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发展核活动中的安全文化

有助于发展的切实可行的建议

DEVELOPING SAFETY CULTURE IN NUCLEAR ACTIVITIES

PRACTICAL SUGGESTIONS TO ASSIST PROGRESS

大亚湾核电运营管理有限责任公司
安全文化与人因改进项目组 译

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再版的话

本译稿是在国际原子能机构1999年中文版的基础上，经过大亚湾核电运营管理有限责任公司安全文化与人因改进项目组的重新审查修改，以及全体成员集体会审而形成的。之所以再版，是因为REPORT-11在INSAG-4所概括的安全文化理念基础上，进一步提出了发展安全文化极具现实指导意义的原则和实践，而原译文在语言本土化方面还多少存在一些遗憾，可能给读者深入理解造成困难。我们期望借助项目组集体的智慧和积累，能够更加准确地认识和把握原文的深刻内涵，使译稿更为达意和流畅，从而有利于安全文化在核电站更深和更广层面的推广和应用。

虽然项目组成员经过了INSAG-4翻译过程的学习和锻炼，但REPORT-11会审过程的难度仍然远远超出我们最初的预期，历时5个月累计1 200人·时才告完成。对译文质量的追求没有因为进度的迟缓而妥协，项目组成员之间无情质疑和激烈辩论的会审过程仍然得到坚持和延续，即使在进度最为缓慢的时候也没有丝毫动摇。对艰苦工作的鼓励往往来自于原文本身所蕴含的思想：每每就内涵深奥而切中要害的段落达成共识之后，再重温完整译文，我们不禁为国际安全文化专家们跨越国界的深刻见解和洞察力所折服，也为REPORT-11从无到有的产生过程而感叹。我们再次深深感到，安全文化的内涵博大精深，即使集中了项目组集体的智慧和力量，力有不逮之处仍然在所难免，因此本书最终还是继续采用中英文对照的方式出版，以避免译文可能产生的歧义或误解。

借此再版的机会，我们期望为我国核电安全文化的持续建设贡献自己的一份力量，欢迎广大核电同行继续提出批评指正意见。

本译文的审核工作得到了广东核电领导的关注和指导，尤其是濮继龙先生对译稿全文进行了逐字审阅，提出了诸多宝贵意见。在此谨表感谢。

大亚湾核电运营管理有限责任公司

安全文化与人因改进项目组

2006年2月

前　言

“安全文化”这一术语是国际核安全咨询组(INSAG)在1986年国际原子能机构出版的安全丛书NO. 75-INSAG-1《切尔诺贝利事故后审评会的总结报告》中引入的,并在1988年出版的安全丛书NO. 75-INSAG-3《核电厂基本安全原则》中被进一步扩展。为提供安全文化方面的指导和解释,在1991年出版的安全丛书NO. 75-INSAG-4中论述了从事核动力活动的组织和个人与安全文化的关系,构成了判别安全文化有效性的依据。

尽管INSAG-4中介绍的安全文化的定义和概念已广为人知,但安全文化原则的实际应用和特征还没有得到充分的总结或广泛的传播。为了补充INSAG-4,本报告介绍了一些实践,这些实践在许多国家发展和保持良好的安全文化方面被证实很有价值。

本安全报告是在监管、运行和工程组织的专家的帮助下编写的,目的是供从事核设施的设计、建造、制造、运营、维护或退役工作的组织和个人使用。它对于所有参与运营大型或小型核设施的组织和个人尤其有用。它还为以下组织提供了参考:监管机构,他们对发展、改进和评估安全文化感兴趣;专业和标准协会,他们对参与核活动的个人进行安全文化培训起重要作用;道德标准评审委员会等机构,他们在认证医学领域职业水准时应当考虑安全文化因素。

IAEA感谢所有为本安全报告的准备工作做出贡献的专家,尤其是M. Merry先生。

FOREWORD

The term 'safety culture' was introduced by the International Nuclear Safety Advisory Group (INSAG) in *Summary Report on the Post-Accident Review Meeting on the Chernobyl Accident*, published by the IAEA as Safety Series No. 75- INSAG-1 in 1986, and expanded in *Basic Safety Principles for Nuclear Power Plants*, Safety Series No. 75-INSAG-3, issued in 1988. To provide guidance in and interpretation of safety culture, Safety Series No. 75-INSAG-4, issued in 1991, dealt with the concept as it relates to organizations and individuals engaged in nuclear power activities and formed a basis for judging its effectiveness.

Although the definition and concept of safety culture as presented in INSAG-4 is widely known, the practical applications and characteristics of the principle of safety culture have not been adequately summarized or widely disseminated. This publication supplements INSAG-4 by describing practices that have proved valuable in establishing and maintaining a sound safety culture in a number of countries.

This Safety Report has been developed with the help of experts from regulatory, operating and engineering organizations and is intended for those who design, construct, manufacture, operate, maintain or decommission nuclear installations. It should be particularly useful for all those involved in operating nuclear facilities, large or small. It will also provide a reference for groups such as regulators who have an interest in developing, improving and evaluating safety culture, for professional and standards associations which play an important role in the safety culture training of individuals engaged in nuclear activities, and for bodies such as ethics review committees who should take into account safety culture issues for certifying professional excellence in the medical field.

The IAEA is grateful to all the experts, particularly M. Merry, who contributed to the preparation of this Safety Report.

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目 录

1. INTRODUCTION

1.1 BACKGROUND

(1) The concept of safety culture was introduced by the International Nuclear Safety Advisory Group (INSAG) in the *Summary Report on the Post-Accident Review Meeting on the Chernobyl Accident* in 1986[1]. The concept was further expanded in the 1988 INSAG-3 report, *Basic Safety Principles for Nuclear Power Plants*[2], and again in 1991 in the INSAG-4 report, *Safety Culture*[3]. Recognizing the increasing role that safety culture is expected to play in nuclear installations worldwide, the *Convention on Nuclear Safety*[4] states the Contracting Parties' desire "to promote an effective nuclear safety culture".

(2) Section 4 of *The Safety of Nuclear Installations*[5] addresses many safety culture principles. Paragraphs 513 and 514 of *Establishing a National System for Radioactive Waste Management*[6] and paragraph 2.28 of *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources*[7] place firm requirements on safety culture for nuclear applications in general.

(3) In view of the increase in attention being given to the safety culture concept it is important for organizations to share their experience, particularly for the benefit of those in which the development of safety culture is still at an earlier stage. The present Safety Report supplements the above IAEA publications by describing practices that have proved valuable in many Member States in developing, maintaining and evaluating safety culture.

1.2 OBJECTIVE

(4) This *Safety Report* is intended to offer practical advice to assist in the development, improvement or evaluation of a progressive safety culture. The approach to developing a safety culture has much in common with the approach to developing an effective organization. The process can be assisted by a learning process within an organization. This publication offers practical advice on ways to encourage this learning process.

1. 引　言

1.1　背　景

（1）安全文化这一概念是国际核安全咨询组（INSAG）在1986年的《切尔诺贝利事故后审评会的总结报告》[1]中引入的。在1988年的INSAG-3报告《核电厂基本安全原则》[2]及1991年的INSAG-4报告《安全文化》[3]中，这一概念被进一步扩展。认识到安全文化将在世界各地的核设施中起到越来越重要的作用，《核安全公约》[4]表达了各缔约国“促进有效的核安全文化”的愿望。

（2）《核设施安全》[5]第4节阐述了安全文化的许多原则。《建立国家放射性废物管理系统》[6]第513段和第514段以及《电离辐射防护及辐射源安全的国际基本安全标准》[7]第2.28段对安全文化在核行业的普遍应用提出了切实的要求。

（3）鉴于安全文化这一概念正日益受到关注，组织之间的经验共享很重要，这对安全文化发展仍处于较早阶段的组织尤其重要。本安全报告是对上述IAEA出版物的补充，介绍了许多成员国在发展、保持和评估安全文化方面业已证明有价值的实践。

1.2　目　标

（4）本安全报告旨在提供切实可行的建议，以帮助发展、改进或评估循序渐进的安全文化。发展安全文化的方法与发展有效组织的方法有许多共同之处。在组织内开展一种学习过程能够有助于安全文化的发展。本出版物为鼓励开展这一学习过程提供了切实可行的建议。

1.3 SCOPE

(5) The development and improvement of safety culture is a dynamic, progressive process. This report focuses on the organizational culture and learning processes required to implement all aspects of safety culture.

(6) There is no prescriptive formula for improving safety culture. However, some common characteristics and practices are emerging that can be adopted by organizations in order to make progress. This publication refers to some approaches that have been successful in a number of countries. The experience of the international nuclear industry in the development and improvement of safety culture could be extended and found useful in other nuclear activities, irrespective of scale. Smaller scale nuclear activities include nuclear pharmacy installations, medium sized hospitals providing radiotherapy, and plants making use of radiation sources in their processes. This report has been prepared in the belief that all those associated with nuclear activities in general are committed to the highest standards of safety and the participation of their employees in achieving that goal.

(7) Examples are given of specific practices found to be of particular value in assisting the development of a sound safety culture. They cover a wide range of activities including analysis of events, the regulatory approach, employee participation and safety performance measures. Many of these practices may be relevant to smaller organizations and could contribute to improving safety culture, whatever the size of the organization.

(8) The practices can be adopted individually, but the most effective approach is to pursue a range of practices that can be mutually supportive in the development of a progressive safety culture, supported by professional standards, organizational and management commitment. Some guidance is also given on the assessment of safety culture and on the detection of a weakening safety culture.

(9) The practical development of safety culture is a challenge facing those who design, construct, manufacture, operate, maintain or decommission nuclear installations. Those involved in other nuclear activities face a similar challenge . Irrespective of the stage of development of safety culture in their organizations, people will find in this publication some positive suggestions for accelerating the safety culture development and improvement process. The publication may also be a useful reference for others who have an interest in implementing and improving safety culture.

1.3 范 围

(5) 安全文化的发展和改进是一个动态渐进的过程。本报告着重讨论实施全方位的安全文化所需要的组织文化和学习过程。

(6) 安全文化的改进没有固定的模式。然而,一些正在形成的共同特征和实践可供组织用于改进安全文化。本出版物引述了一些已在许多国家取得成功的方法。国际核工业在发展和改进安全文化方面的经验可以加以推广,在其他核活动中发挥作用,不论其规模大小。较小规模的核活动包括核制药设施、提供放射治疗的中型医院以及在工艺过程中使用辐射源的工厂。本报告是本着以下信念编写的,即凡与核有关的组织都承诺达到最高安全标准,且由员工共同参与实现这一目标。

(7) 本出版物给出了在帮助发展良好安全文化具体实践方面具有特殊价值的案例。它们包括事件分析、监管方法、员工参与和安全业绩度量等各种活动。许多实践或许与小型组织有关,但不论组织规模大小,这些实践都可以有助于改进安全文化。

(8) 这些实践可以单独应用,但在发展循序渐进的安全文化中最有效的方式是综合应用各种可互补的实践,并辅之以专业标准、组织和管理承诺。本出版物还为评估安全文化和探测正在弱化的安全文化提供了一些指导原则。

(9) 切实可行地发展安全文化,是从事核设施的设计、建造、制造、运营、维护或退役工作的组织和个人所面临的一个挑战。其他核活动的组织和个人也面临着类似的挑战。不管其组织中的安全文化发展处于哪个阶段,人们都可以在本出版物中找到一些有助于加速安全文化发展和改进过程的积极建议。本出版物对实施和改进安全文化感兴趣的其他组织和个人或许还是有用的参考资料。

1.4 STRUCTURE

(10) Section 2 elaborates the concept of safety culture introduced in INSAG-4[3], discusses some issues which may be encountered during implementation, and touches on the benefits that would ensue.

(11) Section 3 sets out three stages of development of safety culture and offers advice on practices appropriate to specific stages that would be useful to organizations seeking further direction in implementing additional improvements.

(12) Section 4 suggests some general practices to develop organizational effectiveness as a means of implementing and improving safety culture.

(13) Section 5 describes some specific practices to develop safety culture: they are intended to apply to all stages of a nuclear installation's life cycle.

(14) Section 6 makes some suggestions on assessing the progress of development of safety culture in an organization and on evaluating the influence of major environmental and internal organizational factors on that culture.

(15) Section 7 gives some guidance on the detection of incipient weaknesses in safety culture that may be of particular interest to regulators and those responsible for self-assessment in organizations.

(16) Section 8 comprises concluding remarks.

1.4 结 构

(10) 第2节阐明了INSAG-4[3]介绍的安全文化概念,讨论了实施过程中可能遇到的一些问题,也提及了将带来的益处。

(11) 第3节划分了安全文化发展的三个阶段,并对每个特定阶段的实践提出了建议,这些建议将有助于组织寻求实施进一步改进的方向。

(12) 第4节建议了一些提高组织有效性的普遍实践,作为实施和改进安全文化的一种手段。

(13) 第5节介绍了发展安全文化的一些具体实践,以期应用于核设施寿期内的所有阶段。

(14) 第6节提出了一些建议,用以评估组织中安全文化的发展进程及评价重要环境因素和内部组织因素对该文化的影响。

(15) 第7节就探测安全文化的早期弱化给出了一些指导原则,这对监管机构和组织中负责自我评估的人员可能具有特殊意义。

(16) 第8节是结束语。