

2005 年核安全评论

前 言

“2005 年核安全评论”报告了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的努力。

一份简要的分析性概述由以下更详细的附件支持*：“2005 年世界范围内与安全有关的事件和活动”（附件一）、“国际原子能机构安全标准：2005 年的活动”（附件二）和“核损害民事责任：国际核责任问题专家组”（附件三）。

“2005 年核安全评论（草案）”已作为 GOV/2006/4 号文件提交理事会 2006 年 3 月会议。“2005 年核安全评论”的最终版本系根据理事会的讨论结果编写。

* 为节约起见，各附件仅以英文附后。

正文摘要

2005 年，国际原子能机构及其总干事荣获了诺贝尔和平奖。诺贝尔委员会的声明确认了原子能机构“为防止核能用于军事目的并确保以最可能安全的方式和平利用核能所作的努力。”

安全问题的全球性反映在当前已制订的有约束力的公约和无约束力的行为准则等相关国际法律文书中。在这一年，举行了《核安全公约》缔约国第三次审议会议以及根据《及早通报核事故公约》和《核事故或辐射紧急情况援助公约》确定的主管当局代表第三次会议。

2005 年，很多成员国在国家立法和监管基础结构方面作出了改进。但是，核装置的安全管理和监管监督的不充分和电离辐射的应用在很多成员国仍是一个问题。收集、分析和传播安全经验和知识是一项持续的挑战。

2005 年，全世界核电厂的运行安全实绩仍然很出色。工作人员和公众因核电厂运行而受到的辐射剂量远低于监管限值。人身伤害事故和事件在工业领域是最低的。没有发生可能对环境产生不利影响的辐射释放事故。世界很多地方的核电厂成功地应对了地震、海啸、洪水泛滥和飓风等严重自然灾害情况。但是，运行安全实绩几年来一直停滞不前，很多论坛对有必要防止工业界产生自满情绪表示关切。

研究堆在这一年也保持了良好的安全运行记录。但是，在很多情况下，没有可利用的资源来充分应对潜在的安全挑战。承担研究堆安全责任的营运者和监管机构都存在这种关切。

2005 年，很多燃料循环设施的营运者开始共享有关特定技术安全实践的更多信息。共享从燃料循环设施事件中汲取的经验教训仍然是一项挑战。

职业辐射防护的关键实绩指标再次表明在 2005 年有了改进。大多数成员国现已对职业受照工作人员实施了一些形式的个人和工作场所监测计划。利用辐射的医疗技术的快速发展和日益增加的应用依然是辐射防护专家在保护技术操作人员和接受治疗的患者方面面临的挑战。很多成员国以及制造商和供应商越来越积极主动地实施放射源安全方案。但是，涉及医疗和工业源安全和保安的严重事件仍在不断发生。

2005 年，放射性物质运输继续保持良好的安全记录，并开始作大量的工作来处理拒绝承运拟用于医疗诊断和治疗的放射性物质的问题。2005 年 7 月，由八个沿岸国和承运国参加的一个小组在维也纳进行了非正式讨论，并计划举行更多的会议。

在继续对保护人类免受放射性排放影响给予高度重视的同时，也日益意识到论证对非人类物种同样实施保护的必要性。

推迟实际实施适当的处置方案意味着放射性废物必须要延长贮存，而且将需要更多的贮存设施。更多的国家正在开始从整体的角度考虑所有因素和整个寿期的废物管理和处置问题。对多国方案和解决方法的兴趣也日益增加。更多的成员国现已认识到使用或生产放射性物质的所有设施都将需要实施退役。

2005 年，切尔诺贝利论坛完成了其工作，并印发了作为协商一致文件的报告。除对 1986 年切尔诺贝利事故的健康和环境后果进行评定外，该论坛还就今后的活动提出了建议。

有必要进一步协调和统一国际应急援助和通讯，以促进做出更有效和更及时的响应。这将涉及加强应急准备计划，包括使应急管理中心实现现代化和举行更广泛的应急演练。在紧急情况下向邻国和可能受影响的国家快速传递准确信息仍然是一项挑战。

不断努力改进安全是保持高水平安全的关键。鉴于已经达到了很好的实绩，未来的挑战是要保持这种势头。安全评定和国际同行评审在评定和改进各领域安全水平方面必须继续发挥重要的作用。同样重要的是，应当使更加积极和综合性的安全方案成为准则。

正在更加深入地探讨和利用安全与保安的协同作用以促进保护人类和环境的共同目标。在实施安全或保安措施之前，必须考虑这类措施的相互影响。

目 录

分析性概述.....	1
A. 导言.....	1
B. 全球核安全制度.....	1
B.1. 概述.....	1
B.2. 国家安全基础结构.....	2
B.2.1. 趋势和问题.....	2
B.2.2. 国际活动.....	3
B.2.3. 未来挑战.....	3
B.3. 国际法律文书.....	4
B.4. 国际安全标准.....	5
C. 核电厂安全.....	5
C.1. 趋势和问题.....	5
C.2. 国际活动.....	7
C.3. 未来挑战.....	7
D. 研究堆安全.....	8
D.1. 趋势和问题.....	8
D.2. 国际活动.....	9
D.3. 未来挑战.....	10
E. 燃料循环设施的安全.....	10
E.1. 趋势和问题.....	10
E.2. 国际活动.....	11
E.3. 未来挑战.....	11
F. 辐射防护.....	12
F.1. 辐射生物效应.....	12
F.2. 辐射安全方案.....	12
F.2.1. 国际放射防护委员会的建议.....	12
F.2.2. 辐射安全的监管.....	13
G. 职业辐射安全.....	13
G.1. 趋势和问题.....	13
G.2. 国际活动.....	14
G.3. 未来挑战.....	14
H. 患者的放射防护.....	15
H.1. 趋势和问题.....	15

H.2. 国际活动	16
H.3. 未来挑战	16
I. 保护公众和环境	17
I.1. 趋势和问题	17
I.2. 国际活动	17
I.3. 未来挑战	18
J. 放射源的安全和保安	18
J.1. 趋势和问题	18
J.2. 国际活动	19
J.3. 未来挑战	20
K. 放射性物质运输安全	20
K.1. 趋势和问题	20
K.2. 国际活动	21
K.3. 未来挑战	22
L. 放射性废物管理和处置安全	22
L.1. 趋势和问题	22
L.2. 国际活动	23
L.3. 未来挑战	24
M. 退役	25
M.1. 趋势和问题	25
M.2. 国际活动	25
M.3. 未来挑战	25
N. 受污染场址的恢复	25
N.1. 趋势和问题	25
N.2. 国际活动	26
N.3. 未来挑战	27
O. 事件和应急准备与响应	27
O.1. 趋势和问题	27
O.2. 国际活动	28
O.3. 未来挑战	29
Annex 1: Safety related events and activities worldwide during 2005	31
A. Introduction	31
B. International legal instruments	31
B.1. Conventions	31
B.1.1. Convention on Nuclear Safety	31

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.....	32
B.1.3.	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	33
B.1.4.	Convention on the Physical Protection of Nuclear Material	33
B.2.	Codes of Conduct	34
B.2.1.	Code of Conduct on the Safety of Research Reactors	34
B.2.2.	Code of Conduct on the Safety and Security of Radioactive Sources.....	34
C.	Cooperation between national regulatory bodies	35
C.1.	International Nuclear Regulators Association	35
C.2.	G8-Nuclear Safety and Security Group	35
C.3.	Western European Nuclear Regulators Association.....	36
C.4.	The Ibero-American Forum of Nuclear Regulators.....	36
C.5.	Cooperation forum of state nuclear safety authorities of countries which operate WWER reactors	36
C.6.	Network of regulators of countries with small nuclear programmes	36
C.7.	The senior regulators from countries which operate CANDU-type nuclear power plants	37
D.	Activities of international bodies	37
D.1.	United Nations Scientific Committee on the Effects of Atomic Radiation.....	37
D.2.	International Commission on Radiological Protection.....	38
D.3.	International Commission on Radiation Units and Measurements	39
D.4.	International Nuclear Safety Group.....	39
E.	Activities of other international organizations.....	40
E.1.	Institutions of the European Union.....	40
E.2.	Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA)	40
E.3.	World Association of Nuclear Operators (WANO)	42
F.	Safety legislation and regulation	43
G.	Safety significant conferences in 2005	44
H.	Safety significant events and international appraisals in 2005	45
I.	Safety networks	47
I.1.	Asian Nuclear Safety Network	47
I.2.	Ibero-American Radiation Safety Network	48
J.	Chernobyl Forum	49

Annex 2: The Agency’s Safety Standards: Activities during 2005	51
A. Introduction	51
B. Commission on Safety Standards (CSS).....	52
C. Nuclear Safety Standards Committee (NUSSC).....	53
D. Radiation Safety Standards Committee (RASSC)	53
E. Transport Safety Standards Committee (TRANSSC).....	54
F. Waste Safety Standards Committee (WASSC).....	54
Appendix 1: The current IAEA Safety Standards	57

Annex 3: Civil Liability for Nuclear Damage:

International Expert Group on Nuclear Liability (INLEX)	63
A. Introduction	63
B. Work undertaken	64
B.1. Explanatory texts	64
B.2. Possible gaps and ambiguities	64
B.2.1. Complexity and diversity of obligations under the international regime	64
B.2.2. Compensation for economic loss sustained as a result of a perceived risk in a situation where there has been no actual release of radiation	65
B.2.3. Difficulties in pursuit of claims	65
B.2.4 Requirement to establish domestic legislation.....	65
B.2.5. Possible inadequacy of compensation	66
B.2.6. The different time limits applying	66
B.3. Outreach activities: Regional workshops on liability for nuclear damage	66
B.3.1. Regional workshop on liability for nuclear damage, Sydney, Australia	66
B.3.2. Regional workshop on liability for nuclear damage, Lima, Peru	67
C. Future work	67

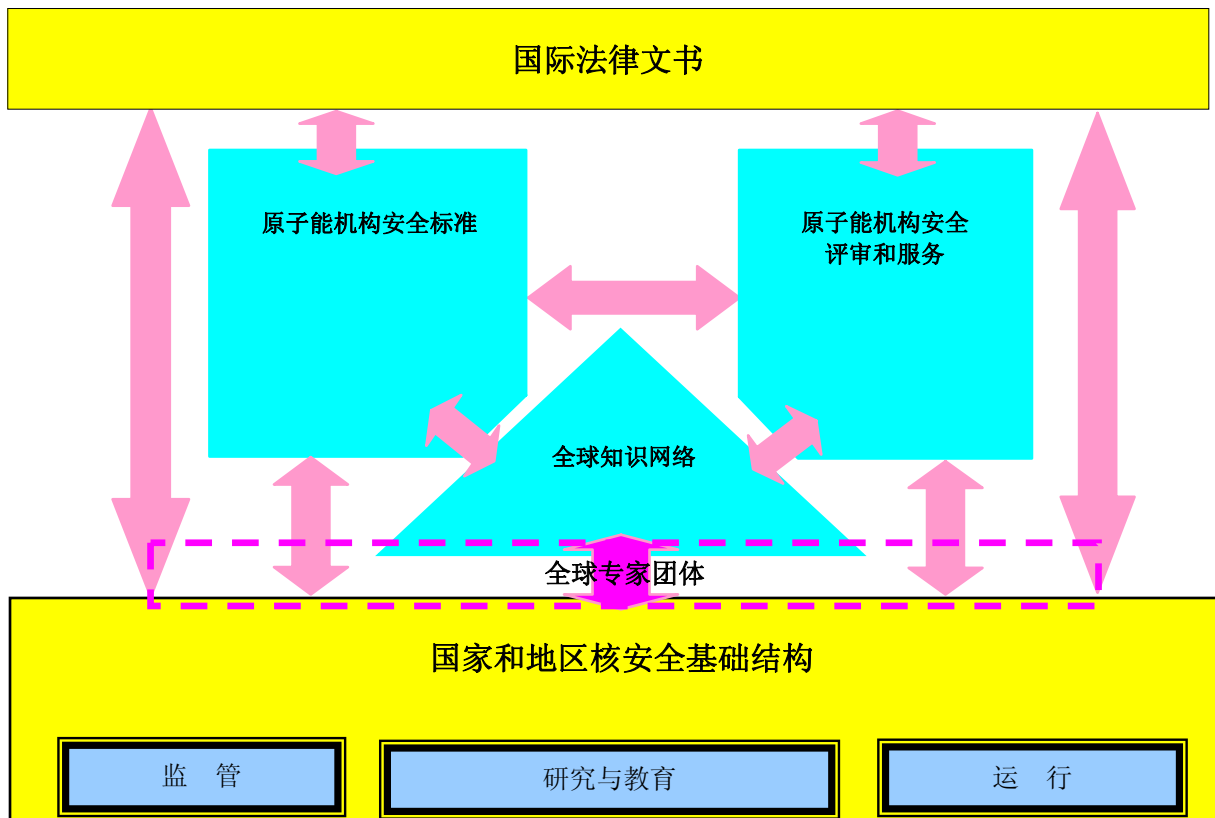
分析性概述

A. 引言

“2005 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应急准备方面的发展趋势和存在问题，并突出强调了 2005 年的发展情况。本概述辅以更详尽的附件¹。鉴于保安与安全之间的关系，本报告也将讨论保安问题。一份单独的报告将涵盖核保安。

B. 全球核安全制度

B.1. 概述



2005 年，原子能机构及其总干事荣获了诺贝尔和平奖。诺贝尔委员会的声明确认了原子能机构“为防止核能用于军事目的并确保以最可能安全的方式和平利用核能所

¹ “2005 年世界范围内与安全有关的事件和活动”（附件一）、“国际原子能机构安全标准：2005 年的活动”（附件二）和“核损害民事责任：国际核责任问题专家组”（附件三）。

作的努力。”将核安全与世界和平联系在一起这一事实表明，已经认识到各种国家和非国家行为者以及国际组织特别是原子能机构的作用的重要性。

1986年的切尔诺贝利事故和2001年9月在美国发生的恐怖主义袭击加速了国际社会在核安全和核保安领域的合作，并促进了作为全球化进程中一个更加显著重要方面的全球安全和保安框架的建立。当今世界日趋复杂，不仅技术、商业和通讯的全球化而且恐怖主义的全球化都在影响着一切人类活动。因此，加强核安全和核保安的解决办法要求制订一个考虑关键利益相关者的利益、国家政策和全球趋势的多边方案。

全球核安全制度建立在考虑广泛的国家和国际行为者的利益基础上，目的是在维护各国主权、权力和最终责任的同时实现共同的目标。有关行为者包括工业界、政府组织、非政府组织和政府间组织、专家团体和民间社会。

原子能机构继续支持建立在下述四项基本要素基础上的全球核安全制度：第一，普遍签署安全公约和行为准则等有约束力和无约束力的国际法律文书；第二，一整套体现良好实践的核安全标准，以此作为实现所有核活动所需高水平安全的一个参考基准；第三，一系列基于安全标准进行的国际安全评审和服务；第四，需要确保建立强有力的国家基础结构和全球专家团体。国家基础结构包括适当的法律和制度方面，特别是核监管机构、研究与教育机构以及工业能力。可自我维持的专门知识和经验安全网络对于持续改进安全和相互学习是非常重要的。原子能机构起到促进第二和第三要素的主要作用。

正如本安全评论所表明的那样，2005年在全球核安全制度的所有四个要素方面都取得了显著进展。而且，该制度正趋于成熟，正在成为全球合作的一个实际范例。

目前正在制定全球保安框架的类似构想，尽管认识到当前实际需要一种独立而协同的方案，但从长远看，该保安框架构想将与安全制度构想充分整合。安全和保安具有共同的目标，这就是保护生命、健康和财产或限制对生命、健康和财产的危害。因此，一项基本的安全要求是确保放射源的安全，以防偷窃、丢失和擅自拥有或转移。在实施安全或保安措施之前，必须考虑这类措施的相互影响。

B.2. 国家安全基础结构

B.2.1. 趋势和问题

强有力的立法和监管框架对于全球核安全非常重要。在运行有核电厂的国家中，在国家安全立法和监管框架方面正在作出显著改进。目前，越来越多的运行有研究堆的国家颁布了具体的法律并设立了独立的监管机构。但是，在一些成员国仍然存在着监管机构的有效独立性以及监管人员的充分性和技术能力方面的问题。

尽管已注意到作出了某些改进，但核装置监管监督的不充分和电离辐射的使用在一些成员国仍然是一个问题。给监管机构配备有能力、训练有素的人员也是一个问

题，特别是在能够配备给监管机构和营运组织的合格人员资源有限的成员国尤其如此。

成员国的监管机构越来越多地利用原子能机构安全标准来制订监管标准以及衡量和审查本国的标准。但是，在使国家条例和规章保持一致以及使之与国际标准相统一方面仍然存在很多挑战。

大多数成员国认识到有必要对放射源实施全面的监管控制，并希望将有关工作与其他国家的情况进行比较。随着放射源进出口导则的实施，这项工作将变得更加重要。对 40 多个非原子能机构成员国国家中的放射源进行控制的问题仍然是一项挑战。

随着有经验的工作人员退休和扩大监管活动的必要性增加，很多监管机构仍面临着人力和财政资源以及维持能力方面的挑战。很多监管机构特别是在培训、技能和经验方面仍需要广泛的援助，以实施充分的监管制度。

B.2.2. 国际活动

目前有一些监管者能够与其他国家的对口方进行信息和经验交流的论坛，如国际核监管者协会、八国集团核安全和核保安组、西欧核监管者协会、伊比利亚-美洲核监管者论坛、运行水冷却和水慢化动力堆国家核安全当局合作论坛、拥有小型核计划国家的监管人员网络和运行坎杜型核电站国家的高级监管者论坛等。

原子能机构继续为协助成员国监管机构提供支持。这些服务包括国际监管评审组、研究堆综合安全评定、放射源辐射安全和保安基础结构评价、运输安全评价服务和国际核保安咨询服务等各类工作组，以及许多培训班、研讨会和讲习班。原子能机构已开发并分发了协助监管机构管理日常活动的信息管理工具（监管部门信息系统 3.0）。原子能机构还继续为监管机构的工作人员提供标准化培训包。

按照以往做法，2005 年与原子能机构大会结合在维也纳举办了高级监管人员会议。来自 50 多个成员国的高级监管人员讨论了诸如安全基本原则、辐射防护标准整体方案以及从《核安全公约》审议会议获得的对领导作用和对话的深刻见解等各种监管方面的问题。高级监管人员还就原子能机构安全标准特别是各种监管机构如何有效地利用这些标准的问题进行了广泛的讨论。

B.2.3. 未来挑战

原子能机构正在制订一项综合方案，以使其与法律和政府基础结构有关的服务更加一致、高效和对成员国有帮助。这一综合方案还将避免工作交迭和不适当重复。

尽管在国家一级和在很多情况下在类似的设施之间充分建立了运行经验反馈过程，但还需要对国际一级的运行经验反馈作实质性改进。

由于有经验的工作人员退休和设施老化，很多成员国当前面临的主要挑战是建立、保持和维护技术能力。为监管机构提供财政和人力两方面的充分资源在很多国家

仍然是一项挑战，特别是随着更多的国家转向可持续的国家方案，情况更是如此。由于核相关技术利用的扩大，更多的监管机构将面临着对这些扩大的利用、先进技术和创新型设计有效地进行监管的挑战。同时也增加了对在国际一级进行协调统一的期望和需求。

研究中心和专门的技术支助组织往往拥有跨学科的科技专门知识。在很多成员国，这些组织向监管者和营运者提供评定和改进安全服务。而在其他成员国，仍然需要建立这些组织。还存在着促进加强各成员国技术支助组织和全球专家团体之间知识和经验交流的需求。

除许可证审批和对新的核设施实施监管外，很多监管者还需要处理许可证更新和现有设施延寿的问题。

很多成员国面临的重大挑战是建立和维护国家放射源库存登记。

需要作出相当大的努力，以确保原子能机构向成员国提供的援助继续与其他国际组织提供的援助或在双边基础上提供的援助保持协调、一致和配合。

B.3. 国际法律文书

当前已制订的有约束力的公约和无约束力的行为准则等国际法律文书证明了安全的全球性。这些文书是建立在实现世界范围内高水平安全的共同期望基础之上的鼓励性文书。

2005年3月，印度批准了《核安全公约》，该公约目前已有56个缔约国，其中包括所有运行核电厂的成员国。2005年4月在维也纳举行了《核安全公约》第三次审议会议，代表们在这次会议上得出结论认为，缔约方都遵守了《核安全公约》以及经过10年和3次审议会议之后，有必要对该公约进行修订。

2005年7月在维也纳举行了《及早通报核事故公约》和《核事故或辐射紧急情况援助公约》确定的主管当局代表第三次会议。与会者还就加强现有演练和演习机制的建议达成了一致意见，并鼓励各国主管当局和原子能机构制订有关国际应急管理体系的行为准则。

截至2005年底，《乏燃料管理安全和放射性废物管理安全联合公约》（联合公约）已有36个缔约国。“联合公约”缔约国举行了会议，最终确定了有关第二次审议会议的安排。缔约国还举行了一次特别会议，核准了经修订的《议事规则和财务规则》、经修订的《审议过程细则》和新的审议过程中《专题会议细则》。

2005年还就通过使《核材料实物保护公约》对缔约国具有法律约束力而实质性地加强该公约达成了一致意见，以便除其他外，特别是保护在国内和平使用、贮存和运输过程中的核设施和核材料。新规则将在获得该公约三分之二的缔约国批准之后生效。

截至 2005 年底，79 个国家已书面通知总干事表示支持《放射源安全和保安行为准则》，而只有 17 个国家正式书面承诺遵守该行为准则有关放射源进口和出口的补充导则。在《研究堆安全行为准则》完成之后，原子能机构目前的活动重点是促进该行为准则的有效实施。

B.4. 国际安全标准

原子能机构安全标准已作为保护人类和环境免受核事故和辐射照射有害影响的全球基准得到了越来越多的应用。一些成员国直接利用这些标准进行许可证审批，而其他国家则利用这些标准作为制订和审查国家条例以及进行有效监管监督的参考。在 2005 年 9 月举行的高级监管人员会议期间，提出了一些有关成员国利用原子能机构安全标准的倡议。英国卫生和安全局以原子能机构安全标准为基准审查了其“安全评定原则”，西欧核监管者协会正在利用原子能机构安全标准作为在统一欧洲各国条例的依据。中国和巴基斯坦报告了在核电厂监管过程中广泛使用原子能机构安全标准的情况。

2005 年，原子能机构从成员国监管机构和其他用户获得了有关原子能机构安全标准使用情况和反馈的信息。这些信息来自原子能机构安全评审服务、安全标准委员会和四个标准委员会，以及通过原子能机构网上调查表从这些标准的个别用户获得和来自于国际组织。在定期审查原子能机构安全标准的过程中对这些信息进行了系统审议，以确保其适用性和不断改进。

C. 核电厂安全

C.1. 趋势和问题

核电厂运行安全实绩在世界范围内总体上仍然保持高水平。工作人员和公众因核电厂运行而接受的辐射剂量仍大大低于监管限值。人身伤害事故和事件数量仍然是该行业内最少的。没有发生过可能导致对环境产生不利影响的无计划辐射释放事故。这样的运行安全实绩充分证明了过去 20 年对改进工程和人力绩效等安全特性所给予的关注。不过，这种实绩多年来却一直停滞不前。以往已经查明根源而且整个核能界都认同这种根源的事件仍在不断发生。世界各地的众多监管机构继续争取获得对其核电工业进行适当监管所需的资源和能力。这些问题与反映激励计划和重视细节的各种不太切实的指标结合起来就提出了一个问题：自满情绪是否会越来越成为一个问题？

运营者和监管者都普遍认为，核安全的影响是世界范围的。目前人们开始关注对核电厂的设计进行某种形式的国际认证，以便把审查新反应堆设计所需的广泛努力有效地加以管理并满足监管机构开展这种审查的共同需求。西欧核监管者协会继续对欧洲目前存在的各种规则和条例开展协调工作。原子能机构继续改进和实施其对正在设

计和建造的核电厂是否符合原子能机构“安全标准”进行评定的计划。美国也建议实施一项新的多边计划，以便让希望根据《联邦法规》第 52 篇“美国核管理委员会条例”第 10 章取得设计证书的新核电厂分享设计和许可证审批方面的信息。

另一个问题是需要建立必要的基础结构，以便不仅对新核电厂的设计和初步许可证审批而且对这种核电厂的建造、调试和在其预计寿期内的运行提供支持。新核电厂的建造最近尤其在远东有所增加，欧洲和北美核电厂的实际和拟议中的建造使这种增加更加突出。营运者和监管者正越来越多地采用国际同行评审的办法，以确定新核电厂是否能充分满足国家和国际的预期。核安全的全球影响已经得到普遍认可，原子能机构也已经启动了各种计划，以确保所有成员国汲取的经验教训和确定的良好实践能够得到分享。

风险知情技术继续在行业内营运和监管机构的决策过程中得到使用，这种技术正被扩大到用于新核电厂的设计中。许多核电厂目前都正在采用某种类型的“风险监测”方法，以有助于其作出运行决策，尤其是与在线维护有关的决策。大多数国家监管机构还在确定运行活动的核准要求、设计许可证审批要求和检查与执法要求方面采用了风险考虑因素。按照原子能机构“安全标准”中的建议，越来越多的成员国正在把概率安全分析作为新设施选址和设计中的一项要求。

大多数有核电厂的成员国现在都制定了各种广泛的计划，以便在营运组织甚至在国家一级分析运行经验。然而，在大多数情况下，这些计划都未考虑到和有效交流国际运行经验。在过去的几年中，无论向营运者还是向事件监管报告系统报告的事件的质量和数量一直维持在最低水平，尽管不断做出了各种努力来加强分享信息的承诺。这种趋势产生的一个结果就是具有同样根源的事件继续反复发生。

世界很多地方的核电厂成功地应对了地震、海啸、洪水泛滥、龙卷风和飓风等极端自然灾害情况。所报告的关于这些情况的结果在任何情况下都没有达到使得公众安全受到挑战或者造成环境影响的地步。这些核电厂还能够在情况缓和后马上恢复运行，从而为恢复工作做出了贡献。必须继续保持警惕，以便对这些极端情况可能给设施和运行实践带来的影响进行评估。

由于世界上正在运行的核电厂几乎有 65%超过了 20 年，目前正在做出关系其未来的各种重要决定，以及正在提出涉及越来越多的设施提高出力和延长许可证的建议。为了提高资金的投资收益并体现技术进步，目前正在开展运行升级活动。各种老化管理和维护以及激励职工队伍计划对于在设施的整个寿期内保持安全具有重要的意义。

核电业务的竞争性已经发展到安全领域的某些迹象加剧了这种趋势。出现了一些竞争性实体不免费分享安全建议和汲取的经验教训的例子。此外，国际核安全组（核安全组）、世界核电营运者联合会（核电营运者联合会）和原子能机构都承认，越来越多没有核背景的高管人员正在掌管运行中的核电厂。虽然这本身并不是一种缺陷，但它却造成一种安全见解也许是很容易理解的环境，而且如果它与有选择性地使用绩效指标等其他因素结合起来，就有可能对安全带来负面影响。

C.2. 国际活动

2005年4月11日至22日,《核安全公约》缔约国在维也纳召开了第三次审议会议,50个缔约国的500多名代表出席了会议。与会者对各缔约国的国家报告进行了全面的同行评审。对于每一个缔约国,与会者确认了良好实践和改进的机会。与会者还得出结论认为,所有与会的缔约国都遵守了《核安全公约》的要求。缔约国还确定需要面对避免由于这种成功所带来的任何自满情绪的挑战。缔约国最后还指出,尽管大家都倾向于每三年提交一次国家报告和召开一次审议会议,但《核安全公约》是一个正在推进的过程,其目的旨在不断地促进核安全进步。审议会议包括一个小组讨论,探讨了监管者和营运者所面临的核安全领导能力方面的挑战,包括强有力的安全文化和安全管理问题。该小组会议强调需要特别重视领导因素问题。

2005年11月30日至12月2日,原子能机构主持召开了一个在全球范围内分享运行和监管经验以改进核设施运行安全实绩的国际会议。与会者向营运组织、监管机构和国际组织就以下问题提出了建议,这些问题是:如何进一步分享运行经验;如何汲取和分享监管制度方面的经验;如何最佳地实现和确保运行延长后的安全;以及如何最好地确保在新核电厂的设计、建造、调试和运行中体现运行经验的问题。

许多成员国认识到,同行评审服务,如原子能机构的运行安全评审组和工程安全评审服务以及核电营运者联合会的同行评价,都是确保核电厂设计、运行和维护安全的重要工具。《核安全公约》第三次审议会议和核电营运者联合会两年一次的大会都专门提到了这种服务。一些成员国也已经将它们纳入其设计、运行和监管过程中。原子能机构所作的努力是在提高运行有效性和改进安全管理方面对核电营运者联合会的努力作出的补充。

C.3. 未来挑战

核电厂安全面临的一个最大的挑战是维护和在某些情况下发展核电厂设计、建造、运行、维护和监管所需的必要的基础结构。这其中包括营运和技术支持组织以及监管机构的知识、技能或能力。有经验的工业高管人员和负责监管工作的高管人员正在陆续退休,这对监管者和营运者的核安全领导层正在构成挑战。正在采用的良好做法已经取得了不同程度的成功,这些做法包括征聘和保留合格的工作人员;制订继承计划以及实行即将退休的工作人员与新来工作人员的交叉;进行质量程序指导;以及制订辅导和培训计划。同样,建立必要的输配电结构以有效地将大容量发电设施纳入能源市场也十分重要。对许多国家来说,对建造业具备有效承担复杂的土木、机械和电气项目所需的技术深度而提出的要求进一步加剧了这种挑战性。由于对这种含有制度性和技术能力的稀缺资源的需求和竞争,商用核电可能的复苏将使知识管理问题变得更加严重。

重复发生的事件是必须以有效和高效的方式加以处理的挑战。还必须开展更多的工作,以使参与核能工业的每个人都能强烈地意识到公开、全面地分享所有核事件和核事故背后细节的价值。必须建立更有效的机制,以便在最大范围内分享从事件中汲

取的经验教训。同样重要的是，应当在全行业范围内分享有助于防止事件发生的成功经验、良好实践和前瞻性战略。

确保安全和保安的概念得到充分考虑和处理的挑战将需要设计者、营运者和监管者予以重视。安全和保安两个论坛都承认，这两个概念的范围和影响有相互重叠之处。在实施安全或保安措施之前，必须考虑这类措施的相互影响。要使这两个原则做到平衡兼顾和协调一致，就必须制定适当的国际导则，以及实施经过有效协调的国家应对战略。

更多的成员国都已计划或正在考虑延长现有核电厂的寿期。必须制定解决寿期管理问题的有效计划。

加强领导作用对于核安全来说必不可少，而对于避免自满情绪则尤其重要。确保核能营运公司的董事会和其中很多还不具备核安全背景的高管人员，理解实现高水平核安全的重要性是一个持续不断的挑战。

D. 研究堆安全

D.1. 趋势和问题

50 多年来，研究堆一直是核安全和核技术的一个基石。在此期间内，这些设施一直保持着良好的安全运行记录。该记录一直持续到了 2005 年。一些新的研究堆最近开始运行或处于后期建设阶段。此外，好几个成员国正在制定建造新反应堆或升级现有设施的计划。这些新的或经过升级的反应堆不仅提高了服务用户的能力，而且通过更多地关注设计安全和引入现代安全系统加强了安全。

在许多情况下，用来适当处理安全问题的资源并不充足。研究堆设施和工作人员的老化是一个持续不断的问题。虽然许多反应堆已经用现代化的安全系统进行了升级，但永久性固定系统、结构和部件的老化需要继续不断认真地得到重视。由于年龄问题出现了既有经验又有技能的工作人员缺失的问题，而这一问题又由于招聘新人的困难变得更加严重，并已成为一些设施中存在的 key 问题。在许多情况下，这都是由于缺乏资金所致。

尽管注意到一些成员国已经做出了一些有限的改进，但对研究堆的监管监督不充分却是另一个仍然存在的问题。在许多成员国，法律和政府基础结构不充分，而且（或者）监管机构达不到独立和有效能的国际标准。给监管机构配备有能力、训练有素的人员也是一个问题，特别是在能够配备给监管机构和营运组织的合格人员资源有限的成员国尤其如此。

许多研究堆仍然处于延期关闭状态。尽管上述大多数反应堆的营运者都表示它们制定了重启或退役的计划，但这些设施在过渡期间的安全必须得到保证。

更多的成员国意识到有必要制定初步退役计划，但实践证明很难把这种意识转化成行动。在一些成员国，对编制初步退役计划继续存在抵触情绪，因为有这样一种观念认为，编制计划就意味着准备关闭设施。

应成员国请求，原子能机构一直在对自愿实施核设施转换和返回高浓铀燃料的国家提供援助。就这项工作而言，原子能机构极为重视相关安全标准和导则的适用问题。

D.2. 国际活动

原子能机构于 2001 年发起实施了“研究堆安全加强计划”。随着《研究堆安全行为准则》的完成，该计划最新版本目前的重点是以下三项主要活动：

- 确定原子能机构的安全文件是全球研究堆安全框架的基础；
- 鼓励和协助成员国有效适用这些安全文件；
- 促进研究堆安全问题的全球和地区合作。

《研究堆安全行为准则》为成员国提供了在制订和统一政策、法律和条例方面的指导，并提出了理想的研究堆安全管理特征。该行为准则的制定工作已经完成，目前的活动都涉及到对它的适用。

2005 年 12 月，原子能机构组织了一个不限人数的会议，30 多个成员国的代表在一起探讨了如何最好地实施《研究堆安全行为准则》的问题。在这次会议上，与会者特别呼吁举行定期会议讨论有效适用“行为准则”，建立一个便利信息交流的因特网站以及将“行为准则”纳入原子能机构所有安全援助和评审活动的问题。

作为“行为准则”辅助文件的有关研究堆安全的安全标准文集的编制工作进展顺利。2005 年出版了 NS-R-4 号“安全要求”——《研究堆安全》。九个支持性安全导则处在起草和审查过程的各个阶段，并将在 2007 年底出版。

成员国间开展的地区合作可以成为处理研究堆界面临的各种问题的一个有效手段。在解决安全问题方面进行合作，建设强有力的安全文化，克服资源不足的矛盾，以及交流运行经验，所有这一切都将得到原子能机构的大力支持。

研究堆安全培训讲习班和研讨会已经和将要继续开办，相关的培训教材已经和将会继续编写，并提供给所有感兴趣的成员国。一般而言，所采取的方法是培训教员。这一方法可以有助于原子能机构制定更有效的培训计划，而且它能促进成员国实现独立自主和自力更生，并鼓励分享知识和经验。

原子能机构目前的计划包括研究堆事件报告系统，其目的是通过就异常事件交流与安全有关的信息来提高研究堆的安全。截至 2005 年底，47 个有研究堆的成员国已经

加入了研究堆事件报告系统。2005 年，大韩民国主办了研究堆事件报告系统技术会议，与会者在会上接受了事件分析技术培训，并为分享吸取的经验教训的目的讨论了各研究堆发生过的事件。

D.3. 未来挑战

从原子能机构的角度看，研究堆安全方面今后的主要挑战有：确保符合原子能机构“安全标准”的有效的监管监督在所有成员国到位；确保整个研究堆界制定出强有力的管理制度；以及确保老化问题通过适当的整修和升级或退役方式得到解决。有效适用“行为准则”和原子能机构“安全标准”是一项持续存在的挑战，同样，为解决这些问题而加强地区和国际合作也是如此。

对研究堆安全进行评定和对其改进提供援助将继续成为一项重大挑战。这种安全评定将强调以下内容：适用“行为准则”和原子能机构“安全标准”；制定确定运行优点、弱点和良好实践的程序；以及在整个研究堆界作为加强安全的一种手段分享这种深刻见解。落实 2005 年 12 月会议的建议将有助于实现上述目标。

考虑到原子能机构在“项目和供应协定”下有关研究堆安全的具体职责，这种研究堆构成了一种特殊的挑战。虽然许多这种研究堆都接待过安全工作组，但有必要使按计划定期派遣安全评审工作组成为规范的做法。此外，秘书处还将举行这类研究堆营运者的定期会议，以便提供一个论坛以讨论和分享运行经验与安全见解，对监管的影响进行审议，并提出有关更有效地开展相互援助和原子能机构提供支持的建议。

E. 燃料循环设施的安全

E.1. 趋势和问题

燃料循环设施涵盖各种各样的活动，包括采矿和冶炼、转化和浓缩、燃料制造、乏燃料临时贮存、后处理和废物整备。其中许多设施由私营部门运营，由于营运者经常相互竞争而使大量工艺和技术资料成为商业敏感信息。过去，这种敏感性问题的经常波及到安全领域。然而，最近出现的一些迹象表明，这种情况可能正在发生变化。例如在欧洲，目前存在着多方共享特定技术安全实践信息的情况。

这些设施面临着独特的安全挑战，例如临界控制、化学危害以及易发火灾和爆炸。其中许多设施高度依靠营运者的干预和行政控制来确保安全。虽然燃料循环设施的安全原则与核电厂类似，但必须对安全方案进行分级，并将这些方案建立在潜在的危害之上。

许多小型设施必须处理缺乏人力和财政资源的问题。在一些国家的监管机构也可以看到这些资源制约情况。同时，许多设施正在以其全部能力的一小部分运行，这种

情况加剧了财政制约，并导致了其他一些挑战，例如以可预见的方式保持人力绩效技能和实施系统运行。因此，这些设施中的许多设施很难在所有安全领域都保持合格的能力。国际燃料循环设施安全导则尚未完成，而原子能机构安全服务的有效性也还须进一步提高。

对于乏燃料，由于缺乏永久处置库，已导致延长贮存设施的使用期限。更高燃耗的燃料、更高的浓缩度和混合氧化物等燃料设计方面的变化正在对确保燃料包壳完整性和排出余热等问题造成额外的挑战。应当指出的是，大多数革新型核电厂设计都包括了乏燃料的再循环利用。

E.2. 国际活动

原子能机构目前正在制定一套专用于整个燃料循环设施的安全标准。这些标准将涉及一般性的和特定工艺的考虑因素。

已经编制了关于燃料循环设施运行安全评价的初步导则。这些导则可供成员国对其燃料循环设施进行自评，并有助于实施原子能机构一项新的题为“燃料循环设施运行期间的安全评价”的同行安全评审服务。《燃料循环设施运行期间的安全评价导则》于 2004 年获得核准，目前可应请求向成员国提供该项服务。原子能机构将继续编制必要的培训教材，以支持“燃料循环设施运行期间的安全评价”服务。

原子能机构还与经济合作与发展组织核能机构（经合组织/核能机构）密切合作，促进有关燃料循环设施安全问题的国际信息交流。在 2005 年举行的一次技术会议上，原子能机构成员国的与会者核可了《经合组织/核能机构燃料事件通报和分析系统导则》。秘书处目前正在建立一个共同网络平台，该平台将涵盖专用于核电厂（事件报告系统）、研究堆（研究堆事件报告系统）和燃料循环设施（燃料事件通报和分析系统）的事件通报系统。

E.3. 未来挑战

原子能机构需要编制一整套专用于燃料循环设施的安全文件。这些设施既包括小型设施，如中试设施以及专用于生产研究堆燃料的研究与发展燃料循环设施，也包括大型设施，如商业规模的动力堆燃料生产和后处理设施。

原子能机构将与成员国合作开展和改进“燃料循环设施运行期间的安全评价”同行评审服务，以便成员国能够认识这项服务的价值，并利用它改进其燃料循环设施的安全。

原子能机构还须开展有关燃料循环设施的专门培训和安全评定服务，这些培训服务将涉及一般性的和特定工艺的安全问题与发展趋势。

F. 辐射防护

F.1. 辐射生物效应

联合国原子辐射效应科学委员会（联合国辐射科学委）在 2005 年 9 月举行的会议上确定，联合国辐射科学委当前对用作辐射防护基础的辐射照射风险的评估基本上是健全的。但正在进行的研究继续表明，就防护目的而言，情况比迄今已设想的还要复杂。

F.2. 辐射安全方案

F.2.1. 国际放射防护委员会的建议

50 多年来，国际放射防护委员会的建议支持和加强了国际和国家辐射安全标准。当前的建议是 1990 年和几年前制订的，国际放射防护委员会已着手对这些建议进行审查。过去 15 年来，在所设想的低水平辐射照射所致健康效应方面没有发生实质性变化，但国际放射防护委员会认为，根据实践²和干预³概念，需要对当前的防护体系加以澄清。2004 年 6 月，国际放射防护委员会发表了一份有关与公众磋商的一系列建议的修订草案。收到了近 200 份答复，总计约 600 页书面材料。在 2005 年 3 月会议上对这些意见进行审议时，国际放射防护委员会认为，提出的许多意见是由于当时没有为进行磋商提供基础文件。自那时以来，已提供了一些基础文件草案征求意见。这些基础文件是：

- 辐射造成的健康危险；
- 放射防护的剂量量值；
- 代表性个人所受剂量的评定；
- 防护的优化；
- 保护非人类物种的参考动物和植物。

在国际放射防护委员会 2005 年 9 月会议上原则核准了前四份基础文件的修订本。第五份基础文件已作为工作资料送交新的保护非人类物种委员会（第五委员会）。此外，根据磋商结果，认为还需要提供三份新的基础文件，第一份基础文件涉及辐射防护控制的范围，第二份涉及国际放射防护委员会剂量限值的依据，第三份涉及医疗照射。

下一份建议草案将在基础文件定稿之后编制完成，并准备提交国际放射防护委员会在 2006 年上半年审议。目前预计将在 2006 年期间就拟议中的建议进行第二轮磋商，磋商的结果很可能是将新建议推迟到 2006 年下半年发表。

² “实践”系指经选择进行的人类活动，这类活动将增加对人类的总体辐射照射。

³ “干预”系指针对已存在的辐射照射采取的行动，其目的是减少照射量。

F.2.2. 辐射安全的监管

原子能机构《国际电离辐射防护和辐射源安全的基本安全标准》（基本安全标准）被视为是电离辐射防护标准的全球参考基准。这些标准基于联合国辐射科学委提供的有关辐射照射健康后果的最新资料和国际放射防护委员会的建议。《欧洲原子能联营基本安全标准指令》等一些地区要求同样基于这些标准和建议，因此，它们与“基本安全标准”是广泛一致的。

自 1996 年发表“基本安全标准”以来，出现了许多重要的发展情况。在技术层面，制订了与“基本安全标准”有直接关联的进一步的安全标准。这些发展连同根据原子能机构“安全标准行动计划”正在开展的活动以及预期国际放射防护委员会的新建议，已促使原子能机构开始对“基本安全标准”进行审查。2005 年期间确定了有关审查和最终修订“基本安全标准”的政策和策略。该政策表明，“基本安全标准”应继续支持各个领域的辐射安全方案，这些领域包括医疗、一般工业、核工业、放射性废物管理和运输，并涵盖职业照射、医疗照射和公众照射。与“基本安全标准”相一致的是“安全要求”一级的文件，因此，“基本安全标准”应当采取能够便于转变为国家监管要求的形式。

拟于 2006 年底之前完成审查工作。这项审查将确定需要解决的问题，并提出解决方案。在这个意义上，审查和修订不应被视为是全然分开的两项工作。特别是，预计将在安全标准委员会 2006 年 6 月会议上提出讨论一些实质性问题的文件和可能适用的解决方案。为了维护业已存在的广泛共识，这项工作将通过与“基本安全标准”的共同发起者充分合作来完成。此外，这项工作还将与对《欧洲原子能联营基本安全标准指令》的审查同步进行，目的是力求取得尽可能多的协调和统一。

G. 职业辐射安全

G.1. 趋势和问题

根据联合国辐射科学委、职业照射信息系统以及各种地区和国家研究机构提供的资料，2005 年再次继续改进了关键的职业辐射防护实绩指标，例如年剂量、年集体剂量、接受高剂量的工作人员数量以及过度照射数量。国际癌症研究机构关于辐射工作者的研究对当前国际辐射防护标准的持久适用性提供了支持。

有必要使国家一级的职业辐射安全导则更加协调统一。虽然工会和监管机构的存在有着不同的理由，但二者都对保护工作人员感兴趣，并都在这方面承担着职责。工会倾向于采用国际劳工组织（劳工组织）制订的导则（劳工组织“第 115 号公约”和实施法规），而国家监管机构则倾向于采用原子能机构和国际放射防护委员会的导

则。在过去的几年中，原子能机构和劳工组织的工作人员建立了更密切的工作关系，目前正在为统一两组织的导则而采取行动。

更多的成员国和组织正在对职业辐射防护计划实施质量管理。

大多数成员国现已对职业性受照工作人员实施了某种形式的个人和工作场所监测计划。已经完成并仍在进行大量的工作，以期改进和协调个人监测计划和技术。

G.2. 国际活动

秘书处正在与劳工组织秘书处和一些国际专业学会协作实施“职业辐射防护行动计划”。原子能机构秘书处和劳工组织秘书处已经设立了一个由若干感兴趣的国家和国际组织的代表组成的指导委员会，就该行动计划的执行提出建议，并进行监督和提供协助。

劳工组织通过促进劳工组织《保护工作人员免受电离辐射公约》（劳工组织“第 115 号公约”）履行其辐射防护领域职业性安全和保健的责任，迄今已有 47 个国家批准了该公约。劳工组织利用“基本安全标准”中的要求作为评定遵守“第 115 号公约”情况的依据。原子能机构出版的很多有关职业辐射防护的文件以及“基本安全标准”也是与劳工组织联合编写的。劳工组织最近得出结论认为“第 115 号公约”仍然具有现实意义，并将继续促进批准和执行该公约。劳工组织有一个完善的涉及与其成员国直线联络的系统，以便于报告和审查其所有公约和建议的执行情况。

劳工组织还制订了一项工作人员辐射防护（即电离辐射防护）实施法规。它最近对该实施法规进行了审查，并提出了一些修改建议。劳工组织目前正在审议这项审查的结果。

原子能机构继续开展评定职业照射所用监测方法的比对活动，目的是帮助成员国遵守剂量限值要求和统一国际商定的量值和评定方法的使用。许多不同的比对活动正处于不同的实施阶段。

2005 年完成了诊断放射学、核医学和放射治疗领域职业防护培训包以及供心脏病学专家使用的辐射防护培训包。

G.3. 未来挑战

需要制订更明确的导则，以帮助监管机构确定哪些活动需要监管，并确定如何适用与人工源照射防护相一致的管理天然增强辐射所致职业照射的适当分级方案。这将包括协助有关当局确定涉及可能需要控制的天然辐射照射的活动，并编写和分发针对具体部门的有关放射性活度水平、照射情况以及含有天然存在放射性物质的工作场所中气载污染物的化学和物理学特征的资料。

重要的是工作场所的辐射防护和其他安全措施不要相互冲突。相反，所有这些措施应当在安全意识和安全文化的总体框架内相得益彰。需要一种考虑了工作场所中一切潜在危害之间各种相互作用的全局观点。

有迹象表明，在某些放射性核素情况下，对怀孕工作人员及其胚胎和胎儿的一些可能的照射途径可能尚未得到充分的确认。虽然一些成员国和国际放射防护委员会等许多机构在该领域已经完成了相关工作，但可能仍有必要就其防护标准的制订和实施提供进一步的国际导则。

劳工组织《工伤事故和职业病津贴公约》（劳工组织“第 121 号公约”）规定了对电离辐射所致疾病给予赔偿。然而，职业受照工作人员可能患有与公众类似的疾病，包括癌症。其中一些疾病可归因于工作中的辐射照射。虽然一些成员国已经有了这方面的安排，但国际导则将有助于就职业电离辐射照射导致有害健康影响的案例进行决策。

H. 患者的放射防护

H.1. 趋势和问题

在过去的三年中，参与原子能机构患者放射防护领域技术合作项目的国家数量增加了近三倍。

更加快速的计算机断层照相系统的逐年发展使跳动心脏的动态成像成为可能，显现和量化了钙在冠状动脉中的积淀情况。利用多道探测器计算机断层照相法同时进行全胸造影的可能性意味着将更广泛地利用这项技术进行重复扫描。在一些成员国，计算机断层照相法目前在医疗照射所致集体剂量中所占份额接近 70%。

集体剂量的第二个最大来源是代替外科施用的介入程序的程度。这些程序利用 X 射线引导导管和导线穿过血管。就对患者的最大皮肤剂量而言，患者个人剂量往往超过出现确定性效应的水平。随着在很多国家每隔二到四年这些程序的使用量就要翻一番，加之有时对同一患者需要重复有关程序，这些程序正在对辐射防护专家构成日益增加的挑战。

对治疗和治愈癌症的放射治疗设施的需求的增加已导致原子能机构发起了“治疗癌症行动计划”，从而将进一步增加促进辐射安全的必要性。

原子能机构对介入心脏病学专家进行辐射防护培训的活动已导致心脏病学专家显著增强了对辐射危险和对患者实施防护之必要性的认识。

H.2. 国际活动

2005 年，国际放射防护委员会出版了《接受非密封放射性核素治疗后的患者出院》（国际放射防护委员会第 94 号出版物）。成员国在放射性核素治疗后的出院准则方面的实践多种多样，因此，国际放射防护委员会的这一导则是非常亟需的。由于原子能机构安全标准考虑了国际放射防护委员会的建议，因此有必要根据该委员会的第 94 号出版物对现有导则进行审查。

欧洲委员会已印发了牙科放射学辐射防护导则。

2005 年，原子能机构继续对介入心脏病学专家进行辐射防护培训。介入心脏病学专家是最频繁使用 X 射线荧光透视的用户之一，但他们对辐射防护了解甚少，或没有进行过这方面的培训。2005 年完成了以只读光盘为载体的培训材料初稿。

在“患者放射防护国际行动计划”下开展了一系列广泛的活动，由此促进了与世卫组织、泛美卫生组织、劳工组织和相应国际专业学会⁴就三个培训光盘（诊断和干预放射学辐射防护、放射治疗和核医学）达成了协商一致。2005 年为所有技术合作地区举办了培训班。该国际行动计划的一项基本内容是通过设备质量控制和患者剂量管理进行的质量管理工作。

各国医学物理学工作者协会还开展了重要的工作，以避免患者接受不必要的剂量。

H.3. 未来挑战

2006 年将创建患者放射防护网站⁵，目标是成为有关这一重要性快速增加主题的信息联络点。

2006 年将为除心脏病学专家和放射学工作者之外从事荧光透视检查程序的医生启动一个新的培训计划。由于越来越多的非放射学工作者（如泌尿科医生、肠胃科医生和整形外科医生）在执业中使用 X 射线荧光透视，以及患者受高剂量照射的可能性，这类培训计划已变得至关重要。

⁴ 国际放射学会、国际医用物理学组织和国际射线照相师和放射学技师学会。

⁵ <http://rpop.iaea.org>

I. 保护公众和环境

I.1. 趋势和问题

目前已有一些关于控制放射性排放以保护公众的明确的国际标准。据联合国辐射科学委估计，这些排放对人类产生的剂量可以忽略不计。当前，对进入环境或环境中存在的放射性核素的风险评定和管理一般建立在只考虑人类健康的基础上。这样做的依据是，现有监管机制下给予人类的保护水平也对环境提供了保护，从而不大可能对非人类物种造成危险。但是，人们日益认识到环境的脆弱性和能够证明正在保护环境免受工业污染物（包括放射性核素）影响的必要性。目前有许多国际、地区和国家组织正在制订具体处理放射性物质对非人类物种影响的政策和方案。

由于技术进步使得能够探测到极低水平的放射性，诸如欧洲“奥斯陆和巴黎公约”中规定的零排放要求的实用性和有效性就不断受到质疑。

天然存在的放射性物质在未受到监管机构通常控制的地区也能够浓集到超过对实践所规定的浓度限值水平。这类活动包括常规的采矿和矿石加工。目前还没有对这种废物的处置库做出规定，而现行标准也并非总能提供必要的指导。

I.2. 国际活动

国际放射防护委员会在一个确认所涉及的宗旨和目的虽然不同但互为补充的总体框架内正在制订保护人类和其他物种的综合方案。尽管对保护人类已经确定了可普遍适用的宗旨和目标，但有关保护其他物种的宗旨和目标却差别很大，并取决于所涉及的物种以及这些物种所受到的危险的性质和情况。国际放射防护委员会已经设立了第五委员会，该委员会将明确审议非人类物种的放射防护问题。

国际放射生态学联盟协调与环境辐射防护有关的科学研究。国际放射生态学联盟目前正在建立一个研究组织网络，以促进协作和资源有效性的研究，后者将填补国际放射防护委员会动物与植物基准数据库中的一般缺项和具体缺项。

原子能机构的“环境辐射防护活动计划”于 2005 年获得理事会的核准。尽管该活动计划具体侧重于原子能机构的行动，但它也考虑了在此领域正在开展活动的其他国际组织⁶的贡献。该活动计划的主要目标是促进协作，以便在制订用以评定和管理进入环境或环境中存在的放射性核素的方案过程中，通过明确考虑非人类物种来加强当前的辐射防护方案。该活动计划也将为成员国保护环境的工作提供援助。

⁶ 包括联合国辐射科学委、国际放射防护委员会、国际放射生态学联盟、经合组织/核能机构和欧洲委员会。

I.3. 未来挑战

目前缺少关于保护非人类物种免遭电离辐射的国际导则，也没有一致认可的可以用来综合连贯地处理这些问题的程序、标准、导则或基准数据集。这已导致制订了不同的国家方案，因而使国际统一工作非常困难。任何适用于环境辐射防护的广泛框架都必须具有充分的灵活性，以便能够在现有的各种一般性环境管理方案特别是环境保护方案的范畴内适用。

有必要进一步探讨可能适用于其他物种的风险的性质，如何量化这类风险，以及如何能够积极地证明没有对其他物种造成危险。在国际法或国内法中已经在个体一级对大量动植物提供了保护，而提供能够在这些法律范畴内使用的建议仍然是一项挑战。

J. 放射源的安全和保安

J.1. 趋势和问题

多年来已经认识到需要采取安全和保安措施来支持放射源在社会经济发展中的和平利用。未受到适当控制的放射源已导致放射性事故。在世界上的很多国家，一些事故造成了严重伤害、死亡和经济破坏。目前已普遍认识到，这类源还有可能被用于恶意的目的。

开发不使用放射源的替代技术的工作仍在继续。但是，在大多数情况下，这些技术还处于初期开发阶段，在很多年内还不能提供全球使用。因此，放射源在可预见的将来仍是不可或缺的。

《放射源安全和保安行为准则》的制订完成是朝着促进放射源安全和保安迈出的重要一步。截至 2005 年底，79 个国家已书面通知总干事表示支持该行为准则。成员国适用该行为准则的程度差别很大。即使拥有健全的监管基础结构的成员国要充分适用该行为准则，也还有一些工作要做。成员国愈来愈希望能够共享有关放射源安全和保安的信息和经验。

作为该行为准则一个补充导则出版的《放射源的进口和出口导则》是朝着在全球范围内改进放射源安全和保安迈出的另一个重要步骤。截至 2005 年底，17 个国家已正式书面通知总干事，表示承诺遵守该补充导则。

许多成员国为制订有关恢复和保持对易受攻击源和无看管源的控制的国家战略作出了巨大努力，目前正在积极地寻找这些源，而不只是应对偶然的发现。在许多国家，源的国家登记制度已经存在，或正在建立之中。此外，世界范围内很多金属再循环设施目前都装备了辐射监测器，并制订了在一旦探测出在回收的废金属中有放射性

时所适用的程序。然而，在发现无看管源后，对其进行回收和安全可靠的贮存或处置仍然是一个挑战。在许多成员国，短期贮存设施数量足够，但许多成员国不具备长期贮存和（或）处置能力。

源制造商和供应商也日益认识到他们的责任，正在积极主动地制订源的安全和保安方案。这包括设计内在更安全的源和在源的全寿期内向用户提供支持等措施。

尽管必须尽可能地对放射源进行回用，但作为完整的放射源管理体系不可或缺的一部分，还必须提供适当的处置方案。目前普遍认识到，制造商和供应商能够在处理废源方面发挥作用。

J.2. 国际活动

加强放射源安全和保安以及处理过去活动遗留问题的许多多边努力都取得了成效。这些主动行动包括美国、俄罗斯联邦和原子能机构以前苏联国家为重点的“三方倡议”和在欧盟支助下启动的各项计划。欧盟的计划已扩大到包括巴尔干半岛、中东和地中海地区。有关管制高活性密封放射源和无看管源的《高活度密封源指令》是欧盟法律的一个组成部分，对欧盟所有成员国都有法律约束力。诸如“减少全球威胁倡议”、“八国集团伙伴关系”和东南亚合作安排等倡议预期能够在全世界更多的国家加强控制。

2005 年，原子能机构出版了第 RS-G-1.9 号“安全导则”《放射源的分类》，目的是提供一个简单合理的分类系统，以便根据放射源对人体健康所致损害的可能性对其进行分级以及将源和利用源的实践分成不同的类别。这种分类能够帮助监管机构制订确保对每个经批准的源进行适当控制的监管要求。

2005 年 3 月，原子能机构组织了“核保安：全球未来发展方向国际会议”，这次会议由英国政府在伦敦承办。会议对《放射源安全和保安行为准则》、“八国集团伙伴关系”和欧盟打击大规模毁灭性武器扩散的政策以及“减少全球威胁倡议”进行了讨论。

法国政府在波尔多主办了“放射源安全和保安：促进对源进行全寿期持续控制的全球系统国际会议”，来自 64 个成员国的约 300 名与会者参加了会议。与会者鼓励所有成员国继续致力于实施“行为准则”，并注意到为恢复和保持对易受攻击源和无看管源的控制而正在进行的许多国家和多边努力。会议认识到需要继续防止放射源的非法贩卖和无意移动。

原子能机构已制订了《国际密封放射源和装置目录》。该目录将提供给正式指定的国家联络点使用，它载有源和装置的详细技术信息以及源和装置制造商的数据库。该目录是确定和表征无看管源的有用工具。

国际放射源供应商和生产商联合会已经成立，其业务宗旨和“良好实践准则草案”均表明，成立该联合会的目的是促进放射源的安全和保安。该联合会的成员在世界放射源供应中占有很大的比例。

原子能机构和国际标准化组织（标准化组织）一直在协作确定新的国际危险源辐射警告标志，以传达“危险-远离-禁止触摸”的讯息。由原子能机构发起的一次盖洛普调查已经结束，目的是为标记大型放射源确定最有效的警告标志。标准化组织将利用调查结果制订一项有关新辐射警告标志的国际标准。预期颁布该标准的目标日期是2006年6月。

J.3. 未来挑战

尽管已经取得了实质性进展，但仍需要做出很大的努力，以便每个成员国都能建立并维持有效处理放射源安全和保安问题的国家专门知识。

为了加强对放射源的控制和管理过去活动的遗留问题，许多双边、多边和国际活动正在执行之中。需要继续做出努力，以确保这些努力以协调和连贯的方式进行，同时避免重复。

在有些情况下，安全和（或）保安关切已导致停止使用放射源而采用其他技术。但是，在很多情况下，放射源是有益的，在实现放射源的益处和促进这种源的安全与保安之间必须维持一种谨慎的平衡。

K. 放射性物质运输安全

K.1. 趋势和问题

2005年，放射性物质运输继续保持良好的安全记录。成员国和国际组织继续参与审查过程促进人们越来越信任《放射性物质安全运输条例》（运输条例）中确定的安全要求。成员国在国家运输条例中基本上采纳了“运输条例”，国际组织也将“运输条例”中的规定纳入其有关危险货物安全运输的文书之中。

2005年，为解决拒绝运输拟用于医疗诊断和治疗的放射性物质的问题作了大量的工作。承运人之间也越来越意识到这一问题，国际海事组织（海事组织）、国际民用航空组织（民航组织）和国际民航驾驶员协会联合会（民航驾驶员协联）等国际组织参与了这一问题的讨论。

成员国愈来愈重视制定放射性物质运输的辐射防护计划，许多成员国还在这方面寻求原子能机构的援助。

K.2. 国际活动

2005 年，原子能机构印发了 2005 年版“运输条例”。理事会也核准了关于审查和修订“运输条例”的新政策。按照这项政策，将每两年审查一次“运输条例”（相关国际机构的现行审查周期），但有关实际修订或印发的决定将根据运输安全标准委员会和安全标准委员会的评定作出。在 2005 年 9 月的会议上，运输安全标准委员会制定了对建议修订案的安全重要性进行评定的标准。

就放射性物质运输期间的保安问题拟定建议的工作还在继续进行。有关保安级别和实物保护措施的建议已经编制，并将于 2006 年初最后完成。

原子能机构继续努力完成以“运输条例”为基础的关于放射性物质安全运输遵章保证的安全导则草案。该安全导则将为希望制定计划以确保有关放射性物质安全运输的国家条例得到遵守的主管部门提供详细的建议。该导则还将有益于有既定计划并谋求与“运输条例”的国际实施更加协调一致的主管部门。此外，该导则还将有助于使用者与主管部门之间的互动。

原子能机构已经编写了关于放射性物质安全运输辐射防护计划的安全导则草案，并且召开了两次技术会议进一步审议有关这一主题的国际导则。

2005 年 7 月，民航驾驶员协联公布了民航驾驶员协联危险货物委员会的立场，其中指出，“民航驾驶员协联危险货物委员会支持运输所有各类危险货物，包括放射性物质，只要这种运输严格按照民航组织附件 18 和相关的《空中安全运输危险货物技术手册》的规定进行。在考虑拒绝承运是否适当时，必须加以明确的是，安全问题始终是压倒一切的因素，其他问题永远不享有优先地位。”

2005 年，海事组织发布了一项在原子能机构协助下拟定的通告，其中呼吁其成员国考虑到已有足够的安全标准以及鉴于放射性物质运输对于健康和其他目的的重要性，不要拒绝运输遵照《国际危险货物海上运输法规》的规定装运的放射性货物。原子能机构应邀参加了国际货物装卸协调协会国际有限公司安全小组的审议，并向该小组通报了“运输条例”中的安全标准以及原子能机构在拒绝运输方面采取的行动。

2005 年 7 月，由八个沿岸国和承运国组成的一个小组在维也纳进行了非正式讨论，并计划举行更多的会议。与会者相当重视保持对话和磋商，以便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。

国际核责任问题专家组（核责任问题专家组）于 2005 年又举行了两次会议。原子能机构主持通过的核责任文书的解释性读本（包括一份适应现代需要的原子能机构核责任体制综述）现已翻译成原子能机构所有正式语文，该读本已作为 GOV/INF/2004/9-GC(48)/INF/5 号文件的附文提供给各成员国。该读本已在原子能机构网站发布，并将于 2006 年早些时候作为原子能机构《国际法律丛书》的一部分出版。

为了提供一个促进遵守国际核责任制度的平台，同时也为了提供一个论坛以公开讨论各国实行该制度可能存在的困难、关切或问题，核责任问题专家组还开展了一系列宣传活动，其中包括编写核责任领域的标准培训教材和组织地区讲习班。2005年11月28日至30日在澳大利亚悉尼举办了第一次核损害责任问题地区讲习班。第二次地区讲习班预定于2006年晚些时候在秘鲁利马举行。

在2005年各次会议期间，核责任问题专家组还对现有国际核责任文书的界限和范围中可能存在的一些缺陷和模糊之处进行了讨论，并做出了一些结论和建议。尽管上述解释性读本对其中的一些结论和建议作了论述，但还有一些结论和建议反映在本评论附件三所载“秘书处的报告”中。该报告还提供了关于核责任问题专家组自成立以来所作工作情况以及今后准备开展的活动的进一步资料。

K.3. 未来挑战

修订“运输条例”的新政策将增加条例的稳定性，并可以让成员国更容易地保持将其国家条例与现行版本的“运输条例”之间的协调一致。不过，在所有成员国实施2005年版“运输条例”是一项重要挑战。此外，及时实施其他运输安全和保安导则仍旧是一项挑战。

尽管做了很多工作来解决与拒绝承运有关的问题，但原子能机构还必须制订和实施一项减少拒绝承运问题频繁发生的国际行动计划。原子能机构打算成立一个咨询委员会对该行动计划的实施提供指导。

在许多成员国，根据运输方式的不同，两个或更多的监管机构有权监管放射性物质的运输。在某些情况下，各监管机构的职责并未明确加以划分。然而，在许多情况下，各机构之间的相互联系需要更明确的界定。

L. 放射性废物管理和处置安全

L.1. 趋势和问题

在每个成员国，根据废物性质、产生的废物数量和贮存和处置时可以利用的设施的性质的不同，对不同类型放射性废物采取的最适当的管理方案也各不相同。放射性物质的处置被认为是一种最终解决办法，而对其他类型废物来说，处置可能是在地表或近地表或深部地下进行。缺乏适当的处置方案意味着在某些情况下放射性废物必须要延长贮存，而且将需要更多的贮存设施。

更多的成员国开始对废物管理和处置问题从一种整体的角度加以考虑，即把所有因素和核材料与放射性物质的整个寿期都考虑进来。在这方面，对废物类型根据其特定管理方案的内在联系进行分类是一种有用的做法，原子能机构1994年“放射性废

物分类”就反映了这一点。然而，1994 年分类法并不全面，其中忽略了好几个重要的废物类型。原子能机构将该分类作为其“放射性废物管理安全行动计划”的一部分进行更新。

世界上目前有 100 多个近地表处置库，它们处置的废物占到已处置放射性废物的主要部分，但不包括采矿和矿物加工作业产生的废物，其中含有较高水平的天然存在的放射性核素。这些近地表设施的质量有差异，有一些属于几十年前开发的设施，目前正在对其进行改造，以使其符合现代标准。实现近地表处置库系统安全的设计方法现已得到明确的承认。对于这种系统来说，对安全标准的遵守可以通过专设屏障、自然系统和有组织控制以防止无意闯入相结合的办法实现。2005 年，匈牙利和大韩民国选定了发展新的近地表设施的候选场址；澳大利亚和瑞士采取了便于就候选场址的选择做出决定的法律/行政措施；加拿大做出了发展中低放废物深部处置设施的决定。

继续将很大的注意力重点放在对高放废物的地质处置上。在好几个成员国，近年来在实现地质处置库运转方面所取得的进展仍在继续。要想为子孙后代提供长期的保护，就必须使用预测模型和典型假想方案来确保设施符合安全标准和辐射安全标准。这是一个十分棘手的课题，目前一些成员国正在采取不同的安全论证方法。

许多成员国需要地质处置的放射性物质数量相对较少。如果每个国家都发展自己的地质处置库，所付出的代价将会太大。因此，在欧洲联盟的一定程度的支持下，在地区一级已经开展了一些研究，目的是研究建立地区处置库以便放置若干个国家的废物的可行性。然而，目前尚未确定潜在的场址，对这一问题将不得不根据其进一步实施国家处置项目的潜在影响进行进一步的审议。

地球表面已经存放了大量来自放射性矿石的开采或水冶的废物，或来自产生含天然放射性核素废物的其他工业的废物。这些场址当地居民的辐射照射剂量可能超过了对公众规定的辐射防护限值。由于废物量很大，可以采取的实际防护措施十分有限。需要制定关于这些场址安全管理的国际导则以及确保其得到遵守的措施。

用来论证废物管理和处置设施安全的安全案例概念在全世界正在越来越多的得到普及，但关于这些安全案例的结构和内容的共识仍在形成之中。不过，已有的一致意见表明，安全案例应该包括所有论证安全的论点和论据，并且应当论述工程和设计理由是否充分，进行定量安全评定并论述项目所有方面的管理制度是否适当。另外的一致意见认为，安全案例将随着项目的进行而编写，但必须编写得适当，以便为选址、设计和总体布置的核准、建造、运行和关闭等重大决策提供支持。为了建立对放射性废物管理和处置设施安全的信任，现在还越来越多地采取同行评审的办法对其安全进行评价。

L.2. 国际活动

芬兰已经开始在 Onkalo 地质处置设施场所建设一个地下实验室。美国正在重新审查其尤卡山的安全标准，以便考虑较长期的问题。法国已经编写出关于黏土环境下地

质处置设施概念的“2005 年档案”。中国正在探索如何加快其地质处置计划的进度，日本则继续考虑可能的废物处置国问题。

理事会在 2005 年 9 月会议上核准了关于地质处置的“安全要求”。就这些要求达成的协商一致意见将成为审议和论证这些设施安全的一个国际参考基准。

2005 年 10 月，在日本东京举行了“放射性废物处置安全国际会议”。来自世界各地的与会者交流了以下方面的信息：放射性废物处置安全；确定适当的废物处置方案；安全标准；介绍安全观点和论证标准遵守情况的安全案例；安全评定方法；处理不确定性；监管审查和利益相关者的参与问题。

正在开展一些国际项目，以通过钻孔处置技术帮助消除全球性的密封废辐射源问题。对一些成员国来说，这种处置概念提供了与这种放射性废物潜在的危险相称的处置方案前景。然而，在这一概念的安全论证方面以及在发展钻孔处置设施许可证审批所需的监管能力方面还必须开展更多的工作。

许多项目目前都在原子能机构的有关工作计划内进行，该计划规定了制定与放射性废物安全有关的安全评定方法和对这种方法进行对比。关于对近地表处置设施适用安全评定方法的计划和关于安全评定推动放射性废物管理解决方案的计划正引起成员国的广泛兴趣。

原子能机构正在开展一个共同框架项目，其目的是主要从危险的角度确定每一大类废物最适当的处置方案。在确定废物类型与处置方案之间的联系时考虑了废物安全标准，但的确也承认，国家战略必须涉及该国和可利用设施内产生放射性废物的活动的数量和类型。

L.3. 未来挑战

原子能机构有关放射性废物管理安全的活动，包括安全标准制定及其采用和适用，都将根据东京会议的结论和 2004 年 12 月在西班牙科尔多瓦举行的低放废物处置国际专题讨论会的结论重新加以审查。

目前正在考虑在中等深度的设施中处置那些不适合近地表处置的某些类型的废物。这种较深度处置所带来的隔离和包容方面的额外好处需要作进一步评价，在这样的深度适合处理哪种废物也需要加以确定。

随着放射性废物的继续累积，对放射性废物延长贮存的影响进行评价将具有更加重要的意义。延长贮存的安全影响需要详细地加以阐述和进行系统的评价，对延长贮存情况可能需要制定具体的安全标准。这种评价必须不仅考虑到遗留废物，而且还要考虑到今后将产生的废物。

未来的另一个重要挑战是在一个或多个国家通过许可证审批和运行对钻孔处置的适宜性和可行性进行验证。

同放射性废物处置设施安全案例的监管评审和评价及其起支持作用的安全评定过程一样，对这种安全案例概念也需要形成共识。

M. 退役

M.1. 趋势和问题

退役是一种正在扩大的业务，更多的成员国现已认识到使用或生产放射性物质的所有设施都将需要实施退役，而不仅仅是核电厂需要实施退役。特别是已经确定了更多已关闭或行将关闭的研究堆，而且目前正在更多地考虑早期退役计划。然而，对于许多设施来说，退役资金仍然是一个令人关注的问题，许多国家缺乏足够适当的监管和营运基础结构来支持退役，其中包括缺乏适当的废物处置解决方案。

世界各地现已积累了大量的退役经验。然而，这种经验尚未进行系统收集，因此还很难与他国分享。

M.2. 国际活动

目前正在规划以确定一个研究堆退役示范项目。该项目将提供一个培训场所，以便让今后规划和实施退役项目的代表学习实际的经验。

M.3. 未来挑战

退役活动自 20 世纪 50 年代初期以来一直在进行，而且已经积累了丰富的经验。因此，在决策者、监管者、辐射和废物安全专家以及核工业之间就以往退役项目的规划和实施过程中汲取的教训开展广泛的信息交流活动的时机似乎已经成熟。特别是有关支持退役过程所需适当水平的基础结构和启动退役规划过程的适当时机的信息极为重要，这一情况尚未得到充分强调。

N. 受污染场址的恢复

N.1. 趋势和问题

1986 年发生的切尔诺贝利事故涉及放射性核素向环境的大量释放。各国政府为应对该事故后果所采取的防护对策基本上是及时和适当的。但现代研究表明，必须对这些努力的方向进行调整。必须将白俄罗斯、俄罗斯和乌克兰受影响地区的社会和经济恢复以及消除公众和应急工作人员的心理负担作为优先考虑事项。今后几十年应当

继续就切尔诺贝利事故在环境、健康和社会等方面产生的一些长期后果进行有针对性的研究和监测。保存在缓解事故后果方面建立的隐性知识是至关重要的。

在前苏联所属整个中亚国家，存在着由许多过去铀矿开采和加工活动遗留的场址。这些场址包括废弃的采矿场、从前的加工设施以及许多含有相关残留物的场所。这些残留物包括尾矿和废石以及废金属垃圾堆和废弃的基础设施。所有这些场所都对居民和环境的安全构成了放射学、化学和物理学方面的潜在危害。

N.2. 国际活动

2005 年，切尔诺贝利论坛⁷完成了它的工作，并发表了两篇技术报告：其中一篇报告讨论了切尔诺贝利事故的环境后果，另一篇则讨论了该事故的健康影响。这两篇报告已经论坛参加者详细审议，并获得了一致接受。论坛参加者还一致认为，经核准的报告是论坛成员关于切尔诺贝利事故的环境和健康后果以及今后采取建议行动的共同立场。此外，论坛摘要报告“切尔诺贝利事故的遗留问题：健康、环境和社会经济影响以及对白俄罗斯、俄罗斯联邦和乌克兰政府的建议”既考虑了科学问题，也考虑了对受影响的各国政府和相关国际组织的实际建议。

2005 年 9 月在维也纳举行的“切尔诺贝利——回顾过去，发展前进”国际会议期间介绍、讨论并核准了切尔诺贝利论坛的所有报告。联合国秘书长在 2005 年 10 月 24 日提交联合国大会的 A/60/443 号报告“优化国际研究、减轻和尽量减少切尔诺贝利灾难后果的努力”中以及在 2005 年 11 月 10 日联合国大会 A/60/L.19 号决议“加强国际合作并协调研究、减轻和尽量减少切尔诺贝利灾难后果的努力”中也注意到该论坛参加者达成的共识。

发表了对位于阿尔及利亚因艾凯尔和拉甘的前法国试验场初步放射性评定的结果。该报告提供了一些供阿尔及利亚政府考虑的建议。拟订了关于哈萨克斯坦塞米巴拉金斯克前苏联核武器试验场放射性评定的初步计划。这些计划的制订及其随后实施是通过国际工作组合作努力的结果，并得到了欧洲联盟的支持。对于该试验场中符合国际解控标准的那些部分实施解控以便当地居民进行重建发展，存在着相当大的压力。

根据原子能机构的一个地区技术合作项目，目前正在哈萨克斯坦、吉尔吉斯斯坦、塔吉克斯坦和乌兹别克斯坦举办一系列讲习班，目的是改进监督和监测系统，并规划对铀矿开采和加工遗留场址实施恢复的办法。除举办讲习班外，该项目还提供了适当的设备以增强上述各成员国当局的监督和监测能力，并组织 and 实施了一项科学访问计划。该项目也涉及与该地区开展相关项目的其他机构保持联系。

⁷ 该论坛的参加者是联合国系统的八个组织（原子能机构、世卫组织、联合国开发计划署（开发计划署）、粮农组织、联合国人道主义事务协调厅（人道主义事务协调厅）、联合国环境规划署（环境规划署）、联合国辐射科学委和世界银行）以及白俄罗斯、俄罗斯联邦和乌克兰的主管当局。

N.3. 未来挑战

已毁坏的切尔诺贝利 4 号机组的退役和切尔诺贝利禁区内放射性废物的安全管理以及该地区的逐步恢复在可预见的将来仍然是一个重要挑战。

已经提议将该地区项目扩大到包括开展一些有关尾矿和其他受影响残址恢复的具体计划。还必须继续与其他机构保持联系，以确保实现综合性援助工作的最优化。

已经确定了另外一些核武器试验场，可能需要对这些场址进行放射学评定，以确定是否能够对其中的一些部分实施解控以进行经济发展。

O. 事件和应急准备与响应

O.1. 趋势和问题

事件和紧急情况仍时有发生，并经常涉及失踪、被盗、受损或被发现的源，这些情况可能引起公众的不当忧虑，而且虽然似乎不大可能导致核设施发生跨境影响的紧急情况，但仍然存在这种可能性。应急准备和响应计划对于工作人员以及在核装置和使用放射性物质的任何附近地方生活的公众的安全是必不可少的。近年来，这种准备的重点已经从核电厂的应急准备转向不仅包括所有核装置的应急准备，而且包括对放射性事件和紧急情况的普遍关注，也包括对恶意使用放射性物质的普遍关注。

总之，人们对应急响应特别是对当地努力和能力的兴趣有所提高，而且一般而言，核装置附近地区都具备一些处理放射紧急情况的能力。但对于全世界大多数国家的地方政府而言，有效地处理放射紧急情况仍然是一项挑战。一线响应人员（消防人员、救护人员、警察）特别需要适用于处理放射紧急情况的完善训练、程序和设备。

许多成员国仍然认为很难加强其应对国外事件的应急准备计划。规定在紧急情况下向邻国通报及时和全面的信息是在可能受影响的国家成功地实施应急对策的关键所在。

任何规模的核或放射性事件和紧急情况都可能造成广泛而复杂的影响，这是确实存在和预见到的影响。最近的经验已经表明，核或放射性事件和紧急情况的影响很少局限于一个地区或一个国家，它们也可能直接和间接地也影响到国际社会。为便于政府当局或公众作出可靠的决定，就必须进行有效的信息共享，而只有通过扩大在发生事件或紧急情况期间和之后的信息交流的公开性、透明度和速度，才能做到这一点。

成员国已经为响应其本国境内的事件和紧急情况做出了不同的国家安排。成员国响应小组的类型、技术产品、设备、培训和运作方法各不相同，由此导致在提供有效的国际援助方面出现明显的问题。

0.2. 国际活动

机构间核应急响应委员会对相关国际政府间组织有关核或放射紧急情况准备和响应的安排进行协调。机构间核应急响应委员会规划和举行国际核应急演习，并分析和分享国际核应急演习的结果。在过去的 10 年中，进行了多次国际核应急演习，并获得了许多经验。

总干事在 2005 年设立了事件和应急中心，以此作为原子能机构就事件和紧急情况进行联络、准备和响应的联络点。通过该中心，成员国及其主管当局、国际组织、技术专家和秘书处能够有效地分享信息和经验并对部署事件和紧急情况准备或响应的援助工作进行协调。

原子能机构正在实施“加强核和放射紧急情况国际准备和响应系统的国际行动计划”。该行动计划包括三个主要领域，即国际通讯、国际援助和可持续的基础结构。2005 年，通讯工作组和援助工作组制订了一些文件草案，它们提出了有关实现国际统一通讯系统和加强核和放射性事件和紧急情况国际援助的概念和战略。

最近的国际核应急演习是 2005 年 5 月举行的代号为 ConvEx-3（2005 年）的应急演习。这次演习是基于罗马尼亚的一次国家演习，并以 Cernavoda 核电厂 1 号机组作为事故机组。Cernavoda 核电厂工作人员与罗马尼亚国家核活动控制委员会以及机构间核应急响应委员会国际联合演习工作组共同为这次演习拟定了假想方案。对实际紧急情况下将需要的关键系统进行了检验，并确定了若干需要改进的机会。评价小组的最后报告将是对该行动计划的一个重要投入。

原子能机构还发表了“国际组织联合辐射紧急情况管理计划”（联合计划）⁸，该计划论述了响应的目标、参与响应的组织、这些组织的作用和职责、它们之间以及它们与各国的相互配合、运行概念和准备安排。各组织在其各自的应急计划中都反映了这些安排。该联合计划没有规定各参加组织之间的安排，但论述了对每个组织在响应期间和作出准备安排时应当如何采取行动问题的共同理解。

2005 年 7 月在维也纳举行了根据“及早通报公约”和“紧急援助公约”确定的主管当局代表第三次会议。与会者核准了若干文件，并审议了 ConvEx-3（2005 年）评价报告。与会者还就加强现有演练和演习机制达成了一致意见，并建议该机制在适当时应涵盖所有地区，而且这些演习应当既涉及核事故，也涉及放射紧急情况，包括恶意行为导致的放射紧急情况。

原子能机构继续与国际放射防护委员会和世卫组织等不同的国际组织合作，制订能够克服在应对过去紧急情况期间确定的当前国际导则中所存在缺陷的标准。此外，

⁸ 该计划系由粮农组织、经合组织/核能机构、人道主义事务协调厅、世卫组织、气象组织、欧洲委员会、泛美卫生组织、欧洲刑警办事处、国际刑警组织、环境规划署和联合国外层空间事务处（外空处）与民航组织合作共同制订。

原子能机构还在集中精力协助成员国迅速建立应对放射紧急情况的最低限度能力，重点是一线响应人员准备方面的能力。

2005 年，原子能机构印发了一些文件，包括“为检验核或放射紧急情况期间核或放射紧急情况方面的准备和医疗响应的一般程序而进行的演习的准备、实施和评价”，目的是帮助成员国加强应急准备和响应。原子能机构还为有关在世界范围内实施应急准备和响应的培训班和技术合作项目提供了支持，并对一个成员国进行了同行评审。

0.3. 未来挑战

一个关键性挑战是要确保紧急情况的一线响应人员在处理电离辐射方面获得适当的培训。同样重要的是应当以简明的语言提供实用资料，以便国家地方当局和公众能够作出知情决定。这种培训和资料必须考虑有关放射学影响的最新信息。

有必要进一步协调和统一国际应急援助和通讯。这将涉及加强应急准备计划，包括使应急管理中心实现现代化和举行更广泛的应急演习。在紧急情况下向邻国和可能受影响的国家迅速传递信息仍然是一项挑战。

与许多其他核和放射性安全领域一样，世界各地在应急响应和准备方面积累了丰富的经验。最近，专家们通过不同的程序报告了这些经验，有必要建立一个协调系统来集中和宣传这些经验。需要将在核安全网方面取得的经验推广到应急准备和响应领域。

Annex 1

Safety related events and activities worldwide during 2005

A. Introduction

This annex identifies those safety related events or issues during 2005 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 issues during 2005.

B. International legal instruments

B.1. Conventions

B.1.1. Convention on Nuclear Safety (CNS)

In March 2005, India ratified the CNS, which now has 56 Contracting Parties, including all Member States operating nuclear power plants.

From 11 to 22 April 2005, Contracting Parties to the CNS met in Vienna for the 3rd Review Meeting, with 50 of the Contracting Parties and over 500 delegates in attendance. The participants conducted a thorough peer review of the national reports which Contracting Parties had submitted in 2004. The many important findings and conclusions during the Review Meeting will serve as valuable guidance for the Agency in implementing its future safety programmes. The Contracting Parties made specific reference to the relevant IAEA Safety Standards as a tool to assist in the review process and recognized the value of the Agency's safety services, such as operational safety and regulatory reviews.

All Contracting Parties identified the fundamental need for openness and transparency in the nuclear industry. There was also special emphasis put on the need for both regulators and operators to show leadership in nuclear safety and about the need to continue and improve communication between regulators and operators. Safety management received a great deal of attention, and is particularly important for operational safety. Probabilistic Safety Assessment is now a mainstream tool in most countries, although every Contracting Party stressed that it is not used in isolation. More and more countries are now requiring periodic safety reviews as part of their regulatory regimes. Knowledge management continues to be important as experienced staff retire and as facilities move into extended operation. The meeting also noted the important role that peer reviews, such as those offered by the Agency and the World Association of Nuclear Operators (WANO), have in maintaining and improving operational safety. Finally, the meeting reinforced the fact that the IAEA Safety Standards

have matured and now offer a comprehensive suite of nuclear safety standards that embodies good practices and a reference point to the high level of safety required for all nuclear activities.

The Contracting Parties also noted that during the first decade of the CNS, there was a focus on tackling specific technical issues of concern in the world. By and large, these technical issues are being addressed and many improvements have taken place. The challenge for the next decade therefore is to avoid any complacency resulting from this success and move the focus on safety to the next plateau. The CNS is not just a triennial exercise and gathering of nuclear professionals, but is instead an ongoing process that looks to continually promote the advancement of nuclear safety.

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)

The Early Notification Convention aims to strengthen international cooperation and exchange of information about nuclear accidents, as early as possible, to minimize transboundary radiological consequences. In 2005 Chile ratified and El Salvador, Qatar and the United Republic of Tanzania acceded to the Early Notification Convention. As of the end of 2005, there were 97 parties to the Early Notification Convention.

The Assistance Convention requires that States and Contracting Parties cooperate between themselves and with the Agency to facilitate prompt assistance in the event of a nuclear accident or radiological emergency to minimize its consequences and to protect life, property and the environment from the effects of radioactive releases. In 2005 Colombia, El Salvador, Qatar and the United Republic of Tanzania acceded to the Assistance Convention, which had 94 parties at the end of 2005.

The Third Meeting of the representatives of competent authorities identified under the Early Notification and Assistance Conventions was held in Vienna from 12 to 15 July 2005. It was attended by 101 representatives of competent authorities from 60 Member States (56 of which are Parties to the Early Notification and/or the Assistance Convention) and by representatives of the World Meteorological Organization (WMO) and the FAO. In addition, observers attended from the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA), the European Commission and the UN Office for Outer Space Affairs.

The Meeting reviewed progress achieved since the last meeting in 2003 and discussed and approved documents prepared under the International Action Plan⁹ — specifically proposals relating to strategies for enhancing international assistance and international communication in the event of a nuclear accident or radiological emergency. Participants also reviewed the evaluation of the ConvEx-3 (2005) international exercise¹⁰ and lessons learned and identified future activities.

The Third Competent Authorities' Meeting:

- agreed on a proposal for enhancing the existing drill and exercise regime, recommending that the regime cover all regions over a suitable time period and

⁹ International Action Plan for strengthening the international preparedness and response system for nuclear and radiological emergencies, GOV/2004/40 (Corrected).

¹⁰ The ConvEx-3 command post exercise was based on a Romanian national emergency exercise held 11–12 May 2005, and involved the participation of 62 Member States and 8 international organizations over 39 hours. The exercise tested the international information exchange arrangements and mechanisms for providing public information in the early phase of a postulated serious nuclear emergency at the Cernavoda nuclear power plant. The Secretariat is grateful to the Government of Romania for hosting and providing support for this exercise.

- that the exercises should address both nuclear accidents and radiological emergencies, including those arising from malicious acts;
- recommended to the Secretariat that it consider taking a more active role in the implementation of the International Action Plan using its normal mechanisms to accelerate implementation while ensuring coordination with the NCACG¹¹;
 - encouraged competent authorities to initiate a request to develop a Code of Conduct for the International Emergency Management System.

In 2005, the Agency was informed of 170 events involving or suspected to involve ionising radiation. Of these, 137 events involved very low activity radiation sources and had no impact on the public or the environment. There were 14 events reported involving radiation sources used in radiography where exposure to workers exceeded regulatory limits, another eight reported cases involving “dangerous” radiation sources and nine other events which occurred at nuclear facilities.

In 15 cases, the Agency was requested to provide assistance pursuant to the Assistance Convention and in eight other cases the Agency offered its good offices. In another four cases, either individuals or the media informed the Agency and this information was uncorroborated. In all cases, the Agency took actions, such as authenticating and verifying the information, providing official information or assistance to the requesting party, and offering the Agency’s good offices.

In four cases, the Agency either sent a fact-finding mission or facilitated multi or bilateral assistance and discussions among the parties involved.

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

The Joint Convention applies to spent fuel and radioactive waste resulting from civilian nuclear activities and to planned and controlled releases into the environment of liquid or gaseous radioactive materials from regulated nuclear facilities. In 2005, Uruguay and Euratom acceded to the Joint Convention, which had 34 parties at the end of 2005 (for Euratom and Uruguay the Joint Convention will enter into force on 2 and 28 March 2006 respectively). Considering that the vast majority of Member States have some requirements for radioactive waste management, it is hoped that more States adhere to the Joint Convention. The Agency conducted four seminars where more than 30 Member States received presentations regarding the benefits of adherence to the Joint Convention.

In preparation for the 2nd Review Meeting of the Contracting Parties to the Joint Convention in May 2006, the organizational meeting took place in Vienna from 8 to 9 November 2005. This meeting elected the Officers and established the Country Groups for the Review Meeting. The Contracting Parties also held an Extraordinary Meeting to formally approve revised Rules of Procedure and Financial Rules, revised Guidelines regarding the review process and new Guidelines regarding the topic sessions in the review process.

B.1.4. Convention on the Physical Protection of Nuclear Material (CPPNM)

The CPPNM inter alia obliges Contracting States to ensure, during international nuclear transport, the protection of nuclear material within their territory or on board their ships or aircraft. At the end of 2005, there were 116 parties to the CPPNM.

¹¹ The National Competent Authorities’ Coordinating Group (NCACG) was established at the Second Meeting of Competent Authorities in 2003 to manage tasks assigned to the competent authorities by the Meeting.

On July 8, 2005, delegates from 89 countries agreed on an amendment to the CPPNM that will substantially strengthen the convention. The amended CPPNM makes it legally binding for States Parties to protect nuclear facilities and material in peaceful domestic use, storage as well as transport. It will also provide for expanded cooperation between and among States regarding rapid measures to locate and recover stolen or smuggled nuclear material, mitigate any radiological consequences of sabotage, and prevent and combat related offences. The new rules will come into effect once they have been ratified by two-thirds of the States Parties of the CPPNM.

B.2. Codes of Conduct

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

The Code of Conduct on the Safety of Research Reactors is a non-binding international legal instrument designed to achieve and maintain a high level of safety in research reactors worldwide through the enhancement of national measures and international cooperation. It provides “best practice” guidance to Member States, regulatory bodies and operating organizations for management of research reactor safety. The Code was adopted by the Board in March 2004 and endorsed by the General Conference in September 2004.

In December 2005, in response to a request from the Contracting Parties to the Convention on Nuclear Safety, the Agency held an open-ended meeting to discuss how best to assure effective application of the Code of Conduct. Thirty-one Member States were represented at this meeting. It was agreed that, while national commitments would be valuable, commitment is best displayed through participation in meetings for exchanging information and experience on application of the Code of Conduct, rather than through a unilateral undertaking. Periodic meetings to discuss topics related to application of the Code of Conduct, to exchange experience and lessons learned, identify good practices, discuss future plans, and discuss difficulties encountered and assistance required to reach full compliance were called for. The meeting also called for an Internet site on which documents related to the periodic meetings can be posted to facilitate exchange of information. Finally, there was a call for the Code of Conduct to be integrated into all Agency safety assistance and review activities, and for consideration to be given to updating the Project and Supply Agreements to reflect the provisions of the Code.

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

This non-binding international legal instrument applies to civilian radioactive sources that may pose a significant risk to individuals, society and the environment. The Code’s objectives are to achieve and maintain a high level of safety and security of radioactive sources. By the end of 2005, 79 States had expressed their political support and intent to work toward following the Code.

One section of the Code of Conduct on the Safety and Security of Radioactive Sources is devoted to the import and export of high activity radioactive sources. Additional details are provided in the *Guidance on the Import and Export of Radioactive Sources* (the Guidance) which was endorsed by the General Conference in 2004 and published as supplementary guidance to the Code of Conduct. Work has continued throughout 2005 to facilitate the implementation of the Guidance, with some States wishing to do so by the beginning of 2006. Noting the findings of the *International Conference on Safety and Security of Radioactive Sources: Towards a Global System for Continuous Control throughout their Life Cycle* in Bordeaux, the Agency held a meeting in Vienna in December 2005 for States to share experiences in implementing the supplementary guidance on the import and export of radioactive sources. Participants from 54 Member States and observers from the European Commission, the World Customs Organization and the International Source Suppliers Association attended. At the meeting, participants noted the multilateral nature of the Guidance and recognized the

importance of States making a political commitment to implement the guidance in a harmonized manner. Most participants also encouraged States to provide details of contact points to the Agency for the purposes of sharing the information with other States. Participants also recognized the need for flexibility whilst States work towards implementing the guidance. Communication between exporting and importing States will be important and participants considered two draft “model” forms — *Request for Consent* and *Notification of Shipment* — that States could adapt for use. Finally, a number of future challenges were identified a number of future challenges that will need to be addressed if the Guidance is to be implemented in a harmonized manner.

C. Cooperation between national regulatory bodies

There are a number of forums in which regulators can exchange information and experience with their counterparts in other countries. Some of these are regional, some deal with particular reactor types and others are based on the size of the nuclear power programme. All of these forums meet regularly to exchange information of common interest and some are developing exchange mechanisms involving the Internet for more rapid means of communication. In addition, selected safety issues of wide interest to regulators are discussed at a meeting of senior regulators held in association with the Agency’s General Conference each year.

C.1. International Nuclear Regulators Association (INRA)

INRA comprises the most senior officials of a number of well-established national nuclear regulatory organizations who wish to exchange perspectives on important issues on nuclear safety with the purpose of influencing and enhancing nuclear safety from a regulatory perspective. INRA met twice in 2005 under German chairmanship.

INRA members exchanged views on the management of ageing processes in NPPs and aspects of knowledge management and informed each other on recent developments regarding nuclear safety regulation in their countries. INRA members also discussed experiences from nuclear safety review and regulatory oversight of an EPR Type Plant. The procedures and processes of the Convention on Nuclear Safety were also discussed.

INRA continued to focus on the issue of independence of nuclear regulatory bodies. Structures of the respective national authorities and possible criteria or key elements for effective independence were discussed. Members agreed to keep the issue on their agenda.

C.2. G8-Nuclear Safety and Security Group (G8-NSSG)

Under the presidency of the UK, the G8-NSSG met three times in 2005. The Agency, OECD/NEA and the European Bank for Reconstruction and Development also attend these meetings. Issues discussed included the Chernobyl Shelter, waste processing facilities at Chernobyl, the Agency’s Code of Conduct on the Safety and Security of Radioactive Sources and the additional guidance on export/import control. Upon request of the Russian Government, the G8-NSSG has established a Peer Review Working Group to provide assistance to the Russian Federation in the preparation of technical regulations for nuclear and radiation safety. The peer review meetings held in 2005 focused on the general and special technical regulations (nuclear reactors and fuel cycle facilities; management of nuclear materials; radioactive substances and radiation sources; radioactive waste management; and transport of nuclear materials and radioactive substances).

C.3. Western European Nuclear Regulators Association (WENRA)

WENRA is comprised of the heads of nuclear regulatory bodies from 17 European countries and has launched working groups on reactor safety and nuclear waste safety. The mandate of these working groups is to analyse the current situation and the different safety approaches, compare individual national regulatory approaches with the IAEA Safety Standards, identify any differences and propose a way forward to possibly eliminate the differences without impairing the final resulting level of safety. The proposals should be based on the best practices among the most advanced existing requirements. The working groups completed their activities at the end of 2005 and WENRA has planned a seminar for stakeholders for February 2006 to present WENRA's report on common reference levels.

C.4. The Ibero-American Forum of Nuclear Regulators

This Forum met from 17 to 19 January 2005 in Rio de Janeiro, Brazil, with the chief regulators from Argentina, Brazil, Cuba, Mexico and Spain attending. At that meeting, the Forum established a Technical Executive Committee to coordinate and supervise the implementation of the Ibero-American Radiation Safety Network.

The Agency continued to support the activities of the Forum in the frame of an extrabudgetary programme dedicated to radiation safety. The programme involves sharing knowledge and experience and mutual learning on safety standards, control of radioactive sources, protection of patients and education and training.

C.5. Cooperation forum of state nuclear safety authorities of countries which operate WWER¹² reactors

The Forum provides an opportunity for senior staff of regulatory bodies in countries operating WWER reactors to exchange information on various regulatory issues and share recent experiences. The 12th Annual Meeting of this Forum was held in July 2005, with 16 representatives, mostly Regulatory Body Heads and Deputy Heads, from eight countries operating WWER reactors participating. Observers from OECD/NEA, the German technical support organization (GRS) and the French Institute for Radiological Protection and Nuclear Safety (IRSN) also attended. The national reports — highlighting the new developments within the last year in the national nuclear industries and regulatory bodies — were presented and discussed. Presentations were also given by the Agency, OECD/NEA, GRS and IRSN and discussed by the participants. The participants also agreed to expand the membership to China, India and Iran where new WWER reactors are under construction.

Under the WWER Forum, the second meeting of the I&C¹³ Working Group was held in November 2005 in Germany to evaluate and share the experience with digital I&C of NPPs for WWER units.

C.6. Network of regulators of countries with small nuclear programmes (NERS)

The current membership of NERS includes Argentina, Belgium, Czech Republic, Finland, Hungary, Netherlands, Pakistan, Slovak Republic, Slovenia, Switzerland, South Africa. The Eighth Annual

¹² water cooled, water moderated power reactor

¹³ Instrumentation and Control

Meeting of Network of Regulators of Countries with Small Nuclear Programs was held in Pakistan in 2005. Discussions at the meeting included:

- Assessment of and management of safety and safety culture in licensees;
- Quality management and ways of maintaining corporate knowledge in regulatory bodies, including training needs assessments and competency profiles;
- Regulatory aspects of licensing new NPPs;
- Regulatory challenges and areas for improvement; and
- Learning from operational experience and safety assessments.

C.7. The senior regulators from countries which operate CANDU-type nuclear power plants

The annual meeting of senior regulators from countries which operate CANDU-Type NPPs (Argentina, Canada, China, India, Republic of Korea, Pakistan and Romania) was hosted by the Atomic Energy Regulatory Board of India in November 2005. The meeting agenda included: the group's mandate; operational experience feedback and significant events; probabilistic safety assessment (PSA) for CANDU, including feedback from the specialists' meeting and from plant specific PSAs; feeder pipe thinning and cracking; regulatory requirements for secondary side inspections; periodic safety review updates; regulatory effectiveness; and issues specific to pressurized heavy water reactors from the 3rd Review Meeting of the Convention on Nuclear Safety. Participants also discussed how to measure, enforce and promote safety culture.

D. Activities of international bodies

Several international expert bodies issue authoritative findings and recommendations on safety related topics. The advice provided by these bodies is an important input to the development of the Agency's safety standards and other international standards and is frequently incorporated in national safety related laws and regulations. The recent activities of a number of these bodies are reviewed in this section.

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

UNSCEAR, an international body reporting to the United Nations General Assembly, includes the leading specialists in the field. UNSCEAR reviews epidemiological studies and results from fundamental radiological research to assess the health risks from radiation exposure. Its extremely detailed reports — globally acknowledged as being authoritative — are a synthesis of thousands of peer-reviewed references. These reports provide the scientific basis for radiation protection schemes and basic standards formed by international and national organizations.

The Committee held its fifty-third session in Vienna in September 2005. At that session, the Committee held detailed technical discussions that resulted in clear direction as to the content and form of its future scientific annexes. The deliberations focused on topics that included analyses of exposures of workers and the public to various sources of radiation; re-evaluation of the risks from radon in homes and workplaces; review of the risk and effects of radiation on non-human biota; consideration of new evidence for the mechanisms by which ionizing radiation can induce health effects; evaluation of new epidemiological studies of radiation and cancer; review of evidence for

diseases other than cancer that might be related to radiation exposure; analysis of the wide variability globally in medical radiation exposures; and analysis of the health impacts due to radiation from the Chernobyl accident.

The Committee had participated in the Chernobyl Forum, whose important mission had covered many aspects of the Chernobyl accident, including the review of radiation health effects. The Committee noted that recent findings of the Forum had affirmed the scientific conclusions on the health consequences due to radiation from the Chernobyl accident. The Committee will continue to provide the scientific basis for better understanding of the radiation health effects of the accident.

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

The ICRP is an independent group of experts that issues recommendations on the principles of radiation protection. ICRP recommendations have provided the basis for national and international standards including the International Basic Safety Standards (BSS). Appointments to the ICRP and its Committees are made for periods of four years, and a new cycle began in July 2005. In 2005, a new Committee was established to consider specifically the protection of the environment.

The current version of the ICRP Recommendations was issued in 1990 and in June 2004, the ICRP issued a draft revision for public consultation. At its March 2005 Meeting, after reviewing the extensive comments received, the ICRP decided that the new Recommendations would not be ready for publishing in 2005 and that the ICRP would focus its attention on the Foundation Documents — supporting the Recommendations — being prepared by the Committees. In 2005, the ICRP consulted on Foundation Documents concerning the following topics:

- Optimisation of radiological protection;
- Assessing dose to the representative individual;
- Health risks attributable to radiation;
- Dosimetric quantities for radiological protection; and
- Reference animals and plants for protection of non-human species.

After consultation, amended versions of the first four documents were approved in principle and these are currently being copy-edited for publication. The fifth draft, on reference animals and plants, and the consultation comments were handed over to the new committee on protection of non-human species as working material.

In 2005, the ICRP also approved for publication reports on:

- A new, more sophisticated model of the human alimentary tract for radiological protection which will be used to calculate updated information on dose per unit intake; and
- Cancer risks attributable to low-dose radiation.

The following ICRP reports were published in 2005:

- Publication 94: Release of patients after therapy with unsealed radionuclides;
- Publication 95: Doses to infants from ingestion of radionuclides in mothers' milk;
- Publication 96: Protecting people against radiation exposure in the event of a radiological attack;
- Publication 97: Prevention of high-dose-rate brachytherapy accidents; and
- Publication 98: Radiation safety aspects of brachytherapy for prostate cancer using permanently implanted sources (in press).

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

The ICRU, a sister organization of the ICRP, provides internationally acceptable recommendations concerning concepts, quantities, units, and measurement procedures for users of ionizing radiation in medicine, basic science, industry, and radiation protection. The current ICRU programme is focused on four areas:

- Diagnostic radiology and nuclear medicine;
- Radiation therapy;
- Radiation protection; and
- Basic science.

In 2005, the ICRU published reports on *Dosimetry of Beta Rays and Low-Energy Photons for Brachytherapy with Sealed Sources* (Report 72) and *Stopping of Ions Heavier than Helium* (Report 73).

D.4. International Nuclear Safety Group (INSAG)

The INSAG was chartered by the IAEA Director General to be an independent, authoritative body that could provide insights and recommendations to Member State governments, industry, the media, the public and the Secretariat. Its efforts focus on nuclear installation safety, but include any other issues that could relate to the safety of nuclear installations. INSAG is made up of 16 internationally recognized experts from around the world who serve for a four-year term. The group represents national regulatory bodies, the nuclear industry, academia and research institutions.

INSAG met twice in 2005 and continued its discussion on the following areas:

- **Global Safety Regime:** INSAG is seeking to further the development of a consistent and comprehensive approach to nuclear safety. INSAG's approach is to define an appropriate ultimate safety regime and then explore means to achieve it.
- **Safety Principles:** Safety principles are subject to change, in part as a result of the application of probabilistic approaches to complement deterministic analyses, the need to encompass fuel-cycle facilities as well as reactors, and the necessity to prepare for new reactor concepts and designs. INSAG is pursuing the conceptual aspects of this problem.
- **Operational Safety:** There are opportunities for continuing improvement of operational safety at existing plants. INSAG is defining some of these opportunities, guided by the experience of operators around the globe.
- **Stakeholder Involvement:** Various stakeholders have a legitimate expectation that they will be informed of nuclear matters and their active involvement can enhance nuclear safety. INSAG is encouraging openness in communication and to promote relationships between the nuclear enterprise and various stakeholders that could have a positive impact on nuclear safety. INSAG is developing insights as to when and how to enhance stakeholder involvement.

Additional thoughts from INSAG include developing a survey of how approaches to nuclear safety have changed over the past five decades to provide a backdrop for further change; dealing with and overcoming complacency that can arise from uneventful past operations; deteriorating nuclear infrastructure; and issues associated with nuclear waste.

E. Activities of other international organizations

E.1. Institutions of the European Union

On 12 November 2004 the European Commission adopted a proposal for a Council Directive intended to replace Directive 92/3/Euratom, on the supervision and control of shipments of radioactive waste between Member States and into and out of the Community. The text was submitted to the European Economic and Social Committee, which issued its opinion on 8 June 2005. The Commission proposal is now being finalised for submission to the Council for further discussion and adoption. The proposed new Directive, which should also apply to shipments of spent fuel intended for reprocessing, simplifies the procedures and ensures consistency with the latest Euratom directives¹⁴ and international Conventions¹⁵.

Agreements for cooperation in the peaceful uses of nuclear energy are now in force between the European Community and Uzbekistan and between the European Community and Ukraine. The objective of these Agreements is to provide a framework for strengthening the overall cooperation relationship.

On 24 January 2005, based on a Commission Proposal, the Council adopted a Decision approving the accession of the European Atomic Energy Community to the Joint Convention, including the declaration of competencies as foreseen in Article 39(4)(iii) of the Convention. On 14 June 2005, based on this Council Decision, the Commission adopted the necessary Decision on accession to the Joint Convention. The instruments of accession were deposited with the IAEA Director General on 4 October 2005, and entry into force was expected for 2 January 2006.

On 25 November 2005, based on Council Decisions, the Commission adopted the necessary Decisions on the accession to the Early Notification and Assistance Conventions by the European Atomic Energy Community¹⁶. The entry into force was expected 30 days after the date of deposit of instrument of accession.

E.2. Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA)

The Nuclear Energy Agency is a semi-autonomous body within the OECD maintaining and developing, through international cooperation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy. It operates mainly through a number of committees covering specific areas.

In the area of nuclear safety and regulation, the Committee on the Safety of Nuclear Installations (CSNI) and the Committee on Nuclear Regulatory Activities (CNRA), have developed a Joint Strategic Plan for safety, where special emphasis is placed on coordination and cooperation. Also, the OECD/NEA held a joint CNRA/CNSI Safety and Regulation Forum on Multilateral Cooperation in Nuclear Safety Research and Regulation in June 2005 in Paris. Over 100 participants took part in the meeting, including most top regulators and research managers from OECD/NEA countries. While

¹⁴ in particular Directive 96/29 Euratom on Basic Safety Standards, and Directive 2003/122/Euratom on the Control of High-activity Sealed Radioactive Sources and Orphan Sources

¹⁵ in particular the Joint Convention

¹⁶ OJ L 314, pp. 21 and 27

many insights were gathered by the participants throughout the Forum, the conclusions focused on four main issues:

- The need to continuously improve operating experience feedback;
- The need to obtain convergence between countries on nuclear safety practices;
- The need to conserve nuclear safety research; and
- The need to have good knowledge transfer.

The CNRA approved a report on regulatory decision making, which presents some basic principles and criteria that a regulatory body should consider in making decisions and describes the elements of an integrated framework for making regulatory decisions. In addition, a report was issued on regulatory inspection practices used to bring about compliance. CNRA approved the expansion of the mandate of the Working Group on Inspection Practices (WGIP) to cover an integrated assessment of lessons learnt from inspection activities. CNRA also approved a new mandate for the Working Group on Public Communication (WGPC) including stakeholder interaction and preparation of a new report on a general strategy for regulatory communications.

The CSNI reviewed the progress achieved by three of its working groups dealing respectively with ageing and structural integrity, risk assessment and operating experience, and by the special expert group addressing human and organisational factors. The CNSI approved the conclusions from the Workshop on PSA for non-reactor facilities and a new activity was endorsed on the use and developments of PSA in member countries. In the field of research facilities for existing and advanced reactors, a group of senior research managers was constituted to provide the necessary input and elaborate elements of strategy for maintaining key research facilities and possibly expanding their use. In 2005, the OECD/NEA published CSNI Technical Opinion Paper No. 7: *Living PSA and its Use in the Nuclear Safety Decision-making Process* and No. 8: *Development and Use of Risk Monitors at Nuclear Power Plants*.

The Radioactive Waste Management Committee (RWMC) finalised a report on *Roles of Storage* that examines the position of storage in various national strategies for the management of long-lived waste and spent nuclear fuel, and clarifies the motivations and the implications on waste management programmes. The RWMC is proceeding with its technical activities to support the safety case for geological disposal and has started a broader initiative to review international experience in preparing a modern long-term safety case. Major outcomes include a report on the practical experiences of compiling safety cases for geological repositories and lessons learnt from current practices and a major symposium in early 2007. An RWMC working party is organising a series of workshops on Approaches and Methods for Integrating Geologic Information in the Safety Case (AMIGO). The 2nd AMIGO workshop was held in September 2005 in Canada, and addressed the linkage of geoscientific arguments and evidence in supporting the safety case. Another workshop series, jointly organised with the EC, addresses aspects of performance of engineered barrier systems (EBS). The 3rd EBS workshop took place in Spain in August 2005 dealing with EBS modelling issues in the context of the safety case and the design process. The RWMC issued a status paper on the *Safety Case of Decommissioning* in 2005 and similar status papers — on Strategy Selection, Release of Sites, Release of Materials and Buildings and Funding Issues — are in progress.

The OECD/NEA was asked by French authorities to organise an International Peer Review of the French geological disposal programme in clay formations. A team of ten internationally renowned experts working on this review delivered its preliminary findings to the French authorities and the waste agency Andra in November 2005. The OECD/NEA had also been asked to undertake a similar and parallel review of the French Partitioning and Transmutation Programme. These peer reviews will become part of the technical support for the upcoming French debate on future options for waste management.

The RWMC Forum on Stakeholders' Confidence (FSC) holds regular workshops in a national context. The 2005 workshop took place in Spain in November 2005 in cooperation with "COWAM - Spain", a joint initiative of Spanish institutional actors and AMAC, the association of Spanish nuclear municipalities. The RWMC Working Party on Decommissioning and Dismantling (WPDD) finalised a report titled *Achieving the Goals of the Decommissioning Safety Case*, and its work on the release of materials and sites is progressing. A specific WPDD working group addresses issues related to the funding of decommissioning activities. At its annual meeting, the WPDD organised a special session on socio-economic aspects of decommissioning.

The Committee on Radiation Protection and Public Health (CRPPH) is finalising its forward-looking work to develop its new collective opinion, focusing on emerging social and scientific issues that could affect radiation protection policy, regulation and practice over the coming 10 to 15 years. One of the key challenges to address is the scientific indications that, in specific exposure circumstances, the standard linear non-threshold model may not be scientifically valid. This would necessitate a higher-level assessment of how risks are evaluated and managed. Further challenges are posed by social trends towards broader stakeholder involvement in decision processes addressing public, worker and environmental health and safety. The CRPPH also supported initiatives in Japan — including two meetings in 2005 between the CRPPH Chair and Secretariat and Japanese radiation protection experts — to exchange lessons and experience in the area of stakeholder involvement in decision making. The CRPPH held a new emergency management exercise (INEX 3) as a common framework for 20 national exercises during 2005. This table-top exercise was designed to help governments better identify practical aspects of consequence management which may affect their policy and regulatory approaches. The summary workshop for INEX 3 will take place in Paris in May 2006.

The Information System on Occupational Exposure (ISOE) is finalising its strategy for the future, using modern web technology to develop a "one-stop-shopping" site for all dosimetric data and trending information, and for finding and sharing all ALARA¹⁷/dose reduction information, experience and lessons learned. This new site will make all ISOE databases available on the web, and will significantly enhance the ability of members of ISOE to most effectively plan and implement radiological protection at the world's nuclear power plants.

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

Every organization in the world that operates an NPP is a member of WANO. WANO is an association set up purely to help its members achieve the highest practicable levels of operational safety by giving them access to the wealth of operating experience from the world-wide nuclear community.

WANO conducted peer reviews at 30 NPPs during 2005, altogether 278 since the programme began in 1992. WANO's long-term goal is to conduct a peer review of each nuclear unit at least once per six years, either as an individual unit or as part of a peer review that includes other units at an NPP. In addition, WANO encourages each NPP to host an outside review at least every three years.¹⁸

WANO continues to emphasize technical support missions, which focus on providing assistance in selected areas, with more than 120 technical support missions undertaken during 2005.

¹⁷ As Low As Reasonably Achievable

¹⁸ Outside reviews include WANO peer reviews, WANO follow-up peer reviews, OSARTs and national organizational reviews such as those conducted by the Institute of Nuclear Power Operators and the Japan Nuclear Technology Institute.

A central operating experience team with representatives from all four WANO regional centres continues to develop operating experience products and information for members. This team produces Significant Event Reports, Significant Operating Experience Reports, and Hot Topics to keep members informed of important events and trends occurring in the industry. In addition, WANO maintains a "Just in Time Training" database that gives plant staff access to relevant operating experience immediately prior to undertaking specific operations and maintenance activities.

WANO's workshop/seminar/training course programme has developed both in scope and in numbers. During 2005, a WANO materials workshop was held in Antwerp, Belgium. This three-day, operationally focused workshop was aimed at senior nuclear managers and provided a forum to discuss significant plant materials issues and the strategies for addressing them. Topics included pressure vessel and piping integrity, nuclear fuel, cabling, and electronic equipment degradation. In addition, each region conducted workshops and seminars on a variety of topics related to NPP operations.

WANO also conducted its 2005 Biennial General Meeting (BGM) in Budapest, Hungary from 10 to 11 October 2005 where senior nuclear utility executives and representatives from WANO members met to review progress and provide guidance for the future aims and objectives of WANO. The theme for the 2005 BGM was *The 21st Century: Nuclear Energy's Promise*.

F. Safety legislation and regulation

During the Senior Regulators' Meeting held in conjunction with the 49th General Conference, a number of Member States made presentations regarding their regulatory activities during 2005.

The Head of the Nigerian Nuclear Regulatory Authority described the positive experience of participating in the Agency's Model Project on Strengthening Radiation Protection Infrastructure. This included the publishing of a number of guidance documents and the accreditation of a resident dosimetry service provider. Much work has also been completed to establish a medical exposure control programme.

The Head of the UK Nuclear Installation Inspectorate described the activities that organization has taken to review its Safety Assessment Principles. In addition to taking into account experience since the last review in 1999, the activity includes benchmarking against the IAEA Safety Standards. The work also involves reviewing the findings of the review against the WENRA harmonization activities.

The Chairman of the Nuclear Safety Commission of Japan described how that organization is fostering safety culture as a complementing measure to safety standards. Recent activities included interviewing the top management of 12 licensees and 36 contractors and future activities will include participating in international initiatives and interviewing maintenance and radiation control personnel. The Commission is also planning on "transfusing" safety expertise from other industrial sectors and introducing "Safety Culture Degradation Indicators".

The Deputy Director General of the Chinese National Nuclear Safety Administration described the activities underway to incorporate the IAEA Safety Standards into the NNSA regulatory requirements for NPPs. It was noted that regulatory requirements of other countries are also considered for incorporation into Chinese requirements.

The Chairman of the Pakistan Nuclear Regulatory Authority described its activities related to the regulatory review of the Chasma 2 NPP design, as well as experience in applying the IAEA Safety Standards to the review process.

G. Safety significant conferences in 2005

From 27 June to 1 July 2005, the government of France hosted the *International Conference on Safety and Security of Radioactive Sources: Towards a Global System for Continuous Control of Sources throughout their Life Cycle* in Bordeaux. The conference was organized by the Agency¹⁹ and was attended by about 300 participants from 64 Member States. The Conference acknowledged that the completion and subsequent endorsement of the Code of Conduct on the Safety and Security of Radioactive Sources represented a major achievement. The Conference encouraged all Member States to continue to work towards implementing the Code's guidance. It also encouraged the Agency to take account of the Code in the review and eventual revision of the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources. The Conference recognized that safety and security are an integral part of effective and comprehensive regulatory structures for ensuring the continuous control of radioactive sources throughout their life cycle and noted that an adequate balance between confidentiality and information exchange must be struck to ensure the safety and security of radioactive sources. The Conference also noted that many national and multi-national efforts are taking place to regain and maintain control of vulnerable and orphan sources. There were also discussions regarding the continuing need to prevent illicit trafficking in and inadvertent movements of radioactive sources. Finally, the Conference noted that the effective management of radiological emergencies involving radioactive sources needs to be an integral part of national strategies for the safety and security of radioactive sources.

From 3 to 7 October 2005, the government of Japan hosted the *International Conference on the Safety of Radioactive Waste Disposal*, organized by the Agency in cooperation with the OECD/NEA and the Japan Nuclear Energy Safety Organization. The Conference considered all possible disposal options available, including near surface, intermediate depth, borehole and geological disposal facilities and also considered multilateral approaches. Participants at the Conference discussed the benefits of being part of the Joint Convention and ways in which more countries could be encouraged to join so that the Convention could become truly global and able to properly fulfill its objectives. Participants also discussed the advantages and disadvantages of regional geological repositories. Participants discussed the situation at the sites at which large volumes of waste from the mining and milling of radioactive ores or from other industries producing waste containing natural radionuclides have been deposited on the earth's surface. Examples of how the communications with affected parties have been managed in national projects were described during the Conference. From these it was clear to participants that openness, trust and participation are all essential in such communication.

From November 30 to December 2 the Agency hosted the *International Conference on Operational Safety Performance in Nuclear Installations* to share, in a global sense, the operating and regulatory

¹⁹ In cooperation with the European Commission, The European Police Office (Europol), the International Criminal Police Organization (Interpol), The International Commission on Radiological Protection (ICRP), the International Labour Organization (ILO), the International Radiation Protection Association (IRPA), the World Customs Organizations (WCO), and the World Health Organization (WHO) and under the auspices of the G-8.

experiences for improving operational safety performance in nuclear installations. Participants made recommendations for operating, regulatory and international organizations regarding how to improve the sharing of operating experiences, how to learn from and share experiences on regulatory management systems, how best to achieve and ensure the safety of extended operations and how best to ensure that operating experience is reflected in the design, construction, commissioning and operation of new NPPs. In particular, the participants noted that both operators and regulators must avoid isolation, freely share safety information and show leadership in nuclear safety.

A number of other important conferences throughout 2005 included nuclear safety as part of their programmes. These included the International Conference on Nuclear Security – Global Directions for the Future in March 2005 in London, United Kingdom, the 4th International Congress on Advances in Nuclear Power Plants (ICAPP '05) in May in Seoul, Republic of Korea, the 18th International Conference on Structural Mechanics in Reactor Technology (SMiRT) in August in Beijing, China and the European Nuclear Conference in December in Versailles, France.

H. Safety significant events and international appraisals in 2005

The International Nuclear Events Scale (INES) is used for facilitating rapid communication to the media and the public regarding the safety significance of events at all nuclear installations associated with the civil nuclear industry, including events involving the use of radiation sources and the transport of radioactive materials. More than 60 countries are currently participating in the INES Information Service. To provide more detailed information and an expanded approach for the INES rating based on actual exposure of workers and members of the public, the INES methodology has been enhanced with additional guidance — endorsed by the INES national officers for pilot use in July 2004 — for the rating of events involving the transport of radioactive material. The INES manual is under revision to incorporate this additional guidance and other clarifications regarding the use of the INES.

The Nuclear Events Web Based System (NEWS) is a joint project of the Agency, OECD/NEA and WANO that provides fast, flexible and authoritative information on the occurrence of nuclear events that are of interest to the international community. NEWS covers all significant events at NPPs, research reactors, nuclear fuel cycle facilities, as well as occurrences involving radiation sources and the transport of radioactive material. The general public can access information submitted during the previous six months through the Agency's website²⁰.

The INES Advisory Committee met to assess the latest developments of INES and NEWS including the pilot use of the additional guidance for rating events involving radiation sources and transport. Events sent in 2004 and 2005, the update of INES manuals and new training material were also assessed. The committee has identified that training on the use of the scale and its guidance should be reinforced by the Agency. At the request of the Canadian government, a seminar on the INES methodology was provided in 2005 to a wide technical audience comprising Canadian nuclear power operators, regulators and public information experts.

²⁰ <http://www-news.iaea.org/news/default.asp>

The Incident Reporting System (IRS) jointly operated by the Agency and the OECD/NEA is an essential element for providing information regarding NPP operating experience worldwide. The 2005 joint Agency/NEA meeting discussed lessons learned from 40 recent events in countries participating in the IRS. In addition, participants discussed four events in detail:

- *Penly 2, France (pressurized water reactor)*: (September 2003) This event involved latent failures in the vicinity of power cable containment penetrations. Defects included insulation faults, stripped cables and cut cables. These cables provide power to safety-related components (such as valves) in the reactor containment building. These defects had likely been existing for some years (i.e., latent failures) and the cables had been installed by a contractor who supplies the same sort of services to a number of NPPs in France. The latent failures were such that in a possible post-LOCA environment, some systems might not operate satisfactorily. Corrective actions included improved training for technicians involved, improved procedures, repair and replacement of affected cables, and improved surveillance.
- *Vandellors 2, Spain (pressurized water reactor)*: (June 2004) This event involved a circumferential break in one train of the Emergency Service Water (ESW) system. The ESW provides heat removal for component cooling, emergency generators, safety ventilations and other systems. There had been early indications of problems (leakage in the vicinity of the rupture had been observed in the early 1990s). There are two trains of ESW, and while the failed train was inoperative, some indications of degradation were observed on the other train, although it did not fail. If both trains had failed, procedural realignments would have been required to provide the necessary cooling. The main causes and contributors to this event included design weakness, inefficient maintenance and surveillance, and organizational and management weakness.
- *Tihange 2, Belgium (pressurized water reactor)*: (March 2005) This event also involved latent failures. In March 2005, a number of 380 volt switchboards were replaced. However, some of these have defects which were not discovered for several months and could have resulted in the loss of some safety-related functions. Had a failure occurred, the loss could have been irreversible since neither the control room operator nor local actions could have actuated some functions. The latent failure was only discovered by chance and a comprehensive design review of the equipment was subsequently necessary.
- *Millstone 3, USA (pressurized water reactor)*: (April 2005) This event involved a reactor trip with safety injection, with some complications caused by the formation of a “tin whisker” on a circuit card in the solid-state protection system. In this case, the tin whisker resulted in a short-circuit in the card. The formation and growth of these whiskers is not unknown in the nuclear industry and other failures had previously been reported at several NPPs. In this case, the failure caused a protective feature to actuate, which suggests the possibility that a similar failure could prevent the actuation of a protective system. The corrective actions are not immediately obvious.

India also presented the situation at its Madras-2 pressurized heavy water reactor during the tsunami in December 2004. Despite the high water level, the diesel generators operated as required and the plant was successfully shutdown. The plant restarted one week later.

Participants made some general observations about these — and other — events presented at the meeting. Several events involved latent failures, which has been a continuing concern in recent years. Emerging phenomena, such as the “tin whisker”, may be more widespread and may require a more generic investigation by the Agency or OECD/NEA. Proper oversight of contractor activities remains an issue that requires intensified attention by both operating organizations and regulatory bodies.

In Argentina, there have been allegations that groundwater supply in the vicinity of the Ezeiza Atomic Center (EAC) was contaminated with anthropogenic radioactive substances including enriched and depleted uranium. The Argentine Nuclear Regulatory Authority (ARN) issued a report dispelling the allegations. To further reassure the local population, the Argentine Government requested the Agency to organize an independent and authoritative expert appraisal (*peritaje*) on the subject with representatives from the competent organizations within the UN system. Experts from FAO, the Pan American Health Organization (PAHO), UNSCEAR, WHO, as well as ICRP and IRPA, and the IAEA participated in the appraisal. The first stage of the International Expert Appraisal consisted in 2005 of a technical field mission to the area of influence of the EAC. The final report to the Argentine Government is expected to be issued in April 2006.

As discussed earlier, the Agency responded to a number of requests pursuant to the Assistance Convention. The more prominent of these included:

- On 16 December 2004, a dangerous Cs-137 radiation source was detected in a transportation container in a truck with scrap metal at a border crossing between Turkey and Georgia. The truck had travelled from Armenia via Georgia to Turkey. On 13 January 2005, Turkey requested Agency assistance to facilitate the return of the source to the control of a responsible and competent authority. The Agency facilitated multilateral discussions among the countries and arrangements for the transport to, and storage at, an appropriate facility in Turkey.
- On 22 September 2005, the Agency received information regarding the theft of an undetermined number of Cs-137 capsules from a storage facility in Venezuela. The capsules had been used for brachytherapy between 1980 and 1990. During the theft, the sources were removed from their shields and left on the floor of the storage facility. At the request of Venezuelan authorities, the Agency facilitated arrangements for the transport of blood samples of involved persons to the Laboratory of Biological Dosimetry of the Argentine Nuclear Regulatory Authority.
- On 14 December 2005, three workers were overexposed by an Ir-192 source (3.3 TBq) from gammagraphy equipment at a cellulose plant under construction in Chile. On 18 December 2005, the Agency received a request for assistance from the Chilean Nuclear Energy Commission and the same day a fact-finding mission composed of experts from Argentina, Brazil, France and the Agency was sent to Chile. One of the three workers presented severe radiation injury and the fact-finding mission recommended *inter alia* specialized management and treatment for this worker. The Agency, upon request of Chilean authorities, facilitated arrangements for the transfer of this worker to a highly specialised hospital in France with experience in treatment of severe radiation burns.

I. Safety Networks

I.1. Asian Nuclear Safety Network (ANSN)

The steering committee of the ANSN met in December 2005 in Vienna. At that meeting, in addition to reviewing 2005 activities, the committee made a number of decisions regarding the ANSN, including

the contents of, and country responsibilities for maintaining, the main portal²¹ and the ANSN access policy. A visual identity policy is now in place to better identify the various sites of the ANSN. All of the National Centres have now received assistance from the Agency/ANL team to put their Centres in full operation.

The Topical Groups (TG) are important components of the ANSN. Three Topical Groups are currently active: Safety Analysis of Research Reactors, Education & Training and Operational Safety. The steering committee reviewed the status of the existing and future Topical Groups (TG) and made a number of recommendations. Member countries agreed to review the Japanese proposal for the activities of the TG on Emergency Preparedness and Response and the TG on Radioactive Waste Management by mid February 2006.

Although most of the documents currently available in the ANSN are education and training-related, other types of documents — such as operational safety documents — are now being added. Many other documents are available through the Hubs or National Centres.

Measures for further promoting the ANSN include a bi-weekly ANSN Newsletter regularly published since mid-March 2005. It is widely distributed in the countries participating to the programme. Promotional meetings (called *Caravan*) are also being organized in participating countries to introduce ANSN to a larger audience, including key decision makers. In 2005, Caravan missions were sent to Indonesia and Vietnam.

I.2. Ibero-American Radiation Safety Network

In January 2005, the heads of the regulatory bodies of the countries participating in the Forum met in Rio de Janeiro and established a steering committee to coordinate the implementation of the programme. The steering committee oversees the activities leading to the design, commissioning and operation of the Ibero American Network. The steering committee includes one representative per country and one Secretariat representative. The steering committee met three times in 2005. At the first meeting in Vienna, the committee discussed its terms of reference and operational structure and reviewed the progress on the IT solution for the network. The committee also agreed to: develop a detailed proposal for the format and contents of a document that describes the regulatory practices in the countries of the region; establish contacts with the relevant professional societies in Iberoamerica; and update the list of contact institutions in the region.

At the second meeting in Buenos Aires, the following aspects were further developed: the *Conceptual Structure* of the network, including the revision of the taxonomy to reflect the regulatory functions; the *Knowledge Management* applications that are required to achieve the objectives of the technical areas and the *IT functionalities* of the network, including the topology of the system, the management of users and information resources.

At the third meeting in Mexico City, a workshop was organized with the participation of the steering committee members and IT specialists where the network prototype was extensively tested. In addition, the steering committee agreed to a quality system, prepared a draft procedure to classify and upload resources in the network, and the Agency experience with the development of the Asian Safety Network was shared. The steering committee also discussed the status of the probabilistic safety analysis in radiotherapy and agreed to present a project proposal on patient protection to the Forum at its next meeting.

²¹ <http://www.ansn.org/>

J. Chernobyl Forum

The Chernobyl Forum consists of relevant international organizations²² from within the UN family and representatives of the three countries²³ primarily affected by the Chernobyl accident. The Forum was established with a view to contributing to the implementation of the UN strategy, *Human Consequences of the Chernobyl Accident — A Strategy for Recovery*, launched in 2002.

The Chernobyl Forum completed its operation in 2005 and issued two technical reports: one discussing the environmental consequences of the Chernobyl accident and one discussing the health effects of the accident. These reports were considered in detail by the Forum participants and accepted by consensus. The Forum participants also agreed that the approved reports are the common position of the Forum members regarding environmental and health consequences of the Chernobyl accident as well as recommended future actions. In addition, the digest Forum report “Chernobyl’s Legacy: Health, Environmental and Socio-Economic Impacts and Recommendations to the Governments of Belarus, the Russian Federation and Ukraine”, considers both the scientific issues and practical recommendations to the governments of the affected states and relevant international organisations.

All of the Chernobyl Forum reports were presented and discussed during the International Conference entitled “Chernobyl: Looking Back to Go Forwards” held in Vienna in September 2005. The consensus of the Forum participants was also noted by the UN Secretary-General in his report to the General Assembly A/60/443, from 24 October 2005, entitled ‘Optimizing the international effort to study, mitigate and minimize the consequences of the Chernobyl disaster’ and in the Resolution of the UN General Assembly A/60/L.19, from 10 November 2005, entitled ‘Strengthening of international cooperation and coordination of efforts to study, mitigate and minimize the consequences of the Chernobyl disaster’.

²² FAO, UN-OCHA, UNDP, UNEP, UNSCEAR, WHO, World Bank

²³ Belarus, the Russian Federation, Ukraine

Annex 2

The Agency's Safety Standards: Activities during 2005

A. Introduction

Article III.A.6 of the IAEA Statute authorizes the Agency to “establish... standards of safety... and to provide for the application of these standards” to its own operations, to assisted operations, to operations under bilateral or multilateral arrangements (at the request of the parties), and to any of a State's activities (at the request of that State). The preparation and review process for IAEA Safety Standards is described in the Attachment to GOV/INF/2001/1.

An Action Plan for the development and application of IAEA Safety Standards was submitted to the Board of Governors in March 2004 (GOV/INF/2004/10-GC(48)/INF/7). The Action Plan pays special attention to providing for the application of standards and collecting feedback on their use and to putting in place a rigorous process to review other Agency safety related publications developed outside the IAEA Safety Standards programme.

The categories in the Safety Standards Series are Safety Fundamentals, Safety Requirements and Safety Guides. Safety Fundamentals present basic objectives, concepts and principles; Safety Requirements establish the requirements that must be met to ensure safety (*shall* statements); and Safety Guides provide recommendations and guidance on how to comply with the safety requirements (*should* statements). Safety Fundamentals and Safety Requirements require the approval of the Board of Governors. Safety Guides are issued under the authority of the Director General.

The IAEA Safety Standards cover five safety areas:

- nuclear safety: safety of nuclear installations;
- radiation safety: radiation protection and safety of radiation sources;
- transport safety: safety of transport of radioactive materials;
- waste safety: safety of radioactive waste management; and
- general safety: of relevance in two or more of the above four areas.

The topics in the general safety area include legal and governmental infrastructure for safety, emergency preparedness and response, assessment and verification, and management systems.

All IAEA Safety Standards are prepared and reviewed in accordance with a uniform process, involving a set of four Committees — the Nuclear Safety Standards Committee (NUSSC), the Radiation Safety Standards Committee (RASSC), the Transport Safety Standards Committee (TRANSSC) and the Waste Safety Standards Committee (WASSC) — with harmonized terms of reference to assist the Secretariat in preparing and reviewing all standards, and a Commission on Safety Standards (CSS) to assist the Secretariat in coordinating the activities of the Committees.

Eight IAEA Safety Standards were published in 2005:

- Nuclear safety: one safety requirements and three safety guides;
- Radiation safety: two safety guides;
- Transport safety: transport regulations 2005 edition; and

- Waste safety: one safety guide.

Since the establishment of the CSS and the Committees in 1995, a total of 73 IAEA Safety Standards have been endorsed by the CSS for publication; of those, 72 (13 Safety Requirements and 59 safety guides) have been published; and 58 further standards (one safety fundamentals, eight requirements and 49 safety guides) are being drafted or revised. A list of IAEA Safety Standards, indicating their current status, is attached as Annex I, and up-to-date status reports can be found on the Agency's website, at <http://www-ns.iaea.org/downloads/standards/status.pdf>. The full text of published IAEA Safety Standards is also available on the Web site, at <http://www-ns.iaea.org/standards/>.

The Agency is working on a draft Unified Safety Fundamentals document (DS298) to replace the Safety Series No. 110, No. 111-F and No. 120. In 2004, the draft was submitted to Member States for comments. A revised draft prepared on the basis of comments from Member States was presented to the Committees in September 2005. The draft is currently under review by the four committees. It is planned to submit a final draft to the CSS in June 2006, and to the Board of Governors for approval in September 2006.

The members of the four Committees are appointed for three-year terms. The fourth such term started at the beginning of 2005; the Committees were all reconstituted for the 2005–2007 period with modified terms of reference that give more emphasis to the use of standards and sharing of the experience from their use. The current term of the CSS is for the four-year period of 2004–2007.

In 2005, the Board of Governors approved the publication of NS-R-4: *Safety Requirements on Safety of Research Reactors* and WS-R-4: *Geological Disposal of Radioactive Waste*.

In June 2005, the Board of Governors approved a revised policy for reviewing and revising TS-R-1: *Regulations for the Safe Transport of Radioactive Material* (the Transport Regulations). Under the previous policy, the Transport Regulations were both reviewed and revised for publication every two years without any consideration whether the changes proposed in the review process had safety significance or not. In the revised policy, while the Transport Regulations will continue to be reviewed every two years (the current review cycle of the relevant international bodies), the decision on the revision and publication will be made based on the assessment of TRANSSEC and CSS.

B. Commission on Safety Standards (CSS)

The CSS, chaired by Mr. A.C. Lacoste, Director General of the Directorate General for Nuclear Safety and Radiation Protection in France, met twice during 2005, in June and November.

At its June meeting, the CSS considered the treatment of security related issues in the safety standards, as well as a strategy regarding the review of safety standards for radiation protection. The CSS also endorsed the publication of one safety guide and approved document preparations profiles (DPPs) for seven safety standards.

At its November meeting, the CSS discussed the status of the draft Safety Fundamentals and agreed to consider the document at its next meeting. The CSS endorsed the submission of Safety Requirements on *The Management System for Facilities and Activities* to the Board of Governors for approval. The CSS also endorsed the publication of four safety guides and approved DPPs for eight safety standards. At the request of the President of the 3rd Review Meeting of the Convention on Nuclear Safety, CSS nominated a representative to assist the President in implementing an adopted resolution of the

Contracting Parties on “The Use of the IAEA Safety Requirements in the Review Process”. The CSS also received a briefing on the activities of the Advisory Group on Nuclear Security (AdSec).

The CSS discussed a progress report being prepared by the Secretariat for submission to the Board of Governors on the implementation of the Action Plan, particularly with regard to the feedback from the use of the IAEA Safety Standards. Reports by CSS members confirm the increased utilization of IAEA Safety Standards worldwide.

C. Nuclear Safety Standards Committee (NUSSC)

NUSSC, chaired by Mr. Lasse Reiman of the Radiation and Nuclear Safety Authority (STUK) of Finland, met in April and October in 2005.

At these meetings, NUSSC endorsed six draft IAEA Safety Standards for submission to the CSS (in some cases subject to specified comments being incorporated). These draft IAEA Safety Standards included the *Safety Requirements: The Management System for Facilities and Activities*. These safety requirements will replace the Agency’s Safety Standards on quality assurance published in 1996.

The updating of the IAEA Safety Standards in the areas of nuclear power plant design and operation is complete. However, the new overall safety standards structure has identified the need for a number of new Safety Guides. In 2005, NUSSC endorsed proposals for 11 of these new Safety Guides.

In the near term, the focus of attention for NUSSC will be on the completion of the Safety Guides for Research Reactors as well as the Requirement and Guides for Fuel Cycle Facilities. Another important task of NUSSC will be the development of the Safety Requirement and Guides in the thematic area of Assessment and Verification, including the methodology and application of probabilistic safety assessment.

D. Radiation Safety Standards Committee (RASSC)

RASSC, chaired by Mr. Sigurdur Magnusson of the Icelandic Radiation Protection Institute, met in April and October in 2005. The April meeting included a joint session with WASSC to discuss issues of common interest.

Two Safety Guides were published during 2005: RS-G-1.8: *Environmental and Source Monitoring for Purposes of Radiation Protection* (in conjunction with WASSC) and RS-G-1.9: *Categorization of Radioactive Sources*.

In 2005, RASSC approved a Safety Guide on *Preparedness for Nuclear and Radiological Emergencies* for submission to the CSS. At the October meeting, RASSC approved Safety Requirements on *Management Systems*, a Safety Guide on *Management Systems: Generic Guidance*, a Safety Guide on *Safety of Radiation Generators and Sealed Radioactive Sources*, and a Safety Guide on *Release of Sites from Regulatory Control upon Termination of Practices* for submission to the CSS.

RASSC also reviewed reports from the Secretariat on the implementation of the Action Plan on the development and application of the IAEA Safety Standards. RASSC received reports from the Secretariat on the review and revision of the *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources* (the BSS). At its October meeting, RASSC developed an outline of an action plan for the review of the BSS and requested that the Secretariat complete the review during 2006. The report of the review should outline the content of the DPP for the revised BSS. The review will identify all of the issues that need to be addressed and will propose solutions. A basic DPP should be submitted in June 2006 to the CSS.

In 2005, RASSC endorsed proposals for two new Safety Guides.

E. Transport Safety Standards Committee (TRANSSC)

Beginning in 2005, TRANSSC will meet twice each year. In 2005, TRANSSC met in March and September. The March meeting was chaired by Mr. Peter Colgan of the Australian Radiation Protection and Nuclear Safety Agency and the September meeting was chaired by Mr. Jarlath Duffy of the Radiological Protection Institute of Ireland.

At its March 2005 meeting, TRANSSC had an in-depth discussion regarding the revision cycle and process for the Transport Regulations. TRANSSC also recommended that the Agency create an advisory group for addressing the issue of denial of shipments, with participation by a limited number of members (such as representatives of producers, carriers, port authorities, customs organizations) who may authoritatively speak on the issue and suggest resolutions. Finally, TRANSSC made a number of recommendations regarding a proposed seminar on complex technical issues relating to the transport of radioactive material.

TRANSSC approved the following documents for submission to Member States for 120-day comments: TS-R-1: *The Regulations for the Safe Transport of Radioactive Material (2007 edition)*, TS-G-1.1 *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material* (both the combined 2003 and 2005 Edition, and the 2007 Edition), TS-G-1.3: *Safety Guide for Management Systems for the Safe Transport of Radioactive Material* and TS-G-1.5: *Safety Guide for Radiation Protection Programmes in Transport*. TRANSSC also endorsed a proposal for one new Safety guide.

At the September meeting, TRANSSC noted that the Board of Governors had approved a new policy for review and revision of the Transport Regulations and discussed how it would implement this policy.

At the September meeting, TRANSSC approved Safety Requirements on *Management Systems* and a Safety Guide on *Management Systems: Generic Guidance* for submission to the CSS.

F. Waste Safety Standards Committee (WASSC)

WASSC, chaired by Mr. Thiagan Pather of the National Nuclear Regulator of South Africa, met in April and October in 2005. The April meeting included a joint session with RASSC. The October

meeting was held in Tokyo, Japan, following the International Conference on the Safety of Radioactive Waste Disposal. The meeting was hosted by the Nuclear and Industrial Safety Agency (NISA), Ministry of Economy, Trade and Industry (METI).

Two Safety Guides were published during 2005: RS-G-1.8: *Environmental and Source Monitoring for Purposes of Radiation Protection* (in conjunction with RASSC) and WS-G-2.7: *Management of Waste from the Use of Radioactive Materials in Medicine, Industry, Research, Agriculture and Education*.

In 2005, WASSC also approved the submission of five Safety Guides to the CSS: DS292: *Storage of Radioactive Waste*; DS332: *Release of Sites from Regulatory Control upon Termination of Practices*; DS335: *Borehole Disposal of Radioactive Waste*; DS336: *Management Systems for the Safety of the Treatment, Handling and Storage of Radioactive Waste*; and DS337: *Management Systems for the Safety of Radioactive Waste Disposal*.

In 2005, WASSC endorsed proposals for three new Safety Requirements and four new Safety Guides.

Appendix 1: The Current IAEA Safety Standards

Safety Fundamentals

- 110 The Safety of Nuclear Installations (1993)
111-F The Principles of Radioactive Waste Management (1995)
120 Radiation Protection and the Safety of Radiation Sources (1996) **Co-sponsorship:**
FAO, ILO, OECD/NEA, PAHO, WHO

The Safety Fundamentals are being revised combining the three documents into one.

Thematic Safety Standards

Legal and Governmental Infrastructure

- GS-R-1 Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety (2000)
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-1.5 Regulatory Control of Radiation Sources (2004) **Co-sponsorship:** FAO, ILO, PAHO, WHO

Emergency Preparedness and Response

- GS-R-2 Preparedness and Response for a Nuclear or Radiological Emergency (2002) **Co-sponsorship:** FAO, OCHA, OECD/NEA, ILO, PAHO, WHO
50-SG-G6 Preparedness of Public Authorities for Emergencies at Nuclear Power Plants (1982)
50-SG-O6 Preparedness of the Operating Organization (Licensee) for Emergencies at NPPs (1982)
98 On-Site Habitability in the Event of an Accident at a Nuclear Facility (1989)
109 Intervention Criteria in a Nuclear or Radiation Emergency (1994)

Two new Safety Guides on: preparedness for emergencies (combining G6, O6 and 98); and criteria for use in planning response to emergencies (replacing 109) are being developed.

Management System

Safety Series

- No.50-C/SG-Q Quality Assurance for Safety in Nuclear Power Plants and other Nuclear Installations (2001) under revision.

Safety Guides (2001)

- Q1 Establishing and Implementing a Quality Assurance Programme

Q2	Non-conformance Control and Corrective Actions
Q3	Document Control and Records
Q4	Inspection and Testing for Acceptance
Q5	Assessment of the Implementation of the Quality Assurance Programme
Q6	Quality Assurance in the Procurement of Items and Services
Q7	Quality Assurance in Manufacturing
Q8	Quality Assurance in Research and Development
Q9	Quality Assurance in Siting
Q10	Quality Assurance in Design
Q11	Quality Assurance in Construction
Q12	Quality Assurance in Commissioning
Q13	Quality Assurance in Operation
Q14	Quality Assurance in Decommissioning (under revision)

Six new Safety Guides on management system (for regulatory bodies, technical services in radiation safety, radiation safety for users, waste disposal, treatment of waste and nuclear facilities) are being developed.

Assessment and Verification

GS-G-4.1 Format and Content of the Safety Analysis report for NPPs (2004)
A new Safety Requirement on safety assessment and verification is being developed.

Site Evaluation

NS-R-3	Site Evaluation for Nuclear Installations (2003)
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)
NS-G-3.3	Evaluation of Seismic Hazard for Nuclear Power Plants (2003)
NS-G-3.4	Meteorological Events in Site Evaluation for Nuclear Power Plants (2003)
NS-G-3.5	Flood hazard for Nuclear Power Plants on Coastal and River Sites (2004)
NS-G-3.6	Geotechnical Aspects of NPP Site Evaluation and Foundations (2005)

Radiation Protection

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
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-1.5	Radiological Protection for Medical Exposure to Ionizing Radiation (2002) Co-sponsorship: 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)

Two new Safety Guides on: safety of radiation sources; and naturally occurring radioactivity are being developed.

Radioactive Waste Management

- WS-R-2 Predisposal Management of Radioactive Waste, including Decommissioning (2000) (under revision)
- 111-G-1.1 Classification of Radioactive Waste (1994)
- WS-G-2.3 Regulatory Control of Radioactive Discharges to the Environment (2000)
- WS-G-2.5 Predisposal Management of Low and Intermediate Level Radioactive Waste (2003)
- WS-G-2.6 Predisposal Management of High Level Radioactive Waste (2003)
- WS-G-2.7 Management of Waste from the Use of Radioactive Materials in Medicine, Industry and Research (2005)

Three new Safety Guides on: safe management of naturally occurring radioactive materials in the environment; storage of spent fuel; and storage of radioactive waste are being developed.

Decommissioning

- WS-G-2.1 Decommissioning of Nuclear Power Plants and Research Reactors (1999)
- WS-G-2.2 Decommissioning of Medical, Industrial and Research Facilities (1999)
- WS-G-2.4 Decommissioning of Nuclear Fuel Cycle Facilities (2001)

One new Safety Requirements on decommissioning of nuclear facilities and one Safety Guide on release of sites from regulatory control upon the termination of practices is being developed.

Rehabilitation

- WS-R-3 Remediation of Areas Contaminated by Past Activities and Accidents (2003)

One Safety Guide on implementation of remediation process for past activities and accidents is being developed.

Transport Safety

- TS-R-1 Regulations for the Safe Transport of Radioactive Material 2005 Edition (2005)
- TS-G-1.1 Advisory Material for the Regulations for the Safe Transport of Radioactive Material (2002)
- TS-G-1.2 Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material (2002)

One Safety Guide on management systems for the safe transport of radioactive material is being developed.

Facility Specific Safety Standards

Design of Nuclear Power Plants (NPPs)

- NS-R-1 Safety of NPPs: Design (2000)

NS-G-1.1	Software for Computer Based Systems Important to Safety in NPPs (2000)
NS-G-1.2	Safety Assessment and Verification for NPPs (2002)
NS-G-1.3	Instrumentation and Control Systems Important to Safety in NPPs (2002)
NS-G-1.4	Design of Fuel Handling and Storage Systems in NPPs (2003)
NS-G-1.5	External Events Excluding Earthquakes in the Design of NPPs (2004)
NS-G-1.6	Seismic Design and Qualification for NPPs (2003)
NS-G-1.7	Protection Against Internal Fires and Explosions in the Design of NPPs (2004)
NS-G-1.8	Design of Emergency Power Systems for NPPs (2004)
NS-G-1.9	Design of the Reactor Coolant System and Associated Systems in NPPs (2004)
NS-G-1.10	Design of the Reactor Containment Systems for NPPs (2004)
NS-G-1.11	Protection Against Internal Hazards Other than Fire and Explosions (2004)
NS-G-1.12	Design of the Reactor Core for NPPs (2005)
NS-G-1.13	Radiation Protection Aspects of Design for NPPs (2005)
79	Design of Radioactive Waste Management Systems at NPPs (1986)

Operation of NPPs

NS-R-2	Safety of NPPs: Operation (2000)
NS-G-2.1	Fire Safety in Operation of NPPs (2000)
NS-G-2.2	Operational limits and conditions and operating procedures for NPPs (2000)
NS-G-2.3	Modifications to NPPs (2001)
NS-G-2.4	The Operating Organization for NPPs (2002)
NS-G-2.5	Core Management and Fuel Handling for NPPs (2002)
NS-G-2.6	Maintenance, Surveillance and In-Service Inspection in NPPs (2002)
NS-G-2.7	Radiation Protection and Radioactive Waste Management in the Operation of NPP (2002)
NS-G-2.8	Recruitment, Qualification and Training of Personnel for NPPs (2003)
NS-G-2.9	Commissioning of NPPs (2003)
NS-G-2.10	Periodic Safety Review of NPPs (2003)
93	System of Reporting Unusual Events in NPPs (1989) (under revision)

One new Safety Guide on conduct of operations is being developed.

Research Reactors

NS-R-4	Safety of Research Reactors (2005)
35-G1	Safety Assessment of Research Reactors and Preparation of the Safety Analysis Report (1994)
35-G2	Safety in the Utilization and Modification of Research Reactors (1994)

Six new Safety Guides on: commissioning; maintenance, periodic testing and inspection; operational limits and conditions; operating organization, recruitment, training and qualification; radiation protection and waste management; and core management are being developed.

Fuel Cycle Facilities

116	Design of Spent Fuel Storage Facilities (1995)
117	Operation of Spent Fuel Storage Facilities (1995)

One Safety Requirements on safety of fuel cycle facilities, and three Safety Guides on: safety of uranium fuel fabrication; MOX fuel fabrication; and conversion facilities are being developed.

Radiation Related Facilities

107	Radiation Safety of Gamma and Electron Irradiation Facilities (1992)
RS-G-1.6	Occupational Radiation Protection in the Mining and Processing of Raw Materials (2004)

Waste Treatment and Disposal Facilities

WS-R-1	Near Surface Disposal of Radioactive Waste (1999) (under revision)
WS-G-1.1	Safety Assessment for Near Surface Disposal of Radioactive Waste (1999)
WS-G-1.2	Management of Radioactive Waste from the Mining and Milling of Ores (2002)
111-G-3.1	Siting of Near Surface Disposal Facilities (1994)
111-G-4.1	Siting of Geological Disposal Facilities (1994)
108	Design and Operation of Radioactive Waste Incineration Facilities (1992)
99	Safety Principles and Technical Criteria for the Underground Disposal of High Level Radioactive Wastes (1989) (under revision)

Four Safety Guides on: geological disposal of radioactive waste; borehole disposal of radioactive waste; near surface disposal of radioactive waste; and monitoring and surveillance of disposal facilities are being developed.

Annex 3

Civil Liability for Nuclear Damage International Expert Group on Nuclear Liability (INLEX)

A. Introduction

The International Conference on the Safety of Transport of Radioactive Material (the International Conference), which was held in Vienna, Austria, from 7 to 11 July 2003, found that “there remains considerable uncertainty and debate related to the implementation of a comprehensive regime to deal with the legal liability resulting from an accident during the transport of radioactive material. There are a number of liability-related conventions, to which many States are parties but many others are not.” Further, it found that “the provisions of the liability conventions, and the relationships between them, are not simple to understand” and, accordingly, “the preparation of an explanatory text for these instruments would assist in developing a common understanding of what are complex legal issues, and thereby promote adherence to these instruments. The Agency Secretariat should prepare such an explanatory text, with the assistance of an independent group of legal experts appointed by the Director General.”

The Director General, in the light of the aforementioned findings and with a view to fostering a global and effective nuclear liability regime, announced on 8 September 2003 to the Board of Governors and on 15 September 2003 to the General Conference the establishment of the International Expert Group on Nuclear Liability (INLEX).

On 19 September 2003, the General Conference, in resolution GC(47)/RES/7.C, stressed “the importance of having effective liability mechanisms in place to ensure against harm to human health and the environment as well as actual economic loss due to an accident or incident during the maritime transport of radioactive materials”, acknowledged the International Conference President’s conclusion that “the preparation of explanatory text for the various nuclear liability instruments would assist in developing a common understanding of the complex issues and thereby promote adherence to these instruments”, and welcomed “the decision of the Director General to appoint a group of experts to explore and advise on issues related to nuclear liability”.

Following the adoption of resolution GC(47)/RES/7.C, INLEX which consists of expert members from nuclear power and non-nuclear power countries and from shipping and non-shipping States, has held five meetings; all at the Agency’s Headquarters in Vienna. The first meeting was held from 16 to 17 October 2003, the second from 22 to 26 March 2004, the third from 13 to 16 July 2004, the fourth from 7 to 11 February 2005 and the fifth from 11 to 14 July 2005.

B. Work undertaken

During the course of its five meetings, INLEX has explored and advised on issues regarding the existing international liability regime for nuclear damage, in particular, concerning the international liability instruments adopted under Agency auspices. Information concerning some of INLEX's work completed to date and its on-going work are set out below:

B.1. Explanatory texts

Further to General Conference resolution GC(47)/RES/7.C, INLEX finalized the discussion and review of explanatory texts (including an overview of those texts) on the nuclear liability instruments adopted under Agency auspices in 1997, as a comprehensive study and authoritative interpretation of the Agency's nuclear liability regime. These explanatory texts have been made available to Member States in English (GOV/INF/2004/9-GC(48)/INF/5) and have also been translated into the other official languages of the Agency: these translated texts are available on the Agency's website: <http://www.iaea.org/About/Policy/GC/GC48/Documents/gc48inf-5.pdf>. The texts will also be published as part of the IAEA International Law Series, later in 2006.

B.2. Possible gaps and ambiguities

During its various sessions, INLEX discussed and reached conclusions and recommendations on a number of possible gaps and ambiguities in the scope and coverage of the existing international nuclear liability instruments. While some of the conclusions and recommendations were addressed through the explanatory texts and are also reflected in the Group's outreach activities,²⁴ the Group decided that others should be reflected more specifically in a report to the Director General and ultimately the wider IAEA audience for consideration. While it should be noted that INLEX's work is still ongoing, those conclusions and recommendations reached to-date are set out below:

B.2.1. Complexity and diversity of obligations under the international regime

The Group noted that countries might adhere to four base conventions i.e. the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy, the revised Paris Convention, the 1963 Vienna Convention on Civil Liability for Nuclear Damage and the revised Vienna Convention, as well as to the 1988 Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention (the Joint Protocol) that links these base conventions and to the Convention on Supplementary Compensation (the CSC) that provided the basis for a global regime to include all countries that adhere to one of the base conventions or adopt national law that complies with the provisions of the Annex to the CSC. In this regard, the Group recognised that, until all countries belonged to the CSC as a global regime, there were some inevitable complexities resulting from the existence of these different instruments.

The Group concluded that the elaboration of a new overarching international nuclear liability instrument was not necessary since the CSC had been adopted for that purpose and required the same

²⁴ Conclusions and recommendations identified for being reflected in the Group's outreach activities included those relating to the issue of compensation for general degradation of the environment, difficulties in the pursuit of claims and the possible inadequacy of the amount of compensation.

treatment by States with respect to minimum compensation amounts, jurisdictional rules and the definition of nuclear damage. The Group also concluded that widespread adherence to the global regime should be promoted through adherence to the revised Vienna and Paris Conventions or the adoption of national law based on the Annex to the CSC. Similarly, other countries should be encouraged within the context of their respective national laws to adopt provisions on compensation, the definition of nuclear damage and jurisdiction similar to those required by the CSC in order to help move towards a more harmonized global regime. The Group also noted that the Joint Protocol was an important measure in building a link between countries that adhere to the Vienna and Paris Conventions (as revised), especially in the interim before widespread adherence to the CSC was achieved.

B.2.2. Compensation for economic loss sustained as a result of perceived risk in a situation where there has been no actual release of radiation

The Group noted that the Vienna and Paris Conventions (as revised) and the CSC contained a revised definition of “nuclear incident” to include situations where there was no release of radiation but where there existed a “grave and imminent threat” of nuclear damage. While noting that this matter had already been partly addressed in the explanatory texts, the Group concluded that in situations such as those above, the cost of preventive measures and any further costs or damage related thereto were covered by the revised definition of “nuclear damage”. At the same time, the Group recognised the importance of the operator and the Installation State working closely with the concerned State or communities in a given situation to try to minimize any unfounded perceptions and to alleviate any economic loss associated with such situations. The Group also noted that the IAEA might have a role to play in such situations, in providing a source of independent advice on the level of risk, if any, that might exist. The Group also noted that, leaving aside the issue of preventative measures, if there were no basis for the competent court to determine the existence of a nuclear incident, then the conventions would not come into effect and general tort law would apply.

B.2.3. Difficulties in pursuit of claims

The Group recognised that through the channelling of jurisdiction to a single designated court which may be located in a foreign country there could be difficulties for claimants in pursuing claims. It concluded that these difficulties could be minimised by provisions which permit a State to bring claims on behalf of its nationals and, in particular, the likelihood that most claims could be resolved through an insurance claims adjustment process without resort to the court system. The Group noted that resort to judicial proceedings would likely only be needed where there was a dispute as to whether a particular type of damage was covered by the competent court.

B.2.4. Requirement to establish domestic legislation

The Group recognised that for those States which have no nuclear industries, the requirement to enact implementing national nuclear liability legislation may constitute a disincentive to adhere to the Conventions. The Group concluded that it would be useful to develop guidelines or generic minimum legislation for both nuclear and non-nuclear States and to make this draft legislation available, in particular, during the outreach activities of the Group. In this context, the Group recommended that in preparing such draft legislation, attention should be given to whether there were any differences necessitated because a State was a party to the Vienna or Paris Conventions or the Annex to the CSC and also whether the requirements were less for States that permit self-executing treaty obligations. The Secretariat is currently preparing such draft legislation for consideration by INLEX.

B.2.5. Possible inadequacy of compensation

Despite revisions to the relevant international liability instruments and the fact that the CSC would provide a system of supplementary compensation, the Group recognised that there was concern that the levels of compensation under the existing Vienna and Paris Conventions remained inadequate. The Group concluded that adherence to the global regime was the best way to ensure adequate compensation and that all States should be encouraged within the context of their national law to adopt compensation amounts similar to those required by the global regime.

B.2.6. The different time limits applying

The Group recognized that the different periods of extinction and prescription in the various nuclear liability instruments resulted from attempts to balance the constraints imposed by the availability of insurance (in most cases limited to ten years) and the desire to ensure compensation for victims with latent injuries. The Group further concluded that all the nuclear liability instruments had sufficient flexibility to permit claims for latent injuries beyond ten years. The Group encouraged all States to use this flexibility to ensure compensation for latent injuries and noted that both the revised Vienna and Paris Conventions specified 30 years as the period in which claims for latent injuries could be brought.

B.3. Outreach activities: Regional workshops on liability for nuclear damage

In order to provide a platform for both fostering adherence to the international nuclear liability regime and to provide a forum for open discussions on possible difficulties, concerns or issues States may have with the regime, INLEX entered into a number of outreach activities, including the development of standard training material in the area of nuclear liability and the organization of regional workshops. These activities have been recognized by the General Conference in resolution GC(49)/RES/9 which, inter alia, “look[ed] forward to the continuation of INLEX’s work, in particular its outreach activities [...]”.

B.3.1. Regional Workshop on Liability for Nuclear Damage, Sydney, Australia

The first Regional Workshop on Liability for Nuclear Damage, in the context of INLEX’s outreach activities, was held in Sydney, Australia, 28-30 November 2005. The workshop was attended by 49 participants from 14 IAEA Member States in the Asia-Pacific region and 12 non-IAEA Member States who are Member States of the Pacific Islands Forum. Two representatives of the Pacific Islands Forum Secretariat also attended the workshop. It followed a standard programme developed by INLEX.

The main purpose of the workshop was to provide information on the existing international liability regime for nuclear damage. In this respect, presentations during the workshop included: an overview of the recent developments of the international legal instruments governing the safe and peaceful uses of nuclear energy; a presentation on why there is a need for a special international liability regime; an overview of the relevant instruments of the regime; and a presentation on the main features of the Convention on Supplementary Compensation (the CSC). The workshop also included presentations on some of the special aspects of nuclear liability, including the principles of liability during transport and insurance of nuclear risks. A presentation was also given on the development of implementing national nuclear liability legislation to reflect the principles and norms of the international liability regime. Although not included in the programme, pursuant to a request of participants, a short presentation was given to identify the types of damage covered in other relevant international instruments *vis-à-vis* the nuclear liability regime.

An additional purpose of the workshop was to provide for the possibility to exchange information on possible difficulties, concerns and key issues that States may have with the existing international liability regime. A case study of a hypothetical accident occurring during the course of transport of nuclear material set the stage for these discussions.

Issues seen as creating potential difficulty which were raised in the discussions included the complexity of the regimes and the disparate adherence by different States (e.g. those involved in transportation thorough the Pacific), the different extinction periods applying between the conventions and the possible inadequacy of compensation limits especially under the old instruments, and the exclusion of claims for general degradation of the environment and economic losses suffered in a situation of no release. These issues did not, however, detract from the major effort made to improve the early instruments and move towards a situation where there was a single comprehensive system such as the CSC that could provide reassurances to non-nuclear States that, if an accident happened and harm occurred, appropriate compensation would be available.

In the participants' view, the workshop provided a very useful forum to provide information and clarity on the international liability instruments, in which participants could become aware of the ways in which the various instruments would operate in the event of an incident. To this end, participants expressed appreciation for the ongoing efforts to create regional awareness, in a clear and comprehensive manner, of the international liability regime.²⁵

B.3.2. Regional Workshop on Liability for Nuclear Damage, Lima, Peru

The second regional workshop is scheduled to be held in Lima, Peru, later in 2006. The workshop is open to representatives from Member States in Latin America. The workshop will follow the same standard programme as the first workshop but will also reflect lessons learnt.

C. Future work

INLEX continues to carry out its three main functions, and the Director General recently extended its term. It is scheduled to meet once a year in the future. INLEX will continue to be a forum of expertise for discussions between shipping and coastal States and to provide authoritative advice on the nuclear liability instruments adopted under Agency auspices.

The Group will continue to consider the need to further develop the nuclear liability regime, in particular, by further discussing and analyzing possible gaps and ambiguities in the scope and coverage of the existing liability instruments. In addition, INLEX will analyze the disadvantages of not adhering to a global nuclear liability regime, in particular, the possible difficulties of obtaining compensation outside the regime. INLEX will also assist in the development and strengthening of the national nuclear liability legal frameworks in Member States. Finally, a number of the nuclear liability instruments adopted under Agency auspices foresee a role for the Board of Governors and for which future action may be required: for example, the establishment of the maximum limits for the exclusion of small quantities of nuclear material from the scope of application of the relevant instruments. INLEX will, through the Director General, make recommendations to the Board of Governors in respect of this and other relevant issues as appropriate.

²⁵ A note on the workshop prepared by the Secretariat is available, on request, from the IAEA Office of Legal Affairs.

The next meeting of INLEX is scheduled for May 2006.