门知识已经丧失，其中的部分原因是由于退休，还有部分原因是由于转移到其他领域。这将继续要求资深科学家进一步努力参与传播知识和培训年轻专业人员，以确保专门知识的代际传承。

J.2. 国际活动

112. 在原子能机构“辐射安全环境模拟计划”下，于 2010 年 1 月在维也纳举办了一次技术会议，有来自 42 个成员国的 140 名人员参会。“辐射安全环境模拟计划”的侧重点是通过开发统一评定模型来改进用于评定对人类和非人类物种照射的环境迁移模型。图 4 对该计划的活动进行了图示介绍。在辐射安全环境模拟中，将任务在九个工作组中进行了分工，以加强对环境中放射性核素产生的放射性影响的评价。辐射安全

[2] http://rpop.iaea.org

环境模拟的主题涵盖了规划、现有和紧急照射情况下的一系列广泛的污染条件。“辐射安全环境模拟计划“将于 2011 年完成。

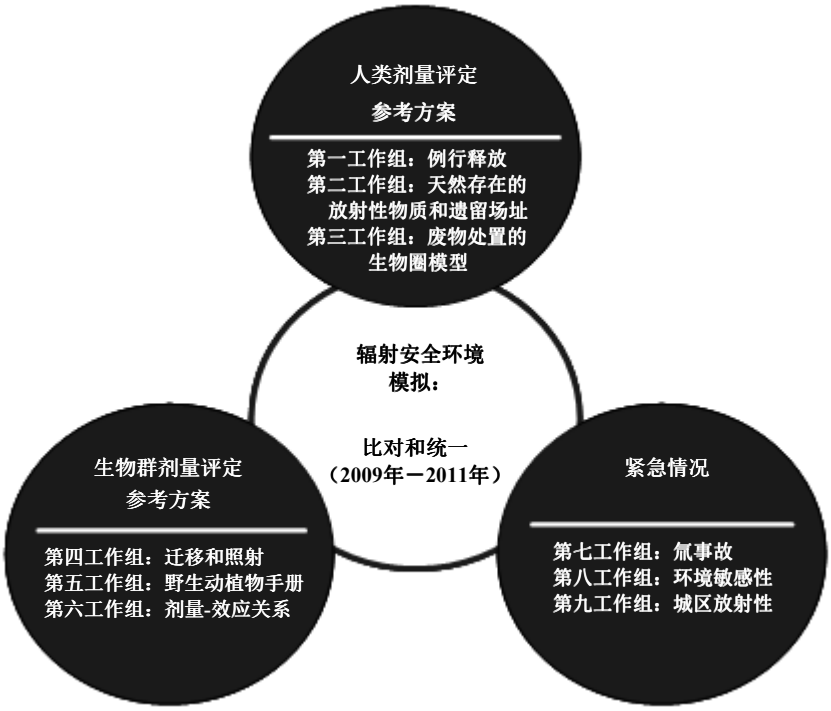

图 4. “辐射安全环境模拟计划”活动和相关的工作组。

113. 2010 年 2 月，原子能机构主办了“国际切尔诺贝利研究和信息网”规划和协调会议，来自白俄罗斯、俄罗斯联邦、乌克兰的国家官员以及原子能机构、联合国开发计划署（开发计划署）和世卫组织的代表出席了会议。“国际切尔诺贝利研究和信息网”于 2009 年 4 月发起，以落实“联合国到 2016 年的切尔诺贝利行动计划”，目的是向受到切尔诺贝利事故影响地区的人民传播科学上正确的信息。这是原子能机构、开发计划署、联合国儿童基金会（儿童基金会）和世卫组织开展的一项联合活动。这次会议的与会者核准了原子能机构“国际切尔诺贝利研究和信息网”技术合作项目的联合倡议和行动。

114. 2010 年 6 月，根据哈萨克斯坦政府的请求，原子能机构一个国际评审组访问了塞米巴拉金斯克试验场北部区域，因为该区域在不久的将来将被解除监管控制。原子能机构工作组侧重于确定塞米巴拉金斯克试验场北部区域的解控是否符合原子能机构的安全标准。哈萨克斯坦共和国国家核研究中心的一份报告概述了在该区域进行的全面辐射生态学研究的结果，并为原子能机构的评审提供了依据。评审组评价了哈萨克斯坦共和国国家核研究中心的样品、制备和测量技术以及在该场址用于居住、农业和工业活动情况下用以估计对公众的可能照射的方案。评审组向哈萨克斯坦原子能委员会提供了一份详细的报告，该报告将成为就场址最终解控做出决策的依据。

115. 2010 年 7 月，原子能机构就法属波利尼西亚居民核安全和辐射防护代表开展的剂量重建过程提交了一份详细的报告。在 1966 年至 1974 年间，这些居民由于法国进行的大气层核试验的直接结果而受到照射。法国政府请求原子能机构开展同行评审，目的是获得国际专家对法国评定受照射人群组的辐射剂量所用方法学的独立评价。2010 年 7 月向法国政府提交了一份详细的评审报告，该报告将被作为进一步决策的依据。

116. 原子能机构于 2010 年 5 月完成了与成员国就 2012 年版《国际电离辐射防护和辐射源安全的基本安全标准（修订案）》（《安全标准丛书》第 GSR Part 3 号）的正式磋商，其中特别是侧重于保护公众和环境的经修订的要求。在与共同倡议组织进行进一步磋商后，原子能机构安全标准委员会核准了最终草案并于 2011 年将其提交理事会核准。另外，《安全报告丛书》第 64 号《源和环境辐射监测计划和系统》已于 2010 年 8 月出版（见秘书处 2011/Note 3 号文件）。

117. 关于陆地或水环境管理排放产生的环境影响放射性评定的安全导则已于 2010 年拟订，计划在 2011 年出版。放射性环境影响分析的准备工作是论证环境放射防护的一个关键组成部分。该导则将促进制订一个标准化的分级方案，并提高对放射性环境影响分析相关过程、定义和方法学的共同认识以及考虑有关设施寿期各阶段的所有环境问题。

118. 新版原子能机构“放射性核素向大气和水环境中排放数据库”于 2010 年发布。该版本应成员国的要求实施了新的功能。改进之处包括：在线搜索和报告工具、图像显示时间趋势、以谷歌地图实现信息的可视化和方便在线提交排放数据。原子能机构和辐射科学委已同意共同维护和使用“放射性核素向大气和水环境排放数据库”。辐射科学委将利用有关核燃料循环装置排放的数据作为输入来评定和报告对局地、地区和全球人口的集体有效剂量承诺。

119. 2010 年 9 月，环境辐射防护协调组在维也纳举行了一次会议。国际政府间组织（包括欧盟、国际放射防护委、经合组织核能机构和辐射科学委）的代表以及世界范围内监管机构和科研机构的代表出席了会议。原子能机构开发的环境介质中核素特有浓度数据集获得认可，该数据集将提供国际放射防护委提议的非人类物种的特有剂量率。

K. 退役

K.1. 趋势、问题和挑战

120. 对世界上开展核退役活动的国家而言，全球民用核遗产退役和净化活动仍是一项巨大的管理、技术、安全和环境挑战。目前在运的 441 座反应堆中，有许多是在 20 世纪 70 年代和 80 年代建造的，预定平均寿期约为 35 年。它们的退役高峰将在 2020 年

到 2030 年出现。《2010 年核技术评论》的补编提供了所有已关闭核动力堆及其退役状况的列表，而同一份报告中的表 A.1 提供了世界范围内所有在运和在建反应堆的列表。此外，还确定了原型堆、试验堆和研究堆以及其他燃料循环设施的退役和净化需求。

121. 近年来，在有关退役的立即拆除战略方面出现了一种变化。这种变化有时被称作递增式退役或顺序化退役，在这种退役中，根据可得资金情况实施立即拆除。这种变化比较难以规划，必然要比首选的立即拆除战略所需的时间要长。

K.2. 国际活动

122. 在 2010 年 11 月 1 日至 4 日在维也纳举行的“伊拉克退役项目”年度会议上介绍了进展报告，并就图瓦萨场址第一个综合退役计划和在图瓦萨建立一个近地表处置设施的计划进行了讨论。原子能机构将通过“伊拉克退役项目”继续在除其他外，特别是退役、废物管理和处置、促进人力资源的能力建设和监管基础结构领域向伊拉克提供援助。

123. 2006 年，原子能机构发起实施了“研究堆退役示范项目”，目的是协助成员国规划和实施研究堆的安全退役。迄今，已举办了九次“研究堆退役示范项目”讲习班。最近一次“研究堆退役示范项目”讲习班是关于研究堆退役的安全评定，于 2010 年 10 月 4 日至 8 日在丹麦国家可持续能源实验室举行。来自 15 个成员国的专家参加了该项目，目的是证明原子能机构安全标准和最佳实践在从规划到完成的设施实际退役期间的适用性和效用性。

124. 原子能机构在 2008 年启动了“安全评定在规划和实施使用放射性物质的设施退役中的应用国际项目”。2010 年 11 月 29 日至 12 月 3 日在维也纳举行了该项目第三次联席会议。来自 30 个国家的专家参加了该项目。“安全评定在规划和实施使用放射性物质的设施退役中的应用国际项目”活动按五个工作组和四个试验案例进行组织。该项目就设施寿期期间退役安全评定的推进以及安全评定结果在规划和实施退役中的利用问题提出了实际建议。该项目定于 2011 年底完成。

125. 在“国际退役网”范围内，2010 年在实现培训的三个要素方面取得了相当大的进展，这三个要素是：退役和拆除实际操作培训、辐射防护培训和现场实习。2010 年举办的“国际退役网”发起的活动包括：退役资金计算专家讲习班（2 月 1 日至 5 日，维也纳）、实践培训班（4 月 12 日至 23 日，美国阿贡国家实验室）以及剂量规划软件的使用专家会议（10 月 12 日至 15 日，比利时莫尔）。

L. 受污染场址的恢复

L.1. 趋势、问题和挑战

126. 20 世纪 80 年代末，对核武器试验、核事故、不良实践和遗弃设施产生的遗留场址

进行恢复的必要性变得明显起来，这个问题在去年对许多国家而言仍然是一项挑战。

127. 其他国家和地区对恢复以前的铀矿山的兴趣也在增加，正如原子能机构大会 GC(54)/RES/7 号决议所呼吁的那样，进一步认识到需要加强对铀矿生产循环中适当国际安全标准的制订和实施工作。

128. 在世界范围内，继续存放有数十亿吨磷石膏放射性核素残留物，有很大一部分数量则被排放到海洋中。磷石膏含有低水平的天然放射性核素，并被继续广泛用于农业和建筑业。实际上，由于对已察觉的放射性风险的关切，磷石膏残留物的使用常常受到严格的限制。原子能机构成立了一个工作组，以便根据“基本安全标准”的要求讨论磷石膏残留物的安全使用问题，并向相关的成员国传播该工作组的讨论结果。就这些工作组活动而言，原子能机构主办了关于磷石膏残留物安全复用的一系列会议，并在 2010 年 9 月主办了一次关于“磷石膏残留物可持续安全利用的放射性防护问题技术会议”。原子能机构已将这些会议的一些内容纳入一份关于磷酸盐工业的安全报告草案中。今后的工作将侧重于编制具体针对磷石膏管理以及经修订的“基本安全标准”在该领域和相关的天然存在放射性物质管理领域应用的培训材料。

L.2. 国际活动

129. 2010 年，原子能机构完成了一份基准文件，其中确定了中亚铀生产遗留场址环境影响评定的需求和优先事项。该文件已被各种国际组织用于向该地区的恢复项目提供援助。

130. 2010 年 10 月，在维也纳举行的一次技术会议上，原子能机构与挪威辐射防护管理局合作发起成立了“遗留场址监管性监督国际工作论坛”。该论坛将通过促进交流想法、信息和方法，向解决遗留场址问题的监管者提供支持。该论坛最初将面向中亚铀矿开采遗留场址的恢复，但其范围将扩大到包含其它类型遗留场址和设施。

131. 应匈牙利原子能管理局并代表 MECSEK-ÖKO 公司提出的请求，原子能机构对匈牙利佩奇附近前铀矿开采和加工场址以往的恢复、长期管护计划进行了国际同行评审。评审会议于 2010 年 12 月 12 日至 17 日举行，来自由四个国家组成的一个五人专家小组召开了这次会议。评审小组的结论和建议旨在加强 MECSEK-ÖKO 公司的长期管护计划，特别是该场址的非能动安全问题。

132. 在哈萨克斯坦、吉尔吉斯斯坦、塔吉克斯坦和乌兹别克斯坦进行的遗留铀矿开采和加工导致产生了大量的铀尾矿和废石堆，它们往往堆放在居住区或靠近居住区。在原子能机构技术合作计划下实施的一个地区项目和世界银行国际开发协会实施的吉尔吉斯斯坦灾害减危项目已经并将继续处理这种遗留物所构成的威胁。

M. 放射性废物管理和处置安全

M.1. 趋势、问题和挑战

133. 随着启动核电计划或扩大现有核计划的国家数量增加，制订提供安全的放射性废物管理的处置计划（包括处置安排）的需求也在增加。原子能机构的安全标准强烈建议各国在核计划发展周期及早制订放射性废物和乏燃料管理战略。

134. 制订或扩大核能计划中的另一个重要问题是需要拥有具备充分资格和专门知识的适当人力资源，以便制订和监管放射性废物管理计划。

135. 迫切需要着手进行处置计划的实施，并且已在这方面取得很大进展，但这些进展主要是在业已开展乏燃料处置设施发展工作的国家取得的。不过，在放射性废物的安全地质处置方面仍存在一些问题。

M.2. 国际活动

136. 2010 年 6 月在维也纳举行的“核动力堆乏燃料管理国际会议”的成果之一是认为运行核电厂的国家需要有可供利用的处置设施，而无论当事国选择的是开式燃料循环还是闭合燃料循环。

137. 这次会议取得的其他一些主要成果包括：(1) 迫切需要制订和实施最终处置方案；(2) 在各国之间存在共享机制的情况下，可扩大关于贮存、后处理和处置的多边解决方案，以纳入和帮助较小的国家；(3) 老化管理措施和标准应当为延期的长期贮存提供更多的指导；(4) 需要制订整体监管方案，以适应运输和贮存许可证审批的不同时间跨度；(5) 在管理现代快堆和先进燃料循环的乏燃料方面的其他考虑因素，因为燃耗较高的乏燃料将须贮存比最初预期更长的时间（100 年或更长时间）。而以越来越高的燃耗值卸出的现代燃料又加剧了由此提出的挑战。

138. 按照“核动力堆乏燃料管理国际会议”的建议，2010 年 11 月设立了乏核燃料两用屏蔽容器的运输安全和贮存安全综合论证文件导则国际联合工作组。由于推迟就乏燃料处置作出决定，从反应堆卸出的需要进行贮存的乏燃料数量正在不断增加，并且超出乏燃料水池容量的情况正在越来越多。该工作组的目的是从整体上向成员国提供编写贮存和运输综合安全论证文件的导则。

139. 2010 年 11 月，欧洲委员会为欧洲理事会制订关于乏燃料和放射性废物管理的指令提出了建议。该建议在很大程度上是根据原子能机构的《基本安全原则》和《乏燃料管理安全和放射性废物管理安全联合公约》所载的义务拟订的。建议的“指令”要求，欧盟成员国应当至少每 10 年对照对其国家框架、国家当局和（或）国家计划进行的国际同行评审的结果对各自的国家框架包括主管监管当局和国家计划及国家计划执行情况开展一次自评定。

N. 放射源的安全和安保

N.1. 趋势、问题和挑战

140. 高活度放射源继续在世界各地广泛使用。虽然没有获得有关正在使用的源数量的可靠数据，但美国核管理委员会 2007 年的一份报告估计，美国正在使用的一类和二类源有 53 700 个，这可以作为说明世界范围内现有源数量的参照点。虽然放射源在为数有限的应用中正在为其他技术如粒子加速器所取代，但在许多情况下，放射源将继续被用于医学、工业和学术应用。此外，虽然大多数成员国都认识到了确保放射源监管控制的重要性，但仍有 30 多个成员国没有建立充分适当的监管基础结构以进行此类源的控制。同样，许多国家没有建立国家登记制度，以确保这些源在整个寿期内以及寿期结束后得到监管控制。

141. 放射源在达到使用寿期终点时更可能脱离监管控制。每年在入境口岸、金属回收设施或其他场所都会发现未处于监管控制之下的放射源（无看管源）。此外，一些成员国不具备充足的专门知识或资源来表征所发现的放射性物质和对无看管源重新实施监管控制。

142. 虽然《放射源安全和安保行为准则》和《乏燃料管理安全和放射性废物管理安全联合公约》提供了安全管理废放射源的既定原则和目标，并鼓励采取所有可能的选案（再循环、复用、返还原产国、贮存和处置），但许多国家仍未确定对其当前和今后的废放射源进行管理的适当战略。这个问题对于拥有少量放射性废物和没有核计划的国家一直并将继续具有特殊的重要性。

143. 截至 2010 年 11 月，已有 100 个成员国承诺执行《放射源安全和安保行为准则》。大多数成员国都使用该“行为准则”建议的分级方案来管理放射源，而且约 60 个成员国正在利用“行为准则”的补充导则《放射源的进口和出口导则》。

N.2. 国际活动

144. 2010 年 5 月，原子能机构在维也纳举行了一次不限人数的技术和法律专家会议，交流了有关《放射源安全和安保行为准则》及相关《放射源的进口和出口导则》执行情况的信息。来自 93 个国家的 160 名专家包括来自政府间组织和非政府组织的观察员出席了会议。会议得出了一系列结论，主席报告[3]对此作了概述。这次会议向秘书处提出的建议包括：实施对“补充导则”的审查过程；组织举行一次顾问会议，讨论管理在国家边境发现的无看管源的问题；在 2005 年在法国波尔多举行的放射源安全和安保国际会议结论的基础上召集一次后续国际会议；以及保持所有成员国中的工作级和决策级人员对辐射源安全和安保的高度认识。

---

[3] http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-8-att1_en.pdf

145. 2010 年 5 月，原子能机构在其技术合作计划的框架内在维也纳组织举办了第一个起草辐射安全和放射源安保条例学习班。这一为期一个月的活动就原子能机构有关放射源安全和安保的标准和导则以及这方面的其他国际标准和导则向来自阿尔巴尼亚、波斯尼亚和黑塞哥维那、保加利亚、克罗地亚、塞浦路斯、拉脱维亚、前南斯拉夫马其顿共和国和黑山监管机构的与会者提供了指导。此外，向与会者提供的辅导有助于他们审查、更新和完成其国家监管文书。

146. 根据 2009 年 2 月在西班牙举行的“废金属中意外放射性物质的控制和管理国际会议”和大会 GC(54)/RES/7 号决议提出的建议，原子能机构与其他国际组织协作，开始起草关于含有放射性物质废金属的跨境运输的国际协定建议书。此外，安全标准委员会已核准关于金属回收和生产工业中的无看管源和其他放射性物质的“安全导则”，该导则目前正在进行出版制作。

147. 为了进一步处理废放射源的长期管理问题，原子能机构组织了 2010 年 10 月在葡萄牙里斯本举办了废密封辐射源的可持续管理国际讲习班。该讲习班除其他外，特别确定了带有共性的问题（例如，缺乏涵盖弃用源的综合废物管理政策，缺乏集中贮存设施，以及没有处置路线）。讲习班还为今后制订弃用源安全管理长期贮存和处置路线的国际活动提出了建议。特别是，讲习班对通过国际合作制订更多与建造钻孔设施有关的项目表示了强力支持。

148. 除了促进可持续解决方案外，原子能机构还在捐助国的协助下向整备和在可能的情况下将弃用源移出使用场所以便在当事国适当设施进行贮存或运往另一国（不一定是原产国）的活动提供了支助。由于缺少运输容器，一些国家收取的处置费用太高，以及一些发展中国家缺乏基础设施，通常很难将旧源运往其他国家。原子能机构将在捐助国的协助下继续积极解决这些限制因素。

O. 放射性物质的运输安全

O.1. 趋势、问题和挑战

149. 拒绝和拖延运输放射性物质的现象继续发生，而因国家条例的差异所导致的拒绝运输现象的增加最为明显。条例的差异会给不同的运输方式造成一定程度的复杂性，而这又会增加不申报危险货物或错误申报危险货物的危险，从而给供应链中涉及的所有各方带来问题[4]。

150. “拒绝运输放射性物质问题国际指导委员会的数据库”（由海事组织作为“全球综

[4] 联合国《危险货物运输示范条例》（第十六修订版，ST/SG/AC.10/1/REV.16 号文件），联合国，纽约，2009 年。

合航运信息系统”数据库系统的一部分主办）有助于确定这些具体的“热点”问题，从而使地区网络能够作出响应。这些网络在过去一年中日益活跃，并带来了广泛的额外利益。

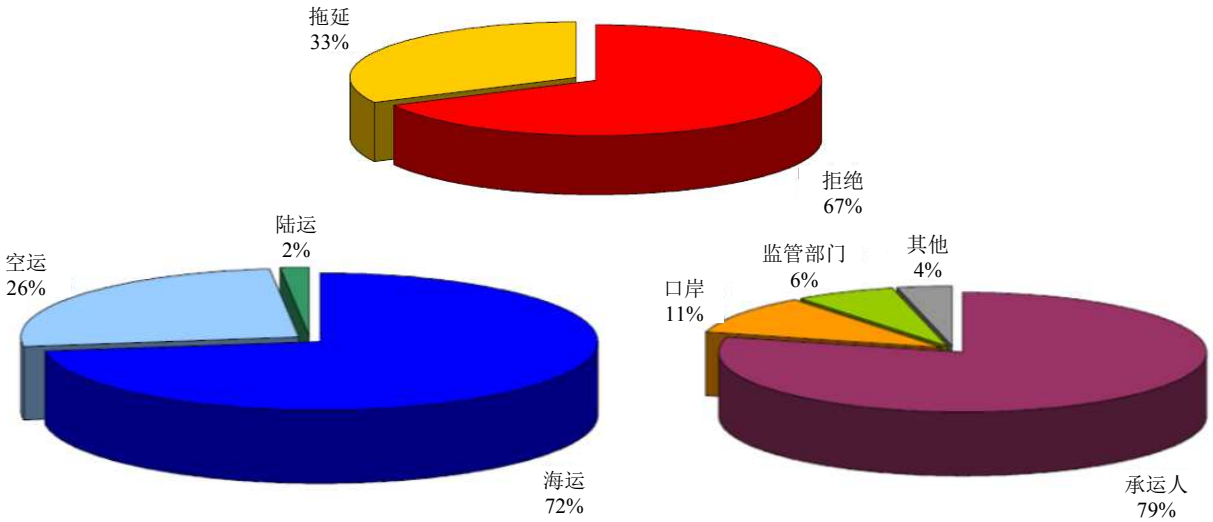

图 5. “全球综合航运信息系统”数据示例，这些数据显示了困难类型、受影响的运输方式和造成拖延的原因。这些数据还能显示受影响的地区和国家。

151. 同联合国其他与危险货物运输有关的机构的合作正在迅速发展。在朝着协调统一迈进的这一过程中，2010 年确定了若干与放射性物质运输有关的规定，但这些规定并未经过充分审查便付诸了实施。根据其任务规定，原子能机构需要对这些规定进行审查，以确保安全不受到损害。

152. 截至 2009 年，许多国家已缔结促进包括放射性物质在内的货物安全运输的 20 份国际或地区文书中的一份或多份文书。但一些公约存在重叠，涵盖了运输旅程的同一些方面的问题。这是 2010 年记录的造成拒绝运输的一个原因。将在计划于 2011 年 10 月举行的原子能机构会议上研究能够在多大程度上实现简化全球体系。这将对承运国或可能受运输影响之国家的国家监管部门以及运输业应对运输放射性物质时提出的问题特别有益。

153. 原子能机构发起了一个倡议，以便确定与移动式核电厂相关的潜在问题，并将特别关注旨在满足岛屿或偏远地区能源需求的浮动反应堆。目前正在俄罗斯联邦建造一个配备两座小型压水堆（均为 150 兆瓦（电））的浮动核电厂。该倡议将确定与移动式核电厂相关的潜在问题，并评定当前的国际法律框架和安全标准对这项技术而言是否适用和适当。原子能机构编写并提交安全标准分委员会和安全标准委员会 2010 年 9 月 30 日至 10 月 1 日举行的第二十八次会议的题为“船载移动式反应堆相关问题”的文件概述了初步评定结果。安全标准委员会一致认为，在现阶段编写关于船载移动式反应堆的安全导则为时尚早，并要求提供有关所涉法律和制度问题及反应堆详细设计的更多资料。

154. 目前正在“革新型核反应堆和燃料循环国际项目”下编写原子能机构技术文件“移动式核电厂的法律和制度问题”。预计该技术文件将于 2011 年底出版。

O.2. 国际活动

155. 拒绝运输放射性物质问题国际指导委员会在 2010 年继续指导开展相关国际活动。

156. 2010 年 2 月，原子能机构主办了一系列侧重讨论拒绝运输放射性物质问题的技术会议。这些会议将监管人员、工业界成员和其他国际组织召集在一起讨论拒绝运输问题，评价以前采取的行动，以及提供指导和培训，目的是有助于减少拒绝运输情况的发生。

157. 与会者审查了拒绝运输放射性物质问题国际指导委员会及其有关网络的结构，并建议采取更加协调一致的方案，这种方案包括国家政府、地区政府间组织和国际政府间组织指定的代表，并由运输界和供应网络的代表加以进一步的补充。这将为响应在 2013 年之前将拒绝运输现象减到微少程度的挑战提供一个更加协调一致和合作的方案。

158. 解决拒绝运输问题工作的第二个阶段涉及由原子能机构牵头采取措施，确定解决拒绝运输问题的关键指标。一个管理小组定期协调和审查进行中的活动和工作，包括当前制订应对拒绝运输问题行动计划的工作。

159. 对《放射性物质安全运输条例》的下一次修订已接近完成，其中包括按照原子能机构大会 GC(54)/RES/7 号决议要求的对放射性物质运输适用的不属于易裂变材料的要求作了重要修改。下一次审查将推迟到能够对其他联合国机构采用的附加要求进行详细研究以评定那些要求的必要性及它们是否有损于安全之后进行。

160. 2010 年 9 月，原子能机构参加了在维也纳与一些沿岸国和承运国举行的第六轮非正式讨论，以便继续进行对话和磋商，在放射性物质海上安全运输方面增进相互理解、建立信任和加强沟通。对一次假想海上事件的介绍和讨论导致增进了与会者之间的理解和信任。

Appendix 1
Safety related events and activities worldwide during 2010

A. Introduction

161. This report identifies those safet related events or issues during 2010 that were of particular importance, provided lessons that may be more generally applicable, had potential long-term consequences, or indicated emerging or changing trends. It is not intended to provide a comprehensive account of all safety related events or activities during 2010.

B. International Instruments

B.1. Conventions

B.1.1. Convention on Nuclear Safety (CNS)

162. The first Officers' Turnover Meeting was organized pursuant to the decision taken at the 4th Review Meeting of the CNS on 30 March 2010. The objectives of the meeting were to improve the review process by sharing experience and lessons learned, and to describe the process in detail, including key documents. As such, the meeting served to improve continuity between incoming and outgoing officers.

163. By the end of 2010, the Convention had 71 Contracting Parties and 11 Signatory States that had not yet ratified the Convention. In 2010, five countries namely, Bosnia and Herzegovina, Kazakhstan, Saudi Arabia, Tunisia and Vietnam became Contracting Parties to the Convention.

B.1.2. Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Early Notification and Assistance Conventions)

164. In 2010, the Dominican Republic, Georgia and Kazakhstan acceded to the Convention on Early Notification of a Nuclear Accident. By the end of 2010, there were 109 Contracting Parties to this Convention.

165. Kazakhstan also acceded to the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency in 2010, bringing the total to 105 Contracting Parties to this Convention.

B.1.3. Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (Joint Convention)

166. In 2010, Gabon, the Republic of Moldova, Kazakhstan and The former Yugoslav Republic of Macedonia became Contracting Parties to the Joint Convention. By the end of the year, there were 57 Contracting Parties to this Convention. Four Signatory States had not yet ratified the Convention.

167. The first Technical Meeting between Joint Convention Contracting Parties and States non-parties focused on the Establishment of Radioactive Waste Management Organizations was held 7 and 9 June 2010 in Paris, France. The event was organized by the Agency, in cooperation with the French Nuclear Safety Authority (ASN), the French National Agency for Radioactive Waste Management (ANDRA) and the Ministry of Ecology, Energy, Sustainable Development and of Sea (MEEDDM) of France.

168. The informal meeting of the Contracting Parties to the Joint Convention to discuss the Secretariat's proposals to promote continuity between Review Meetings and to enhance communications, as requested by the third Review Meeting of the Joint Convention, was held in Paris on 10 June 2010. The meeting was organized by the Agency and hosted by the French Nuclear Safety Authority.

169. The General Committee of the Joint Convention met in Vienna on 24 September 2010. A regional workshop on the Joint Convention was held in Tokyo between 28 and 30 September 2010. Representatives from five Contracting Parties along with nine non-party States participated in the event. The workshop was organized by the Agency in collaboration with the Nuclear and Industrial Safety Agency (NISA) of Japan, the Japan Nuclear Energy Safety Organization (JNES) and the Asian Nuclear Safety Network (ANSN).

B.2. Codes of Conduct

B.2.1. Code of Conduct on the Safety of Research Reactors

170. 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. To support the implementation of the Code, the Agency held three regional meetings (China, Egypt and Slovenia) and one national meeting for Pakistan organized in Vienna on the application of the Code. In total, 65 participants from 27 Member States attended these meetings. The meetings contributed to a better understanding of the code and resulted in several improvement plans for participating Member States.

171. In November 2010, the Agency continued with revising the corpus of Safety Guides for research reactors and with drafting new safety guides. The revised Safety Guide on the Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report was approved for publication. In addition, significant progress was achieved in the development of the three Safety Guides on the application of a graded approach; safety in utilization and modification of research reactors and on instrumentation and control and software important to safety for research reactors.

172. The Agency continued regional activities to examine progress, to promote sharing knowledge and building technical and safety capacities, and to address specific needs of Member States as defined in their self-assessments presented during the international meeting on Application of the Code of Conduct on the Safety of Research Reactors, held in Vienna in October 2008. In 2010, these activities focused on promoting performing periodic safety reviews for research reactors, and improving the capabilities for preparation, review and assessment of research reactor safety documents, as well as on the need to enhance operational radiation protection programmes and emergency planning and preparedness for research reactors.

B.2.2. Code of Conduct on the Safety and Security of Radioactive Sources

173. By the end of 2010, 100 States had written to the Director General to express their commitment

and intention to work toward following the provisions of the Code of Conduct on the Safety and Security of Radioactive Sources. Also, 60 States had expressed support for the Supplementary Guidance on the Import and Export of Radioactive Sources. A total of 105 States had nominated points of contact for the purpose of facilitating the export and import of radioactive sources and had provided the details to the Agency. The Code and the Guidance are not only widely accepted on a national level, but are supported by several groups of countries.

174. The provisions and guidance in the Code of Conduct have been integrated into appropriate Agency safety review services, such as the Integrated Regulatory Review Service (IRRS), advisory missions on control of sources, technical cooperation projects and extra budgetary programmes. Application of the Code of Conduct is accomplished through implementation of national regulations.

175. In September 2010, at the 54th session of the IAEA General Conference, which noted the recommendations of the Open-ended Meeting of Technical and Legal Experts organized in May 2010, requested by the Secretariat to implement the recommendations—in particular, the recommendation calling for the organization of an international conference on the safety and security of radioactive sources, which is currently planned for 2013.

B.3. International Nuclear Regulators Association (INRA)

176. The International Nuclear Regulators Association (INRA), established in 1997, is a group of the most senior nuclear regulatory figures from the Canada, France, Germany, Japan, Republic of Korea, Spain, Sweden, United Kingdom and USA meeting twice a year. In 2010 the United Kingdom was the host country for INRA and meetings were held in April 2010 (London) and September 2010 (Windsor). Sweden has now taken over as the INRA host and the next meeting is planned for May 2011 in Stockholm.

B.4. G8-Nuclear Safety and Security Group (G8-NSSG)

177. Under the Presidency of Canada, the G8-NSSG met in Toronto from 5 to 6 May 2010. The Agency, the European Commission (EC), the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD/NEA) and the European Bank for Reconstruction and Development (EBRD) also attended the meeting as observers. The G8-NSSG meeting focused on, inter-alia, the implementation of the Chernobyl Shelter Fund and Nuclear Safety Account managed by the EBRD; the 3S-based (Safety, Security, Safeguards) Nuclear Energy Infrastructure; and the future of NSSG.

178. The implementation of the Shelter Implementation Plan (SIP), according to the International Advisory Group (IAG), has made a positive impact on safety protection. However, there remain risks to the timely delivery of an operational New Safe Confinement (NSC) that according to the IAG, could be managed by the Project Management Units (ChNPP/PMU), committed and competent contractors and adequately resourced regulators. It was also concluded that that the international community's support for Ukraine enabled the translation of the SIP concept into tangible engineering programmes, which so far have made a major contribution to improving nuclear and radiological safety at Chernobyl and to the protection of the public.

B.5. Western European Nuclear Regulators Association (WENRA)

179. In follow up to a study on safety objectives for new nuclear power reactors published by WENRA in January 2010 and taking into consideration comments received thereon, WENRA adopted a statement on safety objectives for new nuclear power plants in November.

180. WENRA identifies in this statement seven high level qualitative safety objectives and considers that the design of new nuclear power plants should take into account the operating experience feedback, lessons learned from accidents, and developments in nuclear technology and improvement in safety assessment. WENRA is continuing its harmonization work on the basis of these objectives.

181. The WENRA bases its harmonization work for existing and future reactors on the Agency Safety Standards; these standards assist in reinforcing international benchmarks for maintaining and improving nuclear safety worldwide.

B.6. The Ibero-American Forum of Nuclear and Radiological Regulators

182. During the 54th session of the IAEA General Conference in September 2010, a formal arrangement to consolidate the relationship between the Ibero American Forum of Nuclear and Radiation Safety Regulatory Agencies (the FORO) and the Agency was signed by the current President of the FORO and the Deputy Director General of the Department of Nuclear Safety. This arrangement will also help promote support for FORO´s technical programmes.

183. Current FORO projects include: accident prevention in therapeutic medical uses of radiation; collaborative approaches between regulatory and health authorities; life extension licensing of nuclear power plants (NPP); and control of inadvertent radioactive material in scrap metal and recycling industries.

184. In 2010, the project on regulatory issues relating to NPP life extension was completed and the final report will be posted on the FORO web site.

B.7. Cooperation Forum of State Nuclear Safety Authorities of Countries which operate WWER Reactors

185. The 17th Annual Meeting of the Forum of the State Nuclear Safety Authorities of the Countries Operating WWER Type Reactors was hosted by the Hungarian Atomic Energy Authority HAEA from 15 to 17 June 2010. The meeting was attended by senior representatives of the regulatory authorities of countries operating or constructing these reactors, including: Armenia, Bulgaria, China, Czech Republic, Finland, India, the Islamic Republic of Iran, Russian Federation, Slovak Republic and Ukraine. The Agency and Germany's Gesellschaft für Anlagen und Reaktorsicherheit (GRS) attended the meeting as observers. Presentations focused on the most significant issues and developments in the field of nuclear safety and regulation, including those encountered during the construction of the Olkiluoto 3 reactor in Finland.

186. Working groups reported on the activities since the last meeting in 2009. The working groups included regulatory aspects of organizational, management and safety culture-related issues of NPPs; regulatory use of probabilistic safety analysis; and operational experience feedback for improving safety of NPPs. A new working group began work in November 2010 on requirements for quality of fabrication and justification of operation safety of nuclear fuel for WWER reactors, including on the requirements for verification of computer codes. The next meeting of the forum will be hosted by the Slovak Republic in 2011.

B.8. The senior regulators from countries which operate CANDU-type nuclear power plants

187. The Annual Meeting of Senior Regulators of Countries Operating CANDU-type Reactors took place in China, from 8 to 12 November 2010; it was hosted by the National Nuclear Safety

Administration Office in Shanghai. The meeting was attended by six countries (Argentina, China, India, Republic of Korea, Pakistan and Romania).

188. The meeting addressed technical and policy regulatory issues, including regulatory framework and oversight for new NPP construction, refurbishment and ageing management together with the applications of probabilistic safety analysis (PSA) in CANDU NPPs. The participants visited the Third Qinshan Nuclear Power Plant and exchanged information on the future development of the nuclear power programme in China and safety aspects of CANDU plants. The next Meeting of Senior Regulators of Countries Operating CANDU-type Reactors will be held in the Republic of Korea, in the fourth quarter of 2011.

189. Upon request, in May 2010 a preliminary Technical Meeting on PSA for CANDU reactors took place in Vienna. A technical meeting was attended by participants from regulatory bodies and industry, as well as representatives from the CANDU Owners Group; they discussed strategy and terms of reference. The next meeting of the PSA working group will be held in Ottawa, Canada, in the second quarter of 2011.

B.9. Forum of Nuclear Regulatory Bodies in Africa (FRNBA)

190. The Forum of Nuclear Regulatory Bodies in Africa (FNRBA) was established in 2009, comprising 33 African nuclear regulatory bodies. FNRBA consists of nine thematic working groups. FNRBA has initiated "Strengthening Radiation Protection Infrastructure" as a model project.

191. Building on the substantial progress that FNRBA has made in realizing the network of regulatory bodies in Africa, a plenary session of the FNRBA was held in Nairobi, Kenya in May 2010. A significant part of the meeting was devoted to structured discussion and adoption of a strategic business plan, the 2010/2011 Action Plan, developed by the Steering Committee for strengthening the programmatic and institutional capacity building aspects of the Forum to effectively implement its medium term strategic plan.

192. Furthermore, the forum also included the import and export control and transport safety and emergency preparedness and response as new areas for the Technical Working Group. In addition, it discussed and adopted the Terms of Reference and working procedures for all Technical Working Groups, passed resolutions on various organizational and programmatic issues, and considered systemic and virtual networking for further development of the Forum web site [5].

193. During the 54th session of the IAEA General Conference in September 2010, an agreement was signed between FNRBA and the Korea Institute of Nuclear Safety (KINS) to seek more support and assistance from outside of Africa.

B.10. Arab Network of Nuclear Regulators (ANNuR)

194. ANNuR held its first meeting in Hammamet, Tunisia in January 2010, where representatives of the Nuclear and Radiation Regulatory Bodies in Arab countries participated. They discussed a three action plan and its implementation. ANNuR's next meeting will be held in early 2011.

B.11. The International Nuclear and Radiological Event Scale (INES)

195. 2010 marked the 20-year anniversary of INES as celebrated during the Biennial Technical

[5] www.fnrba.org.

Meeting of the INES, held on 11–15 October 2010, in Vienna. The meeting presented successful implementation of INES and discussed its further enhancement. Since 1990, it has increased its initial membership from 31 countries to 69 countries. In 2010, eight countries joined INES: Algeria, Kenya, Indonesia, Latvia, Malaysia, Serbia, Thailand and Zimbabwe.

196. Member States are urged to designate International Nuclear and Radiological Events Scale (INES) national officers and utilize the scale.

C. Activities of international bodies

C.1. United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)

197. In 2010, the UNSCEAR released its 2008 report on Sources and Effects of Ionizing Radiation Vol. I. With Scientific Annexes: A: Medical radiation exposures and B: Exposures of the public and workers from various sources of radiation.

198. According to the report, medical exposures account for 98 per cent of the contribution from all artificial sources and are now the second largest contributor to the population dose worldwide, representing approximately 20 per cent of the total. Computed tomography (CT) scans were found to be the major contributor to medical exposure, with other significant contributions from diagnostic X-rays, interventional procedures, and nuclear medicine.

199. The UNSCEAR reports provide the scientific foundation for national and international programmes on radiation risk assessment and management, including for example the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (BSS).

200. The fifty-seventh session of UNSCEAR was held 16-20 August, 2010 in Vienna. During the meeting, technical discussions took place on assessment of levels of radiation from electrical energy production, uncertainty in radiation risk estimation, attributing health effects to radiation exposure and the methodology for estimating exposures due to discharges. Improved procedures for data collection, analysis and dissemination were also considered.

201. The UNSCEAR Secretariat has been liaising with other relevant organizations, such as the World Health Organization, the International Atomic Energy Agency, the Nuclear Energy Agency of the Organization for Economic Cooperation and Development and the European Union, with a view to streamlining the collection of data on radiation exposures of the public, workers and patients.

C.2. International Commission on Radiological Protection (ICRP)

202. The ICRP has a policy of making draft publications available online for consultation and all comments received are taken into account in finalizing its recommendations. In 2010 the following documents were issued for consultation: 1) Education and Training; 2) Environmental Protection – Transfer Parameters for Reference Animals and Plants; and 3) ICRP Statement on Radon and Lung Cancer Risk from Radon and Progeny (two related but separate documents).

203. The ICRP was co-author of the ICRU Report 84: Data for the Validation of Doses from Cosmic Radiation Exposure of Aircraft Crew.

C.3. International Commission on Radiation Units and Measurements (ICRU)

204. The ICRU manages its work through a Main Commission and 11 Report Committees. It also operates a further two joint committees with the ICRP.

205. The current ICRU programme addresses priority issues in diagnostic radiology and nuclear medicine, radiation therapy, radiation protection and radiation science.

206. The ICRU published the following reports in 2010: Prescribing, Recording, and Reporting Intensity-Modulated Photon-Beam Therapy (IMRT)(ICRU Report 83); and Reference Data for the Validation of Doses from Cosmic Radiation Exposure of Aircraft Crew (ICRU Report 84, jointly with the ICRP).

C.4. International Nuclear Safety Group (INSAG)

207. In 2010, INSAG issued a report entitled INSAG 24: The Interface between Safety and Security at Nuclear Power Plants. The report highlights the importance of a coordinated approach to nuclear safety and security. A second report entitled Framework for Risk Informed Decision Making Process is in the final stage of preparation. The report proposes a methodology to integrate deterministic and probabilistic techniques in a decision making process.

208. As in previous years, the INSAG Forum was held on the sidelines of the 54th session of the General Conference. The Forum was dedicated to highlighting essential messages from previous INSAG reports to countries considering launching a new nuclear power programme.

D. Activities of other international organizations

D.1. Institutions of the European Union

209. In 2010, the European Nuclear Safety Regulators Group (ENSREG), an independent expert body comprising senior officials from the national regulatory or nuclear safety authorities of all 27 EU Member States, held three meetings. Topics discussed in the meetings included: development of two learning processes from the Convention on Nuclear Safety review meetings and from the Agency's International Regulatory Review Service (IRRS) missions to other Member States; the establishment of an expert resource pool and of a network of regulatory contact points needed for the development of an European IRRS programme of peer-reviews; the elaboration of a Memorandum of Understanding between ENSREG and the Agency on the practicalities of a European programme of peer review missions; and the elaboration of key principles for national regulators on common practices for improving transparency.

D.2. Nuclear Energy Agency of the Organisation for Economic Cooperation and Development (OECD/NEA)

210. The NEA Committee on Nuclear Regulatory Authorities (CNRA) and the NEA Committee on the Safety of Nuclear Installations (CSNI) met in December 2010. The committees reviewed progress on activities from 2010 and forthcoming activities for 2011-2012. Participants from over 22 countries, the European Commission (EC) and the Agency attended the meetings. Major agenda items for both committees included updating operating plans, long-term operation, NEA interactions with emerging nuclear power countries and discussions on the safety of research reactors.

D.3. World Association of Nuclear Operators (WANO)

211. WANO conducted peer reviews at 36 NPPs during 2010; altogether it has conducted 457 peer reviews since the programme began in 1992. WANO's long-term goal is to conduct a WANO peer review of member nuclear stations such that each nuclear unit is reviewed at least once per six years, either as an individual unit or as part of a peer review that includes other units at a station. In addition, each station is encouraged to host an outside review at least every three years (allowing a WANO peer review to count as an outside review.) An outside review would include Operational Safety Review Team (OSART) missions, WANO follow-up peer reviews, and national organizational reviews such as those conducted by the Institute of Nuclear Power Operations (INPO) and the Japan Nuclear Technology Institute (JANTI).

212. WANO continues to emphasize technical support missions, which focus on providing assistance in selected areas, with almost 200 technical support missions undertaken during 2010. Many of these technical support missions included experts from other WANO regions sharing their experiences to support improvements in operational safety.

E. Safety significant conferences in 2010

E.1. International Conference on Human Resource Development for Introducing and Expanding Nuclear Power Programmes

213. The conference on human resource development held in Abu Dhabi, United Arab Emirates, from 14 to 18 March 2010, brought together over 250 experts, scientists and officials from 62 Member States. The wide participation of Member States and Agency staff enabled the sharing of information and ideas on effective ways to attract and train the human resources required to maintain the vanishing global nuclear workforce. The conference recognized the need for governments to be heavily involved in the development of human resources for a safe, secure and sustainable nuclear power programme and the need to cooperate locally, nationally and internationally in building human resources for a nuclear power programme. It was also commonly agreed that maintaining competence is a national responsibility and that existence of an effective safety culture is a prerequisite for the implementation of a nuclear power programme.

E.2. International Conference on the Management of Spent Fuel from Nuclear Power Reactors

214. The Agency organized this international conference, held in Vienna, 31 May–4 June 2010 with 166 participants from 35 countries. The conference addressed all aspects of spent fuel management from national policy through legal and regulatory aspects, experience with spent fuel storage, reprocessing and recycling options and long term storage and disposal. Key issues in radioactive waste management were highlighted, in particular safety, security and sustainability of storage of spent fuel over time.

E.3. International Conference on Operational Safety Experience and Performance of Nuclear Power Plants and Fuel Cycle Facilities

215. This international conference was held in Vienna from 21-25 June 2010 with 163 participants representing 45 Member States and five international organizations in attendance. There were a total

of 49 presentations from operators, international organizations, regulators and technical support organizations. These covered leadership, management of safety, safety culture, operating experience, newcomers with ambitious plans, international peer reviews, application of Agency Safety Standards and long term operation. Recommendations for future work in these areas were proposed and accepted by the conference participants.

E.4. International Conference on Challenges Faced by Technical and Scientific Support Organizations in Enhancing Nuclear Safety and Security

216. From 25–29 October 2010, the Agency and the Japan Nuclear Energy Safety Organization (JNES) organized and hosted this second international TSO conference, which followed the first TSO Conference held in Aix-en-Provence, France, in 2007; 229 participants from 46 countries and five international organizations attended and focused on the following: the role and responsibility of Governments in defining and implementing TSO capabilities and policies; the Agency's role as a strong driving force for the development of the TSO knowledge network; and the TSO remit to pursue on-going efforts in improving and optimizing worldwide technical capabilities needed to support nuclear safety and security. The conference concluded with five recommendations, most notably focusing on achieving greater safety and security synergy by extending TSO functions and establishing a TSO Forum that would act as a platform for worldwide cooperation.

E.5. International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry

217. The Radiation Protection in Medical Applications session was held during the International Symposium on Standards, Applications and Quality Assurance in Medical Radiation Dosimetry (from 9–12 November 2010, in Vienna, with 372 participants attending the symposium from 66 countries). The following issues and challenges, inter alia, were discussed: (i) increasing medical worker awareness and minimizing risk of the deterministic effects from the use of radiation in medical procedures; (ii) implementing individual monitoring of medical staff in full; especially for extremity dosimetry; (iii) implementing radiation protection programs at medical facilities for both worker and patient protection; (iv) optimizing diagnostic imaging procedures in interventional radiology and nuclear medicine; (v) implementing international standards, guidance and assistance on capacity building and training in radiation protection; (vi) upgrading and/or creating national dose registries at the National/State level.

F. Safety significant events in 2010

F.1. International Reporting System for Operating Experience (IRS)

218. The fundamental objective of the IRS is to contribute to improving the safety of commercial nuclear power plants (NPPs) which are operated worldwide. The IRS provides an essential feedback tool, ensuring proper reporting and feedback of safety significant events such that the causes, the lessons learned and the corrective actions can be disseminated widely. It is an international system jointly operated by the International Atomic Energy Agency and the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD/NEA).

219. The Incident Reporting System has increased its functionality to include expanded views and to make available operational experience feedback. In addition, the name of the system was revised in

2010 to the "International Reporting System for Operating Experience". The system retains the IRS acronym.

220. The 2010 joint Agency–OECD/NEA meeting of the IRS national coordinators, which was held in Vienna, discussed corrective actions and lessons learned from 27 recent events in nuclear power plants. These events covered a wide range of scope and complexity. Some events had classic initiators, such as: loss of offsite power (with different causes including severe weather conditions); loss of ultimate heat sink; leakage from the pressurizer and internal flooding, and others. Some events were related to human error (staff overriding limitation systems, complacency and maintenance errors), and some events were related to organizational and safety culture issues (oversight of sub-contractors, acceptance of degraded conditions, incomplete design reviews and communication of design changes between different related institutions). However, the majority of events were of a technical nature: several Emergency Diesel Generator (EDG) failures, spare parts problems, material problems in Steam Generators (SG), cracks in pressurizer heaters, problems from original design and construction, high voltage breaker failure, transformer fires and inadvertent control rod insertion.

F.2. Events of interest in 2010

221. **Haiti:** Following the earthquake that occurred in Haiti on 12 January 2010, the Agency took action and provided humanitarian aid in terms of medical X-ray equipment and related medical consumables. The Agency sent an offer of good offices regarding the recovery of radioactive sources which might have been located in areas affected by the earthquake. An offer of good offices was also sent to the Dominican Republic as this country has licensed companies which did operate in Haiti and confirmed that a number of radiation sources were located at the site of a collapsed building in Haiti. As natural disasters might lead to severe radiological consequences, the Agency Incident and Emergency Centre (IEC) will approach affected countries with offers of good offices and will remain in stand-by mode ready to assist, if requested.

222. **Chile**: Following the earthquake that occurred in Chile on 27 February 2010, the Agency requested information from the authorities on the safety and security status of radiation sources possibly located in the area affected by the earthquake. The Chilean counterpart investigated the situation and reported that there was neither safety nor security related consequences arising from radiation sources used for medical purposes in the area affected by the earthquake.

223. **Honduras**: On 28 October 2010, elevated dose rates up to 14 mSv/h were detected from an underground source in a courtyard. Initial actions were taken to shield the area and install appropriate cordons and signs. The IEC received a request for assistance from authorities and deployed an Assistance Mission team, comprising a team leader from the IEC and a RANET team from Mexico. During the initial meeting, it was revealed that a source inventory had been performed after the dose rate detections indicating that a 15mCi 137Cs brachytherapy was missing. The mission team subsequently performed dose rates surveys and safely recovered a source from a depth of approximately 2 cm below the surface. Analysis of the source identified that it was the missing source. Source encapsulation remained intact and it was placed in a dedicated shielding facility with the other brachytherapy sources. Dose reconstruction determined that individual overexposure was extremely unlikely.

224. **Venezuela**: A radiation accident occurred in Turmero, Aragua State, when, on 3 June 2010, after a number of workers handled an unshielded Ir-192 2.4 TBq (64.95 Ci) industrial radiography source. The Agency received a request for assistance on emergency communication channels, and on 14 June 2010, an Assistance Mission was deployed to Venezuela with the objectives to assess the medical condition of the most exposed individuals and to provide medical advice for medical treatment for

them. Based on the results of this assistance mission, a request for medical treatment was issued by Venezuela. The IEC facilitated medical treatment in France within the RANET framework. As a consequence of the highly specialized and effective medical treatment, the most exposed person recovered entirely after being subjected to surgery and adjuvant administration of mesenchymal stem cells.

225. **Italy:** According to the information sent by Italy through the emergency communication channels and through the public and media information channel, NEWS, a Co-60 source estimated to be in the range of 150 to 200 GBq was discovered in the port of Genoa, in a container shipment of scrap metal coming from abroad on 20 July 2010. Legal and radiological safety investigations were carried out by the local authorities at the site of the discovery, in line with national legislative provisions and international safety regulations on the matter.

226. **Russian Federation**: In early August, large areas in the Russian Federation, including areas near nuclear power plants and nuclear facilities in Sarov and Snezhinsk were affected by wildfires. This raised concerns regarding the safety of nuclear materials in those facilities and also in the areas contaminated as a consequence of the 1986 Chernobyl accident. The Incident and Emergency Centre was in contact with the official Russian contact point, the Situation and Crisis Centre of ROSATOM. On two occasions, the IEC requested and promptly received information. The information was translated and made available to all contact points by email. In addition, the competent authority of France (ASN) and a technical support organization in Germany (BFS) posted fact sheets on the consequences of fires in contaminated areas, on their respective web sites. Once official information was available, the number of requests both from competent authorities and from the media decreased significantly and no further IEC action was necessary.

G. Safety Networks

227. Sharing Agency nuclear safety information, lessons learned, and subject matter expertise to aid in building capacity in Member States and informing the public at large continues to be a challenge. However, in 2010, the Agency made significant strides in addressing this capacity building and information sharing challenge through fostering development of various nuclear safety and security knowledge networks.

G.1. Asian Nuclear Safety Network (ANSN)

228. From the beginning of 2010, the new ANSN project management team began full operation of managing the ANSN programme activities.

229. In March 2010, the first meeting of the ANSN Capacity Building Coordination Group (CBCG) took place in Tokyo, Japan. At this meeting, the CBCG reviewed and discussed the first draft of the ‘Generic Action Plan for establishing the Regional Capacity Building System in Asia’ and agreed to submit the draft to the 3rd meeting of ANSN-Nuclear Safety Strategy Dialogue (NSSD) in April 2010. In addition, the CBCG discussed development and implementation of a generic action plan for achieving the ‘Vision for the ANSN by the year 2020’ (Vision 2020).

230. The 3rd meeting of the Nuclear Safety Strategy Dialogue (NSSD) was held in April 2010, in Yogyakarta, Indonesia. This meeting was attended by 32 participants from 10 ANSN countries, as well as the Association of South East Asian Nations (ASEAN) and the Arab Network of Nuclear Regulators (ANNuR) as observers. The NSSD participants confirmed the necessity of expanding their

national education and training centres to national capacity building centres, implementing plans to establish a network of these centres, eventually building a regional capacity building system in Asia.

231. In May 2010, the second meeting of CBCG and the 11th meeting of Steering Committee (SC) took place in Vienna. Following the results of the 3rd meeting of NSSD, the CBCG developed guidance for ANSN Member States to prepare their own national action plans and also identified the need of developing action plans for topical groups to further establish the regional capacity building system in a collaborative and coordinated manner.

232. The SC supported the proposals from the CBCG to develop action plans for capacity building by ANSN Member States as well as the topical group action plans. The SC strongly encouraged the Agency to further develop capacity building IT Modules in cooperation with the IT support group. The SC also agreed to redesign the Country Knowledge Base on the ANSN web site to enhance mutual learning and knowledge sharing under the responsibility of ANSN Member States.

233. During the 54th session of the IAEA General Conference in September 2010, a round table discussion on Nuclear Safety Knowledge Networking took place; 50 attendees from 20 countries participate. The meeting focused on: (1) sharing experience and good practices in developing the future of global and regional knowledge networks; (2) enhancing collaboration and coordination among global and regional networks and capacity building centres; and (3) working with technical and scientific support organizations (TSO) for improving Member States' safety. The participants strongly encouraged the Global Nuclear Safety and Security Network (GNSSN) and the ANSN to further develop their IT infrastructure as well as share the importance of exploring mutually beneficial ways IT networking among GNSSN, ANSN, FORO, FNRBA, ANNuR and ETSON.

234. In October 2010, the 3rd meeting of CBCG and the 12th meeting of the SC took place in Beijing, China. The CBCG agreed there was a need to provide regional peer reviews and support arrangements for the preparation and implementation of national Action Plans for building capacity in new NPP ANSN countries. The CBCG discussed collaborations among ANSN and other Agency Member States on these international initiatives through, inter alia, the Regulatory Cooperation Forum (RCF), to optimize limited resources nationally, regionally and internationally. The SC suggested that this proposal should be compatible with relevant international standards and guides and existing Agency review services. The SC reviewed and approved the proposed ANSN work plan for 2011 with some modifications.

G.2. Ibero-American Nuclear and Radiation Safety Network (FORO)

235. The FORO now has full responsibility for operation of the network. The development of a second version of the network has been approved by the FORO; this will improve the collaborative tools for further networking.

236. Collaboration of the FORO with the Agency through its Technical Cooperation Programme has made considerable progress in 2010. In September of 2010, as a follow up to the workshop in 2009 on safety assessment in radiotherapy, a second workshop was held in Havana, Cuba. The work completed to date by 12 Member States was reviewed; this included their implementation of lessons learned from accidental exposure and the application of the Risk Matrix Method as a proactive tool for prevention.

237. The FORO has agreed to collaborate with the Agency in capacity building by hosting a workshop in Chile in 2011 on strengthening emergency preparedness and response.

G.3. International Decommissioning Network (IDN)

238. Currently, over 400 professionals in 60 countries participate in the IDN. Participants from Member States with developed decommissioning programmes find the IDN a valuable forum for comparing their approaches and identifying other decommissioning experts with similar challenges.

239. A number of activities were conducted in 2010, including workshops and training courses on decommissioning, using Agency Safety Standards as the basis. Additional improvements highlighted in training include: the use of new media and communication technologies in decommissioning training to improve distance learning; creation of a training video promoting more consistent training; and contributions to very specialized trainings in leading national and international institutions (some were offered cost-free). Other activities in 2010 included most notably:

- Determination of Neutron Induced Activity for Decommissioning Purposes, June, Budapest, Hungary (TC RER3009) WS on Dose Assessment and Dose Optimization for Decommissioning purposes, October, Mol, Belgium (TC RER 3009);
- Decommissioning Safety Assessment, October, Riso, Denmark (R2D2P);
- Release of Sites and Building Structures from Regulatory Control, September, Karlsruhe, Germany (joint R2D2P and TC RER 3009);
- Additional guidance on decommissioning safety assessment provided through the Safety Assessment Results in the Planning and Implementation of Decommissioning (FaSa) Project.

G.4. Disposal of low level radioactive waste (DISPONET)

240. DISPONET has launched a systematic training programme, supporting the development of a disposal facility for very low, low and (when appropriate) intermediate level radioactive waste. The training courses have been or will be organized for the regions of: Asia, Latin America, Africa, and Europe. The initial set of courses are expected to deliver messages at general level: participants are introduced in the waste disposal bases, advised on organizing the repository development project, explained the role of design, siting procedure elements, and relevant safety aspects, and instructed on how to identify and manage stakeholders. Such courses were hosted by the Bhabha Atomic Research Centre in Mumbai, India, (February 2010 - Middle East and Asia countries) and ENRESA, Spain (March 2010 - Latin America countries).

241. DISPONET has also created a forum for sharing proven practices among advanced operators of disposal facilities. The International Workshop on Waste Acceptance Criteria for Disposal of Very Low, Low, and Intermediate Level Waste was hosted by the DBE Technology in cooperation with BfS Salzgitter in Peine, Germany between 28 and 30 September 2010 and provided for 40 experts from 23 countries a forum for sharing experience regarding inter alia establishing a waste acceptance system, discussing challenges in criteria implementation, assessing acceptance procedures for specific waste. The development of the acceptance system is an iterative process that should be carried out in parallel, and in conjunction, with the development of the facility design and safety assessment.

G.5. Global Nuclear Safety and Security Network (GNSSN)

242. The Global Nuclear Safety and Security Network (GNSSN) represent a set of existing knowledge networks and information resources. Significant improvement of this network has been made in 2010.

243. During the 54th session of the IAEA General Conference in September, the new GNNSN public site platform was launched. It uses advanced IT software and SharePoint, merging several technical subject areas into one common platform.

244. A technical meeting on further development of GNSSN and RegNet was held in Vienna from 6 to 10 December 2010. The main purpose of the meeting was to present the current status for the development of GNSSN/RegNet; to demonstrate the inherent potential in the integration of multinational networks; to exchange and share information on good practices in the field of knowledge networking and finally to discuss and agree on further development of GNSSN/RegNet based on the current pilot of GNSSN/RegNet and existing networks.

G.6. International Regulatory Knowledge Network (RegNet)

245. In 2010, the International Regulatory Network (RegNet), a key element of GNSSN, was further developed by the Agency with the aim to establish and maintain common interfaces for direct access to respective information of Member States or International Organizations through links to their web sites. RegNet can also serve as a platform for direct collaboration between interested partners.

246. Future development will include systematic access to existing regional and thematic networks. Special attention will be given to information sharing on IRRS (Integrated Regulatory Review Service) missions, Generic Safety Issues (GSI) and Country Contribution Sites (CSS) including the Country Nuclear Regulatory Profiles (CNRP).

247. The regional Conference on 21st Century Capacity Building and Virtual TSOs in Asia was held in October in Tokyo, Japan. 60 participants from 20 countries, particularly from those countries participating in nuclear safety regional networks including the ANSN, FNRBA, ANNuR and ETSON attended this conference. The purpose of this regional conference was to strengthen and expand the nuclear safety knowledge networks (both human and virtual), to enhance effective nuclear safety and security capacity building and infrastructure development.

G.7. Regulatory Cooperation Forum (RCF)

248. A major outcome of the 2009 Conference on “Effective Nuclear Regulatory Systems” in Cape Town, South Africa, State regulatory body authorities agreed to establish a forum to facilitate coordination and collaboration on nuclear safety regulatory issues between States developing new nuclear power programmes and States with mature nuclear power programmes.

249. The Regulatory Cooperation Forum (RCF), established in June 2010, provides services and activities as an integral part of the Agency’s primary capacity building systems. It also provides support for State education and training programmes and the TSO expert community. It comprises a core group of 15 members with the European Commission and the Nuclear Energy Agency participating as observers. At its first plenary meeting during the 54th session of the General Conference, which was attended by 80 participants representing 40 States, the benefits of the RCF were discussed by both recipient and provider members. In addition, the results of the first phase of an RCF test case mission to the Jordan Nuclear Regulatory Commission (JNRC) were presented. It was agreed to continue the JNRC test case and to have providers fill the regulatory gaps identified during the first phase. The core group will meet in April 2011 to review the results of the JNRC test case. Another RCF plenary meeting is planned to be held during the 55th session of the IAEA General Conference.

G.8. International Safety Assessment Center (INSAC)

250. In 2009, the Agency established the International Nuclear Safety Assessment Centre (INSAC), formed to support Member States with established nuclear programmes as well as those considering starting new nuclear power programmes, with the overall objective of facilitating capacity building based upon the Agency safety standards. For example, using safety standards through validation of technical bases along with tools used for the technical evaluation of safety cases.

251. Through advisory and review services, networking and effective knowledge and information sharing, the INSAC can assist embarking Member States early in the NPP selection process to understand and determine the impacts of various technologies in accordance with the regulations that impact each design. By applying a flexible, graded approach, INSAC can facilitate Member States in any phase of the NPP process.

252. Within the Agency, INSAC services and activities are part of the Agency primary capacity building systems by coordinating and collaborating with Member State education and training programmes, technical and scientific support organizations (TSOs) and the expert community to efficiently and effectively strengthen States' capacity building efforts.

253. The development, in cooperation with G-SAN, of an advisory service for competency building in safety assessment and a methodology for the application of Integrated Risk Informed Decision Making Process are examples of recent achievements. Work continues in the development of methodologies for Safety Performance Indicators and Safety Goals and their Applications

G.9. Global Safety Assessments Network (G-SAN)

254. In 2010, a Global Nuclear Safety Assessment Network (G-SAN) was set up to facilitate focused collaboration on safety assessment capacity building in support of strengthening global nuclear safety; especially in the expanding and developing nuclear programmes worldwide, including: a) support to Member States in safety assessment knowledge management and capacity building based on Agency Safety Standards; and b) fostering safety assessment knowledge and experience exchange among Member States and cooperation on safety assessment issues important for nuclear power programmes.

255. The G-SAN web-based system provides organized access to technical references through links to appropriate websites, to databases or directly to materials stored on GSAN servers. From this, an expert forum is facilitated for discussion on important technical topics, focusing on questions faced by countries developing safety infrastructure and competency. The discussions on topics addressed are answered by leading experts in the field.

256. G-SAN organizes safety assessment projects with the goal of furthering safety assessment knowledge. Through active participation in the projects Member States have the opportunity to engage their technical staff in collaboration on global issues important to safety assessment methods and applications.

257. G-SAN also addresses the education and training needs in the area of safety assessments. Periodic training courses are provided as well as courses and workshops, based on specific needs that can be conducted over the internet to increase the audience and provide wider access to tools such as analytical training simulators.

G.10. Underground Research Facilities Network (URF)

258. Advanced Conceptual and Numerical Methods for Modelling Subsurface Processes training was provided by Sandia National Laboratories and US DOE (Albuquerque, USA, 18–25 June 2010); it

included a site visit to the WIPP (Waste Isolation Pilot Plant) disposal facility. The Agency in cooperation with Japan Atomic Energy Agency (JAEA), and with support from ITC School of Underground Waste Storage and Disposal, Switzerland, prepared a course on Fundamentals of Geological Disposal (Horonobe and Tokai, Japan, 8–17 September 2010). Strengthening National Competencies in the Area of Stakeholder Dialogue for Radioactive Waste Disposal was subject of the workshop held in Las Vegas, USA (6–10 December 2010) and organized by Sandia National Laboratories. It was designed to enhance the human resource capabilities of Member States and their capacity to manage repository development programmes by understanding stakeholder concerns. The Annual General Meeting of the Network was held in Vienna from 2 to 4 March 2010.

G.11. Network on Environmental Management Remediation (ENVIRONET)

259. The Agency has launched the ENVIRONET (Network on Environmental Management and Remediation) in 2009. It is an information network dealing with legacy sites (existing contaminated sites) as well as life-cycle approaches for minimizing the need for future remediation measures due to the operations of nuclear facilities and naturally occurring radioactive materials (NORM) industries. Topics to be covered by the ENVIRONET include: life-cycle planning of both facility operations and environmental remediation; project planning (quality control and assurance); data management, integration and communication; site characterization; modelling, risk assessment; remediation technology development and selection; monitoring; stakeholder involvement and communication; regulation and policy development; risk communication; stewardship, institutional control and funding.

G.12. Nuclear Waste Characterization Network (LABONET)

260. In 2010, to improve and further facilitate waste characterization competencies and capacities in Member States the network of laboratories, connecting specialists involved in nuclear waste characterization activities (LABONET) was established. The main objective of LABONET is to coordinate support to organizations or Member States with less advanced programmes on characterization of low and intermediate level waste, by making available the relevant skills, knowledge, managerial approaches and expertise from Member States with mature operating characterization laboratories.

Appendix 2
The Agency's Safety Standards: Activities during 2010

A. Introduction

261. Article III.A.6 of the IAEA Statute authorizes the Agency "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 operation 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." The categories in the Safety Standards Series are Safety Fundamentals, Safety Requirements and Safety Guides.

262. One of the main achievements during 2010 was the completion of the first version of the document on Strategies and Processes for the Establishment of the IAEA Safety Standards (SPESS). It implements the roadmap on the long term structure of safety standards that provides for an improved structure and format for the Safety Requirements and a reference set for the collection of Safety Guides. It also includes all policy and strategy papers established by the Secretariat and approved by the Commission on Safety Standards (CSS). The SPESS document [6] describes the strategies, the processes and the associated responsibilities for the planning, development, review and revision, approval and establishment of the IAEA safety standards. The intent is to document and strengthen the process that started with the establishment of the CSS and the Safety Standards Committees (SSCs) in 1996, in order to achieve by the end of 2015 and to maintain beyond this time (1) a genuine integration of all areas in the Safety Standards Series, using a top-down approach based on the unified Safety Fundamentals; (2) a rationalization of the Series with a reasonable and manageable number of Safety Guides; (3) a significant improvement in 'user-friendliness'; and (4) a rigorous and efficient process for the establishment of additional standards and revision of existing ones.

263. Another main achievement was the review and revision by the SSCs and the CSS of the Terms of Reference of the four SSCs for their sixth term from 2011 to 2013. The revised Terms of Reference include a programmatic function to advise the Nuclear Safety Department on the programme for the development, review and revision of standards and on the programme for their application. More emphasis is also placed on the SSCs' role in relation to the feedback from the users of safety standards and the review of feedback reports prepared by the Secretariat.

264. In 2010, the SSCs and the CSS also discussed a proposal from the Secretariat for a more systematic feedback collection and analysis process and a proposal for an improved review and revision process for the safety standards in the future.

---

[6] http://www-ns.iaea.org/downloads/standards/spess.pdf

265. A joint task force of the Advisory Group on Nuclear Security (AdSec) and the CSS was established in 2009, co-chaired by the Chairman of AdSec and the Chairman of the CSS, with terms of reference, including short and long term objectives. For the short term, the task force will follow the implementation of the measures to strengthen, and ensure the transparency of the process for the review and approval of Nuclear Security Series publications and will propose steps to establish in a progressive manner the necessary interface between draft nuclear safety and draft nuclear security related publications, including their cross-verification, to ensure their completeness and consistency. For the long term, the task force will study the feasibility of the establishment of a Nuclear Safety and Security Standards Series that would cover both nuclear safety and nuclear security.

266. The joint task force met in March and September 2010. At the March meeting, the task force concluded that there were no impediments to establishing nuclear safety and security standards, including one set of standards that would cover both nuclear safety and nuclear security in a thematic and application specific manner. The task force launched two preliminary tasks, namely (1) an analysis of the various thematic and operational areas of the nuclear security and nuclear safety domains, in order to determine the areas in which each may be unique or where they may overlap. In the areas where the safety and security domains overlap, the areas should be carefully examined in order to determine where associating the domains might be feasible; and (2) a mapping exercise to determine how to put together the current structure of general and specific safety standards, and the current structure of nuclear security recommendations. At the September meeting, the joint task force established a list of 12 criteria to be used to assess the feasibility of the different possible options for the future of the Nuclear Security Series and the Safety Standards Series. The joint task force also discussed the status and challenges for the establishment of a Nuclear Security Guidance Committee (NSGC).

267. In 2010, the Board of Governors established as Agency safety standards one additional General Safety Requirements in the new structure of safety requirements, Governmental, Legal and Regulatory Framework for Safety (GSR Part 1) and two Specific Safety Requirements, Disposal of Radioactive Waste (SSR-5) and Safety of Nuclear Power Plants: Commissioning and Operation (SSR-2.2).

268. The draft revisions of the International Basic Safety Standards Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources and of the Safety Requirements NS-R-1: Safety of Nuclear Power Plants: Design were approved by the Safety Standards Committees in 2010 for submission to the Commission on Safety Standards in 2011.

269. Regarding the processes associated with the safety standards programme, several significant improvements were observed. In particular, these improvements led to increased levels of openness, transparency and quality of the safety standard review process; greater involvement of the users and interested parties, including collaborators in industry (by participating in drafting meetings and by providing input for Member States' review of standards, and by providing feedback on their use); and greater interaction between the Member States, the SSCs and the CSS. In 2010, this was further complemented by an increased involvement of the Chairpersons of the SSCs and the CSS in the discussion of strategies and policies for the future development of the safety standards series and by increased reporting on the results of the review by the Secretariat's technical editors of the draft standards prior to their final approval by the SSCs and the CSS. These improvements were facilitated by the use of information technologies and, in particular, the safety standards related web pages [7], which were also modernized in 2010.

[7] http://www-ns.iaea.org/standards/

270. Since the establishment of the CSS and the SSCs in 1996, 110 standards have been established (one Safety Fundamentals, 14 Safety Requirements and 95 Safety Guides); of these, 106 have been published. Forty-three further standards (three Safety Requirements publications and 40 Safety Guides) are being drafted or revised. A list of published Agency Safety Standards, indicating their status as of 31 December 2010, is attached as Annex I, and an up-to-date status report can be found on the Agency's website [8]. The full texts of published Agency Safety Standards are also available on the website through this status report.

B. Commission on Safety Standards (CSS)

271. The CSS, chaired by Mr Andre-Claude Lacoste, Chair of the French Nuclear Safety Authority, met twice in 2010, in March and in September/October and endorsed the submission of two Safety Requirements to the Board of Governors for approval: Disposal of Radioactive Waste (DS354) and Safety of Nuclear Power Plants: Commissioning and Operation (DS413). The CSS also endorsed eight Safety Guides: Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency (DS44), Geological Disposal of Radioactive Waste (DS334), Storage of Spent Fuel (DS371), Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report (DS396), National Strategy for Regaining Control over Orphan Sources and Improving Control over Vulnerable Sources (DS410), Orphan Sources and other Radioactive Material in the Metal Recycling and Production Industries (DS411), Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations (DS417) and Establishing the Safety Infrastructure for a Nuclear Power Programme (DS424).

272. The CSS also approved in 2010 twelve Document Preparation Profiles (DPPs) for Safety Guides on Advisory Material for the forthcoming edition of Regulations for the Safe Transport of Radioactive Material (DS425), Radiation Protection of the Public and the Environment (DS432), Site Survey and Site Selection for Nuclear Installations (DS433), Radiation Safety of Radioisotope Production Facilities (DS434), Instrumentation and Control and Software Important to Safety for Research Reactors (DS436), the forthcoming edition of the Regulations for the Safe Transport of Radioactive Material (DS437), Addendum to NS-R-5, Appendix IV "Reprocessing Facilities" and Appendix V "Fuel Cycle Research and Development Facilities" (DS439), Design of Auxiliary and Supporting Systems in Nuclear Power Plants (DS440), Regulatory Control of Radioactive Releases to the Environment from Facilities and Activities (DS442), Commissioning for Nuclear Power Plants (DS446), Predisposal Management of Radioactive Waste from Fuel Cycle Facilities (DS447) and Predisposal Management of Radioactive Waste from Reactors (DS448).

C. Nuclear Safety Standards Committee (NUSSC)

273. NUSSC, chaired by Mr Geoff Vaughan of the Nuclear Installations Inspectorate of the United Kingdom, met in June/July and in November of 2010. The first meeting of 2010 included a joint session with WASSC to discuss issues of common interest.

[8] http://www-ns.iaea.org/downloads/standards/status.pdf

274. At its meetings, NUSSC approved ten draft Agency safety standards for submission to CSS: two Safety Requirements – the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (DS379, revision of the BSS) and Safety of Nuclear Power Plants: Design (DS414, revision of NS-R-1) and eight Safety Guides – Establishing the Safety Infrastructure for a Nuclear Power Programme (DS424); Volcanic Hazards in Site Evaluation for Nuclear Installations (DS405); Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations (DS417); The Safety Case and Safety Assessment for Predisposal Management of Radioactive Waste (DS284); Safety Classification of Systems, Structures and Components in Nuclear Power Plants (DS367); Safety Assessment for Research Reactors and Preparation of the Safety Analysis Report (DS396); The Use of a Graded Approach in the Application of the Safety Requirements for Research Reactors (DS351); and Periodic Safety Review for Nuclear Power Plants (DS426).

275. NUSSC also approved three draft Agency safety standards for submission to Member States for comment, namely the forthcoming edition of the Safety Requirements – Regulations for the Safe Transport of Radioactive Material (revision of TS-R-1, DS437); a Safety Guide on Criticality Safety for Facilities and Activities Handling with Fissionable Material (DS407) and a Safety Guide on Safety in the Use and Modification of Research Reactors (DS397). In 2010, NUSSC also approved DPPs for 10 new or revised safety standards.

276. NUSSC reviewed the new Terms of Reference of the SSCs and prepared the 5th Three Year Report on NUSSC's activities in the period 2008–2010.

D. Radiation Safety Standards Committee (RASSC)

277. RASSC, chaired by Mr Sigurdur Magnusson of the Icelandic Radiation Protection Institute, met in June and November/December in 2010. One of RASSC's main tasks in 2010 was overseeing the on-going revision of the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (BSS). Following approval of the BSS by both NUSSC and TRANSSC at their meetings in November/December 2010, the joint RASSC/WASSC meeting held on 6-10 December 2010 spent two days discussing additional changes to the draft text. At the end of the meeting, there was a high degree of consensus that all of the technical issues had been adequately resolved and approval was given for the revised BSS to be submitted to the CSS for endorsement.

278. RASSC also approved six further draft safety standards for submission to CSS: the draft Safety Requirements on Safety of Nuclear Power Plants: Design (DS414, revision of NS-R-1) and five draft Safety Guides – Establishing the Safety Infrastructure for a Nuclear Power Programme (DS424); Safety Case and Safety Assessment for Predisposal Management of Radioactive Waste (DS284); National Strategy for Regaining Control over Orphan Sources and Improving Control over Vulnerable Sources (DS410), Orphan Sources and Other Radioactive Material in the Metal Recycling and Production Industries (DS411), Periodic Safety Review for Nuclear Power Plants (DS426).

279. RASSC approved for submission to Member States for comment one draft Safety Requirements, namely the forthcoming edition of the Regulations for the Safe Transport of Radioactive Material (DS437, revision of TS-R-1) and three draft Safety Guides: Criticality Safety for Facilities and Activities Handling Fissionable Material (DS407), Monitoring and Surveillance of Radioactive Waste Disposal Facilities (DS357), and External Expert Support on Safety Issues (DS429). Furthermore, RASSC approved several DPPs for new or revised safety standards.

280. RASSC continues to advise the Agency on emerging and topical issues in radiation protection. One such issue relates to the use of ionizing radiation to prevent malicious acts and terrorism, an example of which is security screening at airports. The current BSS states that such uses of ionizing radiation are deemed to be not justified. RASSC has recognized that a decision on the justification of such exposures is a matter for national governments, who have to take into account issues other than radiation protection in reaching a decision. This will be reflected in the revised BSS.

E. Transport Safety Standards Committee (TRANSSC)

281. TRANSSC, chaired by Mr E. William Brach of the US Nuclear Regulatory Commission, met in June and November/December in 2010, bringing to an end another three-year cycle of the Committee. In 2010 the full suite of transport standards was published for the first time since 1996. The work of TRANSSC now concentrates on reviewing the standards and ensuring they remain up to date, rather than developing new standards.

282. In 2010 TRANSSC approved the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Sources (DS379, revision of the BSS) and Safety of Nuclear Power Plants: Design (DS414, revision of NS-R-1) for submission to the CSS, together with a Safety Guide on Establishing the Safety Infrastructure for a Nuclear Power Programme (DS424).

283. TRANSSC approved to be sent for 120 day Member State comment the Regulations for the forthcoming edition of the Safe Transport of Radioactive Material (DS437, revision of TS-R-1) and three Safety Guides: Criticality Safety for Facilities and Activities Handling with Fissionable Material (DS407), the Advisory Material for the Agency Regulations for the Safe Transport of Radioactive Material (DS425); and External Expert Support on Safety Issues (DS429) The DPP for DS450 Safety Requirements on Decommissioning and Termination of Activities) was approved. Both the DPP for DS451 (addendum to TS-G-1.6) and the draft addendum itself were approved, the draft addendum being approved to send to Member States for 120 day comment.

284. TRANSSC also offered advice on the near term and longer term programme of work for the Agency, and in particular in relation to the safety standards work. A major area of work identified was ensuring harmonization with the provisions of the UN Model Regulations, in particular the common requirements that apply to all dangerous goods. A two year programme of work for 2011 to 2013 was approved.

F. Waste Safety Standards Committee (WASSC)

285. WASSC, chaired by Mr Thiagan Pather of the National Nuclear Regulator of South Africa, met twice in 2010, in June/July and December. The June/July meeting included joint sessions with NUSSC and in the meeting of December there were joint sessions with RASSC to discuss issues of common interest.

286. In 2010, WASSC approved for submission to the CSS two draft Safety Requirements publications: Protection against Ionizing Radiation and for the Safety of Radiation Sources (DS379, revision of the BSS), and Safety of Nuclear Power Plants: Design (DS414, revision of NS-R-1). WASSC also approved for submission to the CSS eight draft Safety Guides: The Safety Case and

Safety Assessment for Predisposal Management of Radioactive Waste (DS284), The Safety Case and Safety Assessment for Disposal of Radioactive Waste (DS355, revision of WS-G-1.1), Volcanic Hazards in Site Evaluation for Nuclear Installations (DS405), National Strategy for Regaining Control over Orphan Sources and Improving Control over Vulnerable Sources (DS410), Orphan Sources and Other Radioactive Material in the Metal Recycling and Production Industries (DS411), Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations (DS417), Establishing a Safety Infrastructure for a National Nuclear Power Programme (DS424) and Periodic Safety Review of Nuclear Power Plants (DS426).

287. In addition, WASSC approved for submission to Member States for comment the draft Safety Requirement Regulations for the forthcoming edition of the Safe Transport of Radioactive Material (DS437, revision of TS-R-1). WASSC also approved for submission to Member States for comment three draft Safety Guides: Criticality Safety for Facilities and Activities Handling Fissionable Material (DS407), Monitoring and Surveillance of Radioactive Waste Disposal Facilities (DS357), and External Expert Support on Safety Issues (DS429). WASSC also approved seven DPPs in 2010 and provided feedback and comments on several Safety Guides under development.

288. Additionally WASSC provided advice to the International Expert Group on Nuclear Liability (INLEX) on German proposals for the exclusion of small training and research reactors and nuclear installations being decommissioned from the Liability Conventions.

Annex I
The published Agency Safety Standards as of 31 December 2010

A. Safety Fundamentals

SF-1	Fundamental Safety Principles (2006) **Co-sponsorship:** Euratom, FAO, ILO, IMO, OECD/NEA, PAHO, UNEP, WHO

B. General Safety Standards (applicable to all facilities and activities)

GSR Part 1	Governmental, Legal and Regulatory Framework for Safety (2010)
GS-R-2	Preparedness and Response for a Nuclear or Radiological Emergency (2002) **Co-sponsorship**: FAO, OCHA, OECD/NEA, ILO, PAHO, WHO
GS-R-3	The Management System for Facilities and Activities (2006)
GSR Part 4	Safety Assessment for Facilities and Activities (2009)
GSR Part 5	Predisposal Management of Radioactive Waste (2009)
WS-R-3	Remediation of Areas Contaminated by Past Activities and Accidents (2003) (under revision)
WS-R-5	Decommissioning of Facilities Using Radioactive Material (2006)
115	International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (1996) **Co-sponsorship**: FAO, ILO, OECD/NEA, PAHO, WHO (under revision)
GS-G-2.1	Arrangements for Preparedness for a Nuclear or Radiological Emergency (2007) **Co-sponsorship**: FAO, OCHA, ILO, PAHO, WHO
GS-G-3.1	Application of the Management System for Facilities and Activities (2006)
GS-G-3.2	The Management System for Technical Services in Radiation Safety (2008)
GS-G-3.3	The Management System for the Processing, Handling and Storage of Radioactive Waste (2008)
GSG-1	Classification of Radioactive Waste (2010)
RS-G-1.1	Occupational Radiation Protection (1999) **Co-sponsorship**: ILO
RS-G-1.2	Assessment of Occupational Exposure Due to Intakes of Radionuclides (1999) **Co-sponsorship**: ILO
RS-G-1.3	Assessment of Occupational Exposure Due to External Sources of Radiation (1999) **Co-sponsorship**: ILO
RS-G-1.4	Building Competence in Radiation Protection and the Safe Use of Radiation Sources (2001) **Co-sponsorship**: ILO, PAHO, WHO
RS-G-1.7	Application of the Concepts of Exclusion, Exemption and Clearance (2004)
RS-G-1.8	Environmental and Source Monitoring for Purposes of Radiation Protection (2005)
RS-G-1.9	Categorization of Radioactive Sources (2005)
WS-G-2.3	Regulatory Control of Radioactive Discharges to the Environment (2000) (under revision)
WS-G-2.5	Predisposal Management of Low and Intermediate Level Radioactive Waste (2003) (under revision)

WS-G-2.6	Predisposal Management of High Level Radioactive Waste (2003) (under revision)
WS-G-3.1	Remediation Process for Areas Affected by Past Activities and Accidents (2007)
WS-G-5.1	Release of Sites from Regulatory Control on Termination of Practices (2006)
WS-G-5.2	Safety Assessment for the decommissioning of Facilities Using Radioactive Material (2008)
WS-G-6.1	Storage of Radioactive Waste (2006)
109	Intervention Criteria in a Nuclear or Radiation Emergency (1994) (under revision)

C. Specific Safety Standards (applicable to specified facilities and activities)

C.1 Nuclear Power Plants

NS-R-1	Safety of Nuclear Power Plants: Design (2000) (under revision)
NS-R-2	Safety of Nuclear Power Plants: Operation (2000) (under revision)
NS-R-3	Site Evaluation for Nuclear Installations (2003)
GS-G-1.1	Organization and Staffing of the Regulatory Body for Nuclear Facilities (2002)
GS-G-1.2	Review and Assessment of Nuclear Facilities by the Regulatory Body (2002)
GS-G-1.3	Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body (2002)
GS-G-1.4	Documentation for Use in Regulating Nuclear Facilities (2002)
GS-G-3.5	The Management System for Nuclear Installations (2009)
SSG-12	Licensing Process for Nuclear Installations (2010)
GS-G-4.1	Format and Content of the Safety Analysis report for Nuclear Power Plants (2004)
NS-G-1.1	Software for Computer Based Systems Important to Safety in Nuclear Power Plants (2000) (under revision)
NS-G-1.3	Instrumentation and Control Systems Important to Safety in Nuclear Power Plants (2002) (under revision)
NS-G-1.4	Design of Fuel Handling and Storage Systems for Nuclear Power Plants (2003)
NS-G-1.5	External Events Excluding Earthquakes in the Design of Nuclear Power Plants (2004)
NS-G-1.6	Seismic Design and Qualification for Nuclear Power Plants (2003)
NS-G-1.7	Protection against Internal Fires and Explosions in the Design of Nuclear Power Plants (2004)
NS-G-1.8	Design of Emergency Power Systems for Nuclear Power Plants (2004) (under revision)
NS-G-1.9	Design of the Reactor Coolant System and Associated Systems in Nuclear Power Plants (2004)
NS-G-1.10	Design of Reactor Containment Systems for Nuclear Power Plants (2004)
NS-G-1.11	Protection against Internal Hazards other than Fires and Explosions in the Design of Nuclear Power Plants (2004)
NS-G-1.12	Design of the Reactor Core for Nuclear Power Plants (2005)
NS-G-1.13	Radiation Protection Aspects of Design for Nuclear Power Plants (2005)

NS-G-2.1	Fire Safety in the Operation of Nuclear Power Plants (2000)
NS-G-2.2	Operational limits and Conditions and Operating Procedures for Nuclear Power Plants (2000)
NS-G-2.3	Modifications to Nuclear Power Plants (2001)
NS-G-2.4	The Operating Organization for Nuclear Power Plants (2002)
NS-G-2.5	Core Management and Fuel Handling for Nuclear Power Plants (2002)
NS-G-2.6	Maintenance, Surveillance and In-Service Inspection in Nuclear Power Plants (2002)
NS-G-2.7	Radiation Protection and Radioactive Waste Management in the Operation of Nuclear Power Plants (2002)
NS-G-2.8	Recruitment, Qualification and Training of Personnel for Nuclear Power Plants (2003)
NS-G-2.9	Commissioning for Nuclear Power Plants (2003) (under revision)
NS-G-2.10	Periodic Safety Review of Nuclear Power Plants (2003) (under revision)
NS-G-2.11	A System for the Feedback of Experience from Events in Nuclear Installations (2006)
NS-G-2.12	Ageing Management for Nuclear Power Plants (2009)
NS-G-2.13	Evaluation of Seismic Safety for Existing Nuclear Installations (2009)
NS-G-2.14	Conduct of Operations at Nuclear Power Plants (2008)
NS-G-2.15	Severe Accident Management Programmes for Nuclear Power Plants (2009)
NS-G-3.1	External Human Induced Events in Site Evaluation for Nuclear Power Plants (2002)
NS-G-3.2	Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for Nuclear Power Plants (2002) (under revision)
SSG-9	Seismic Hazards in Site Evaluation for Nuclear Installations (2010)
NS-G-3.4	Meteorological Events in Site Evaluation for Nuclear Power Plants (2003) (under revision)
NS-G-3.5	Flood hazard for Nuclear Power Plants on Coastal and River Sites (2004) (under revision)
NS-G-3.6	Geotechnical Aspects of Site Evaluation and Foundations for Nuclear Power Plants (2005)
SSG-2	Deterministic Safety Analysis for Nuclear Power Plants (2009)
SSG-3	Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants (2010)
SSG-4	Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants (2010)
WS-G-2.1	Decommissioning of Nuclear Power Plants and Research Reactors (1999) (under revision)
79	Design of Radioactive Waste Management Systems at Nuclear Power Plants (1986) (under revision)

C.2. Research Reactors

NS-R-3	Site Evaluation for Nuclear Installations (2003)
NS-R-4	Safety of Research Reactors (2005)
SSG-9	Seismic Hazards in Site Evaluation for Nuclear Installations (2010)
GS-G-1.1	Organization and Staffing of the Regulatory Body for Nuclear Facilities (2002)
GS-G-1.2	Review and Assessment of Nuclear Facilities by the Regulatory Body (2002)
GS-G-1.3	Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body (2002)
GS-G-1.4	Documentation for Use in Regulating Nuclear Facilities (2002)
GS-G-3.5	The Management System for Nuclear Installations (2009)
SSG-12	Licensing Process for Nuclear Installations (2010)
NS-G-2.11	A System for the Feedback of Experience from Events in Nuclear Installations (2006)
NS-G-2.13	Evaluation of Seismic Safety for Existing Nuclear Installations (2009)
NS-G-4.1	Commissioning of Research Reactors (2006)
NS-G-4.2	Maintenance, Periodic Testing and Inspection of Research Reactors (2006)
NS-G-4.3	Core Management and Fuel Handling for Research Reactors (2008)
NS-G-4.4	Operational Limits and Conditions and Operating Procedures for Research Reactors (2008)
NS-G-4.5	The Operating Organization and the Recruitment, Training and Qualification of Personnel for Research Reactors (2008)
NS-G-4.6	Radiation Protection and Radioactive Waste Management in the Design and Operation of Research Reactors (2008)
WS-G-2.1	Decommissioning of Nuclear Power Plants and Research Reactors (1999) (under revision)
SSG-10	Ageing Management for Research Reactors (2010)
35-G1	Safety Assessment of Research Reactors and Preparation of the Safety Analysis Report (1994) (under revision)
35-G2	Safety in the Utilization and Modification of Research Reactors (1994) (under revision)

C.3. Fuel Cycle Facilities

NS-R-3	Site Evaluation for Nuclear Installations (2003)
NS-R-5	Safety of Nuclear Fuel Cycle Facilities (2008) (under revision)
SSG-9	Seismic Hazards in Site Evaluation for Nuclear Installations (2010)
GS-G-1.1	Organization and Staffing of the Regulatory Body for Nuclear Facilities (2002)
GS-G-1.2	Review and Assessment of Nuclear Facilities by the Regulatory Body (2002)
GS-G-1.3	Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body (2002)
GS-G-1.4	Documentation for Use in Regulating Nuclear Facilities (2002)
GS-G-3.5	The Management System for Nuclear Installations (2009)

SSG-12	Licensing Process for Nuclear Installations (2010)
NS-G-2.11	A System for the Feedback of Experience from Events in Nuclear Installations (2006)
NS-G-2.13	Evaluation of Seismic Safety for Existing Nuclear Installations (2009)
SSG-5	Safety of Conversion Facilities and Uranium Enrichment Facilities (2010)
SSG-6	Safety of Uranium Fuel Fabrication Facilities (2010)
SSG-7	Safety of Uranium and Plutonium Mixed Oxide Fuel Fabrication Facilities (2010)
WS-G-2.4	Decommissioning of Nuclear Fuel Cycle Facilities (2001) (under revision)
116	Design of Spent Fuel Storage Facilities (1995) (under revision)
117	Operation of Spent Fuel Storage Facilities (1995) (under revision)

C.4. Radioactive Waste Disposal Facilities

WS-R-1	Near Surface Disposal of Radioactive Waste (1999) (under revision)
WS-R-4	Geological Disposal of Radioactive Waste (2006) (under revision)
GS-G-1.1	Organization and Staffing of the Regulatory Body for Nuclear Facilities (2002)
GS-G-1.2	Review and Assessment of Nuclear Facilities by the Regulatory Body (2002)
GS-G-1.3	Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body (2002)
GS-G-1.4	Documentation for Use in Regulating Nuclear Facilities (2002)
GS-G-3.4	The Management System for the Disposal of Radioactive Waste (2008)
SSG-1	Borehole Disposal Facilities for Radioactive Waste (2009)
WS-G-1.1	Safety Assessment for Near Surface Disposal of Radioactive Waste (1999) (under revision)
111-G-3.1	Siting of Near Surface Disposal Facilities (1994) (under revision)
111-G-4.1	Siting of Geological Disposal Facilities (1994) (under revision)

C.5. Mining and Milling

RS-G-1.6	Occupational Radiation Protection in the Mining and Processing of Raw Materials (2004)
WS-G-1.2	Management of Radioactive Waste from the Mining and Milling of Ores (2002) (under revision)

C.6. Applications of Radiation Sources

115	International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (1996) **Co-sponsorship:** FAO, ILO, OECD/NEA, PAHO, WHO (under revision)
GS-G-1.5	Regulatory Control of Radiation Sources (2004) **Co-sponsorship:** FAO, ILO, PAHO, WHO
RS-G-1.4	Building Competence in Radiation Protection and the Safe Use of Radiation Sources (2001) **Co-sponsorship:** ILO, PAHO, WHO

RS-G-1.5	Radiological Protection for Medical Exposure to Ionizing Radiation (2002) **Co-sponsorship:** PAHO, WHO (under revision)
RS-G-1.9	Categorization of Radioactive Sources (2005)
RS-G-1.10	Safety of Radiation Generators and Sealed Radioactive Sources (2006) **Co-sponsorship**: ILO, PAHO, WHO
WS-G-2.2	Decommissioning of Medical, Industrial and Research Facilities (1999) (under revision)
WS-G-2.7	Management of Waste from the Use of Radioactive Materials in Medicine, Industry, Agriculture, Research and Education (2005)
SSG-8	Radiation Safety of Gamma, Electron and X Ray Irradiation Facilities (2010)

C.7. Transport of Radioactive Material

TS-R-1	Regulations for the Safe Transport of Radioactive Material 2009 Edition (2009) (under revision)
TS-G-1.1 Rev1	Advisory Material for the Agency Regulations for the Safe Transport of Radioactive Material (2008) (under revision)
TS-G-1.2	Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material (2002)
TS-G-1.3	Radiation Protection Programmes for the Transport of Radioactive Material (2007)
TS-G-1.4	The Management System for the Safety Transport of Radioactive Material (2008)
TS-G-1.5	Compliance Assurance for the Safe Transport of Radioactive Material (2009)
TS-G-1.6	Schedules of Provisions of the Agency Regulations for the Safe Transport of Radioactive Material (2005 Edition) (2010)