

安全丛书 No.75-INSAG-4
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安全文化

国际核安全咨询组报告

SAFETY CULTURE

A REPORT BY THE INTERNATIONAL
NUCLEAR SAFETY ADVISORY GROUP

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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(按姓氏笔画为序)

方春法	王皓宇	朱闽宏	何红升	张 明	杨茂春
邹庆安	邹勇平	陈小强	陈伟仲	陈 泰	陈 强
周永雄	郑北新	金航军	赵 昔	奚芝苓	郭利民
秦余新	高柯夫	傅先刚	琚存有	鲁明波	廖伟明
樊陪都	戴忠华				

再版的话

本译稿是在1992年原子能出版社INSAG-4中文版的基础上,经过大亚湾核电运营管理有限责任公司(DNMC)安全文化与人因改进项目组的重新审查修改、多层次校核,以及全体成员集体会审而形成的。之所以再版,一方面是因为INSAG-4所阐述的安全文化理念和实践,在十几年后的今天,仍然具有现实的指导意义和生命力;另一方面,经过十几年的安全文化推广和实践,电站对于安全文化的内涵和实质有了更进一步的认识和把握,具备了将原文中抽象、难懂的概念译成更为达意、流畅汉语的可行性,从而有利于安全文化在核电站更深层面的推进和传播。DNMC安全文化与人因改进项目组汇集了电站各层面、各专业对于安全文化有热情、有经验、有见解的一批管理者和员工,其成员具有较广泛的代表性,并通过集体会审的方式在某种程度上再现了INSAG-4文件的产生过程。为了译文的准确无误,项目组成员之间无情质疑、逐字逐句激烈辩论,有效集中了全体有识之士的集体智慧,保证了译文的基本质量。虽然如此,在会审过程中我们仍然深深感到,安全文化的内涵博大精深,即使采用了上述组织方式,力有不逮之处仍然在所难免,因此本书最终还是采用中英文对照的方式出版,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全译稿进行了逐字审阅,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
2005年8月

FOREWORD

by the Director General

With the intention of strengthening the IAEA's contribution to ensuring the safety of nuclear power plants, leading experts in nuclear safety were invited by the Agency to form the International Nuclear Safety Advisory Group (INSAG). This group serves mainly as a forum for the exchange of information on nuclear safety issues of international significance and formulates, where possible, common safety concepts.

The term 'Safety Culture' was first introduced in INSAG's *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 further expanded on in *Basic Safety Principles for Nuclear Power Plants*, Safety Series No. 75-INSAG-3, issued in 1988. Since the publication of these two reports, the term Safety Culture has been used increasingly in the literature in connection with nuclear plant safety. However, the meaning of the term was left open to interpretation and guidance was lacking on how Safety Culture could be assessed. The present report deals with the concept of Safety Culture as it relates to organizations and individuals engaged in nuclear power activities, and provides a basis for judging the effectiveness of Safety Culture in specific cases in order to identify potential improvements.

The report is intended for use by governmental authorities and by the nuclear industry and its supporting organizations. Prepared by a highly authoritative body, it should help to promote Safety Culture. It is intended to stimulate discussion and to promote practical action at all levels to enhance safety.

前 言

国际原子能机构总干事

为加强国际原子能机构(IAEA)在保证核电厂安全方面的作用,IAEA邀请核安全领域的国际知名专家组成了“国际核安全咨询组(INSAG)”。INSAG的主要任务是提供一个信息交流的平台,研究有国际意义的核安全事项,提炼通用安全理念。

1986年,IAEA出版了安全丛书 No. 75-INSAG-1《切尔诺贝利事故后审评会的总结报告》,该报告首次提出了“安全文化”(Safety Culture)的术语。1988年,IAEA又出版了安全丛书 No. 75-INSAG-3《核电厂基本安全原则》,对安全文化进行了阐述。之后,安全文化一词逐步在核电厂安全相关文件中得到广泛应用。但是,安全文化的具体含义仍有待进一步阐释,如何评价安全文化也缺乏指导。本报告从核电厂组织与个人层面阐述了安全文化的含义,并结合一些具体情况提出了判别安全文化有效性的依据,以找出可能的改进。

本报告由权威机构编写,供政府有关部门、核工业及相关支持单位使用,应当有助于推进安全文化。目的是激发讨论,促进在各个层面付诸行动,提高安全水平。

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SUMMARY

The response to a previous publication by the International Nuclear Safety Advisory Group (INSAG), No. 75-INSAG-3, *Basic Safety Principles for Nuclear Power Plants*^①, indicated a broad international interest in expansion of the concept of Safety Culture, in such a way that its effectiveness in particular cases may be judged. The present report responds to that need. It is directed especially to the senior management of all organizations whose activities affect nuclear plant safety.

In embarking on a report on Safety Culture, INSAG was faced with the fact that the concept has not been fully charted in previous studies, and there is no consensus on the meaning of Safety Culture. In seeking to develop views that will be commonly shared and have important value in application, INSAG found it necessary to explore deeply the general factors which contribute to a satisfactory nuclear safety regime. The outcome is a document which represents the common view of INSAG members.

The first proposition presented by INSAG is the definition of Safety Culture:

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

This statement was carefully composed to emphasize that Safety Culture is attitudinal as well as structural, relates both to organizations and individuals, and concerns the requirement to match all safety issues with appropriate perceptions and action.

The definition relates Safety Culture to personal attitudes and habits of thought and to the style of organizations. A second proposition then follows, namely that such matters are generally intangible; that nevertheless such qualities lead to tangible manifestations; and that a principal requirement is the development of means to use the tangible manifestations to test what is underlying.

① INTERNATIONAL NUCLEAR SAFETY ADVISORY GROUP, *Basic Safety Principles for Nuclear Power Plants*, Safety Series No. 75-INSAG-3, IAEA, Vienna (1988).

概 要

国际上对国际核安全咨询组(INSAG)出版的 No. 75-INSAG-3《核电厂基本安全原则》^①的反映表明,人们普遍对进一步阐明安全文化这一概念感兴趣,希望能通过一些具体事例对安全文化的有效性进行评价。本报告正是针对这一需求,特别为对核电厂安全有影响的各组织高层管理人员而编写的。

在编写安全文化报告过程中,INSAG 面对的实际情况是,安全文化这个概念在过去的研究中尚未充分探讨过,其含义亦未形成统一的认识。为了建立普遍认同并具有重要推广应用价值的安全文化内涵,INSAG 感到有必要深入研究良好的核安全体制的基本要素。其成果就是这份代表 INSAG 成员共同观点的文件。

INSAG 提出的第一项建议就是安全文化的定义:

安全文化是存在于组织和个人中的种种特性和态度的总和,它建立一种超出一切之上的观念,即核电厂的安全问题由于它的重要性要保证得到应有的重视。

INSAG 的这一表述措词严谨,强调安全文化既是态度问题,又是体制问题;既和组织有关,又和个人有关,也关系到以恰当的理解和行动处理所有安全事项的要求。

这一定义把安全文化与个人的态度和思维习惯以及组织的风格联系在一起。INSAG 的第二项建议指出,个人的态度、思维习惯和组织的氛围往往是无形的,这些无形的特性又往往通过有形的方式表现出来,核心要求是建立各种办法,通过有形的方式检验无形的内涵。

^① 国际核安全咨询组《核电厂基本安全原则》, Safety Series No. 75-INSAG-3, IAEA, 维也纳(1988)。

INSAG takes the view that sound procedures and good practices are not fully adequate if merely practised mechanically. This leads to a third proposition: that Safety Culture requires all duties important to safety to be carried out correctly, with alertness, due thought and full knowledge, sound judgement and a proper sense of accountability.

In its manifestation, Safety Culture has two major components: the framework determined by organizational policy and by managerial action, and the response of individuals in working within and benefiting by the framework. Success depends, however, on commitment and competence, provided both in the policy and managerial context and by individuals themselves.

Sections 1 to 3 of the report develop the complementary ideas of the framework provided at the policy and managerial level and of individual responses. This is done in a general way so that the views expressed are applicable in any organization with responsibilities affecting nuclear safety.

To make practical use of the work towards improving nuclear plant safety requires more substance. All those engaged in matters touching on nuclear safety are likely to insist that what is described is entirely characteristic of their own approach. All will say: "But this is what we do already". INSAG therefore judged it right to go further, and so the latter part of the report provides more detail on the tangible characteristics of a satisfactory Safety Culture in different kinds of organizations. In the main text this is in the form of statements of what should be expected. In the Appendix it is in the form of a series of questions, provided as an aid to self-examination by organizations rather than as a Yes/No checklist.

Finally, in preparing this report, INSAG took care to avoid merely listing sound practices and requirements for satisfactory individual behaviour which, while no doubt worth restating, take matters little further. Instead, INSAG sought by way of propositions to analyse and illustrate the topic in more general ways, and to provide means by which organizations may examine and improve their own practices, performance and working methods. On this basis, INSAG offers the report as a contribution to the further enhancement of nuclear plant safety.

INSAG 认为,仅仅机械地执行完善的程序和照搬良好实践是不够的。由此,INSAG 提出第三项建议:安全文化要求,对安全重要的职责必须得到正确履行,即要求具备警觉性、充分的思考、全面的知识、准确的判断和高度的责任心。

具体来说,安全文化由以下两个主要方面组成:第一是由组织政策和管理活动所确定的安全体系;第二是个人在体系中的工作表现。成功取决于上述两个方面对安全的承诺和能力。

本文第 3.1 节到第 3.3 节分别从政策层、管理层及个人的响应三个层面对安全体系做了进一步阐述,以使其能够适用于任何一个具有核安全相关职责的组织。

要使安全文化理念在实际应用中不断提高核电厂安全水平,还需要更多的实质内容。所有核安全相关的工作人员大概会认为,本报告阐述的观点与他们平常所做的工作没什么两样。他们会说:“这些都是我们早已在做的啊!”正因为如此,INSAG 认为应该再深入一步,因而在报告的最后一部分给出了更多的细节,阐明在不同的组织中良好的安全文化所应具有的可见的特性。报告的正文以陈述的方式阐明什么是所期望的安全文化,报告的附件以问卷的形式列举了一系列问题,作为安全文化自我评估的工具,而不仅仅作为“是/否”检查清单。

最后,INSAG 有意避免简单列举良好个人行为的实践和要求,尽管这些实践和要求值得反复强调,但本报告并没有进一步展开。相反,INSAG 力图以建议的形式,进一步分析和提炼一般规律,为各个组织提供一些自我评估的手段,帮助其改善工作方法、工作实践和工作业绩。基于此,INSAG 的这份报告也是对进一步提高核电厂安全的一份贡献。

1. INTRODUCTION

1. Except for what are sometimes called 'Acts of God', any problems arising at a nuclear plant originate in some way in human error. Yet the human mind is very effective in detecting and eliminating potential problems, and this has an important positive impact on safety. For these reasons, individuals carry heavy responsibility. Beyond adherence to defined procedures, they must act in accordance with a 'Safety Culture'. The organizations operating nuclear plants, and all other organizations with a safety responsibility, must so develop Safety Culture as to prevent human error and to benefit from the positive aspects of human action.

2. The substance of Safety Culture is the means by which close attention to safety is achieved for both organizations and individuals. INSAG introduced the term Safety Culture in its Summary Report on the Post-Accident Review Meeting on the Chernobyl Accident^②. In its subsequent report, Basic Safety Principles for Nuclear Power Plants^③, referred to in the following as INSAG-3, Safety Culture was highlighted as a fundamental management principle. The present report responds to comments received after publication of INSAG-3 proposing that the concept of Safety Culture be clarified and so defined that its effectiveness could be confirmed in specific instances.

3. This report gives particular attention to operating organizations, because the link between human performance and plant safety is closest there. Yet the discussion extends to Safety Culture in all concerned, because the highest level of safety is achieved only when everyone is dedicated to the common goal.

4. The safety of the plant also depends critically on those who previously designed, constructed and commissioned it. A partial list of other contributors includes the background community of science and engineering, the governmental bodies responsible for regulation and those responsible for the underlying research.

② INTERNATIONAL NUCLEAR SAFETY ADVISORY GROUP, Summary Report on the Post-Accident Review Meeting on the Chernobyl Accident, Safety Series No. 75-INSAG-1, IAEA, Vienna (1986).

③ INTERNATIONAL NUCLEAR SAFETY ADVISORY GROUP, Basic Safety Principles for Nuclear Power Plants, Safety Series No. 75-INSAG-3, IAEA, Vienna (1988).

1. 引言

(1)除了所谓“上帝的旨意”这种不可抗力以外,核电厂发生的任何问题在某种程度上都来源于人因失误。然而人的心智在探测和消除潜在问题方面是十分有效的,这一点对安全有着积极作用。正因为如此,每个人都肩负着重要的安全责任。除了要遵守程序的规定,他们还必须按照“安全文化”要求来进行每一项工作。因此,核电厂运营组织以及所有具有安全责任的组织都必须建立安全文化,充分发挥人的积极因素,防范人因失误。

(2)安全文化的实质就是要促使组织和个人密切关注安全。INSAG 在《切尔诺贝利事故后审评会的总结报告》^②中首次使用了安全文化这个名词。在后来的另一份报告《核电厂基本安全原则》^③(以下称作 INSAG-3)中,安全文化被强调为基本的管理原则。本报告是对 INSAG-3 发表后收到意见的回应,这些意见要求对安全文化的概念加以澄清和定义,使安全文化的作用能在实践中得到证实。

(3)考虑到人员行为与核电厂安全的相关性最强,本报告对核电厂运营组织给予特别关注。然而,对安全文化的探讨也要延伸到所有相关的组织。因为只有当每一个人都致力于这个共同目标时,才能获得最高的安全水平。

(4)核电厂的安全也极大地取决于设计、建造和调试人员,也和科学与工程行业背景、政府监管部门以及科研机构等有关。

^② 国际核安全咨询组《切尔诺贝利事故后评审会的总结报告》,Safety Series No. 75-INSAG-1,IAEA,维也纳(1986)。

^③ 国际核安全咨询组《核电厂基本安全原则》,Safety Series No. 75-INSAG-3,IAEA,维也纳(1988)。

5. INSAG-3 identified particular aspects of Safety Culture. It also dealt with matters not so identified but which represent practices important for achievement of the required human responses. What follows treats these practices as an essential component of Safety Culture.