

# NUCLEAR LAW BULLETIN No. 52

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## FOREWORD

*The Nuclear Law Bulletin is now in its twenty-sixth year, and with this December issue the Secretariat would like to thank the Bulletin readers for their constancy and its correspondents for having made it possible to keep abreast of developments in nuclear legislation, agreements and case law throughout these years. Although the general format of the Bulletin has remained unchanged, we have tried to keep up with the needs of our readers by regularly creating new subject headings and by publishing articles on current trends and doctrine reflecting concerns in the nuclear field. We also believe that the time has now come to ask our readers whether they would care to take an active part in the preparation of the Bulletin by replying to a brief questionnaire - on the last page - on their preferences and special interests to be taken into account as far as possible for future issues. We hope that many of you will respond with your suggestions Thank you.*

*Please send your replies to Nuclear Law Bulletin, OECD Nuclear Energy Agency, Le Seine St. Germain, 12 Bd des  
Des, 92130 Issy-les-Moulineaux, France*

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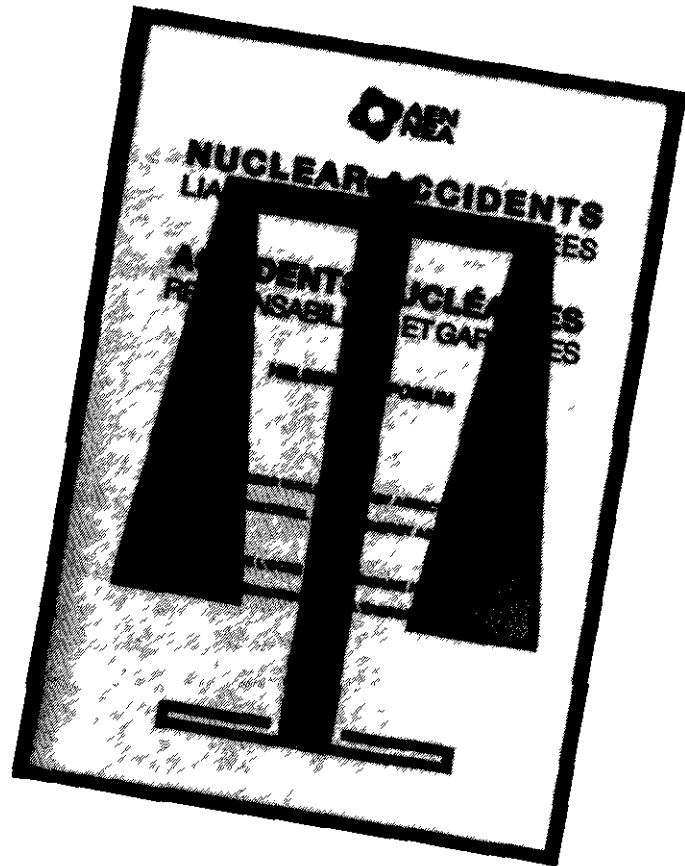
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**NUCLEAR ACCIDENTS  
LIABILITIES AND GUARANTEES**

The 1992 Symposium on Nuclear Accidents - Liabilities and Guarantees organised by the OECD Nuclear Energy Agency in collaboration with the International Atomic Energy Agency discussed the nuclear third party liability régime established by the Paris and Vienna Conventions its advantages and shortcomings and assessed the teachings of the Chernobyl accident in the context of that régime. The topics included the geographical scope of the Conventions the definition of nuclear damage in particular environmental damage insurance cover and capacity supplementary compensation by means of a collective contribution from the nuclear industry or governments and finally the international liability of States in case of a nuclear accident.

**ACCIDENTS NUCLÉAIRES  
RESPONSABILITÉS ET GARANTIES**

Le Symposium de 1992 sur les accidents nucléaires - responsabilités et garanties organisé par l'Agence de l'OCDE pour l'énergie nucléaire avec la collaboration de l'Agence internationale de l'énergie atomique a été consacré à l'étude du régime de responsabilité civile nucléaire établi par les Conventions de Paris et de Vienne il a permis de faire le point sur ses conditions d'application et ses lacunes et de tirer en particulier les leçons de l'accident de Tchernobyl dans le contexte de ce régime. Les sujets examinés comprenaient le champ d'application géographique des Conventions la définition du dommage nucléaire en particulier les dommages à l'environnement la couverture et la capacité d'assurance le recours à des moyens d'indemnisation supplémentaire en faisant appel à des fonds fournis par l'industrie nucléaire ou les gouvernements et enfin la responsabilité internationale des États en cas d'accident nucléaire.





## OPTIMISING RADIATION PROTECTION THE ETHICAL AND LEGAL BASES\*

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"Quand on n'a pas la science,  
il reste la sagesse"

Michel SERRES, Eclaircissements

### **Abstract**

*The principle of optimisation has gradually become a fundamental element of the radiological protection system recommended by the International Commission on Radiological Protection (ICRP). This article sets out to show that this principle makes it possible to apply science and set out the law in a new way. Closer to a social standard rather than a scientific one, given its reference to the model of acceptability of radiological risk, it differs from the factual judgment underlying the threshold principle. Involving, as it does, value judgments and the idea of compromise between economic and social interests, it means that science has a need to call on ethics and the law.*

### **1 INTRODUCTION**

Given the lack of certainty as to the exact nature of the relationship between exposure and the likelihood of stochastic effects in the case of low doses of ionizing radiation, the ICRP has preferred the cautious approach of assuming a linear relationship without any threshold. On the basis of this exposure/risk relationship, and in an endeavour to limit any damage from stochastic effects to a level acceptable to individuals and society, the ICRP

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\* This article summarises a series of papers on ethics and radiation protection presented by J. Lochard at various recent Congresses and the Doctoral thesis "Le droit de la radioprotection" ("Radiation Protection Law") defended in 1993 at the Faculty of Law, Economic Science and Management of Nancy University by M.C. Grenery-Boehler.

\*\* Responsibility for the ideas expressed and the facts given rests solely with the authors.

issued more detailed and specific recommendations concerning the protection of man from ionizing radiation in its Publication 26 in 1977 [1], and more recently in Publication 60 in 1991 [2]. The system it proposes for the management of radiological risk is based on three fundamental principles. The first of these is that practices must be justified: no human activity requiring the use of ionizing radiation can be authorised unless it results in a net positive gain for society. This principle is based on a cost-benefit type analysis which is the responsibility of the competent regulatory authorities as regards deciding which practices are beneficial to society [3] and, in a wider context, is the responsibility of politicians as regards choosing strategic technological options, such as nuclear power. According to the second principle, namely that of the optimisation of protection, usually expressed in the acronym As Low As Reasonably Achievable (ALARA) in ICRP terminology, all exposures must be kept as low as is reasonably achievable, economic and social considerations being taken into account. Lastly, individual dose equivalents should not exceed certain limits specified by the ICRP: this is the principle of the limitation of individual doses.

It is no longer appropriate today, in the field of radiation protection, to use a simple mechanistic approach, presenting science as a unique and objective setting of rules. The adoption of a comprehensive approach incorporating a large dose of pragmatism would seem to be the only way of translating the prevailing uncertainty into a system of values which, albeit complex, do reflect the many facets of the actual situation. When knowledge is diluted by a large dose of uncertainty, man may adopt one of two attitudes: either like Descartes he restricts reality to that which can be measured and calculated, dismissing whatever does not fit into this functional, but far too limiting, framework, or, he endeavours to incorporate all types of logical reasoning which can elucidate reality: thus devising systems as complex but also as rich as that drawn up by the ICRP in the field of radiological protection. It can thus be seen that value judgments of an ethical, social and economic nature have been taken into account in the drafting of successive ICRP publications. The philosophy underlying management of the risk of radiation is based on the prevailing uncertainty as to whether low doses have any effects. Given this scientific uncertainty and in order to minimise regrettable consequences of any error in assessment, the cautious approach is to act "as if" there was no doubt as to the existence of such effects. Adopting this cautious approach for low doses of a linear dose-effect relationship without any threshold does not therefore reflect the current state of scientific knowledge but is an intellectual concept designed to form the basis for measures taken in the field of radiation protection. When no threshold is adopted, reducing exposure thus appears as a logical objective. However, rather than systematically minimising exposures in an effort to achieve zero risk, which is tenable neither from the viewpoint of resource allocation nor from that of equity, the ICRP recommends that ALARA protection levels be aimed for within a rational scientific and ethical framework for managing the residual risk of radiation.

Historically, the philosophy of radiation protection was based on the simple and very effective system of HED (High Erythema Dose) [4], defined as the amount of X-ray exposure needed all at once to bring on, in a given skin area, the beginning of an erythema. A system of prevention of such deterministic effects was adopted, based on the idea of a threshold which gave rise to the classical concept of limits, easy to apply from the regulatory viewpoint and guaranteeing the protection of each individual.

Once the likely existence of stochastic effects from exposure inferior to the threshold was recognised, the debate on how to manage the risk of radiation spread beyond the

limited field of scientific certainty. Indeed, it is impossible, with the data available, to demonstrate irrefutably that effects from low doses do or do not exist. The Manichean and straightforward system of prevention thus gave way to uncertainty, doubt and "hypothetical" objectivity as regards the management of the stochastic effects of exposure to low doses. Unable to find a scientific basis for a non-ambiguous response [5], application of the system for managing radiological risks drawn up by the ICRP is determined by compromises reached by experts who can no longer restrict themselves to the scientific sphere alone. These problems may now no doubt be referred to as "trans-scientific", meaning that social, economic and ethical considerations are needed as guides in this area of uncertainty and the "hypothetical". Thus, as far as stochastic effects are concerned, the cautious approach adopted has led logically to a desire to reduce exposures. The arrangements and objectives required to achieve this end were long a matter of controversy and it was only gradually that the ICRP was able to define the concept of optimisation according to which exposures must be kept as low as reasonably possible, economic and social considerations being taken into account. This principle, the purpose of which is to reduce exposures and which has also evolved very recently towards a limitation of "inequities" in the distribution of individual doses, opens up new dimensions in the scientific field. It emphasizes the fact that radiological protection is not simply a matter of scientific certainty and regulation based on the concept of a threshold. Radiological protection is also a question of prudence, economic effectiveness and also of ethics, as illustrated by the quest for equity.

In successive ICRP publications, the principle of optimisation has become fundamental to the Commission's system of radiological protection. It explains why science has called upon the law, for the notion of compromise between economic and social interests that optimisation implies and for the ethics on which it is based, so that the two disciplines together can devise a rational and balanced system to manage the risk of radiation, management which is soundly based and capable of judicious decisions. The principle represents a meeting place between science and the law, offering scientists a "new" way to think about science, and lawyers an opportunity to take a "new" approach to the law.

## **2 A "NEW" APPROACH TO SCIENCE**

The concept of dose limitation on which the previous ICRP recommendations were based evolved, in the ICRP Publication 60 of 1991, into a system of radiological protection. This semantic nuance is a way of saying that the concept of a limit, in its "biological" dimension of threshold or its "legal" one of prohibition, no longer constitutes a guarantee of adequate radiological protection. The system of prevention based on the notion of a threshold has given way to a system of radiological risk management based on the principle of caution linked to the recognition of stochastic effects as early as 1950 and to the assumption, adopted subsequently, of a linear relationship without any threshold, considered to be the prudent approach as regards low doses. This change has involved a number of consequences affecting the place and functions of the concepts of limits and optimisation in the system of radiological protection. In its Publication 60, the ICRP expressly states the need, when striving for dose levels as low as reasonably achievable, to take account not only of the economic dimension but also of equity. In emphasizing the question of the distribution of individual doses by introducing the principle of equity in exposure reduction, the ICRP has thus given a more specific form to the social dimension which previously had remained somewhat vague.

## 2 1 From prevention to prudence

Until the 1950s, compliance with a so-called "tolerable" dose limit, based on a model of deterministic effect thresholds, was considered to be a satisfactory approach to protection. As long as deterministic effects were the sole criterion applied, such effects manifesting themselves only if threshold-doses were exceeded, the objective of radiological protection could be conceived as the total prevention of any effects in persons exposed, simply by providing that the threshold doses must not be exceeded. However, studies on radiologists exposed at the beginning of the century and on the Japanese populations irradiated by the atomic bombs dropped on Hiroshima and Nagasaki in 1945 revealed that, even below the thresholds above which deterministic effects appeared, there could be stochastic effects [6]. The recognition of stochastic effects and the subsequent assumption of a linear relationship without any threshold below which low doses were considered as safe, have constituted the basis for radiological protection over the last three decades.

The concept of prevention was based on the belief that science could, by considering objectively and measuring risk, control it and reduce the likelihood of detriment. Adoption of a cautious approach [7], on the other hand, results from uncertainty about the extent of scientific knowledge itself, and reflects the dilemma arising from the relativity of such knowledge and the need to take decisions. Unlike the scientific approach under which knowledge and prevention are made the symbols of a "deterministic" management of risk, the principle of caution, by incorporating the doubts about scientific knowledge, calls upon a totally new approach to risk-taking. The hypothesis is that of doubt, on the basis of which the following approach, conservative in nature and which some would describe as "riskophobe" has been adopted. In the field of radiological risk, the non-invalidated hypothesis that there exists a linear relationship without any threshold between the dose received and the likelihood of the appearance of stochastic effects at low doses is held as "provisionally" valid even though it has not been formally proved. This approach, which uses the very same terms as Pascal's doctrine, is founded on an anthropocentric humanism based on the principle that since everything is measured in relation to man, the problem is not so much one of the scientific validity of the dose-effect relationship as that of the ethical "fairness" of this relationship. In accordance with the principle of responsibility [8] that the primary duty of man is self-preservation, the dose-effect relationship meets ethical considerations defined as responsibility for others [9] and which dictate that the rule of caution be applied, this being a fundamental and valid rule for all human action. Anyone who "bets" on the absence of low-dose thresholds has been cautious since he has endeavoured to minimise the damage done in the event of his being mistaken. For to wager on the existence of a threshold is, in the event that one is proven wrong, to risk losing everything since it will not be possible to turn the clock back. In these circumstances, the gambler therefore prefers to bet on the non-existence of a threshold and, should he be wrong, will only have to regret simply having been so careful. In this event, nothing is lost except for unnecessary expenditure on protection. In endeavouring to minimise any regrets, it is not only the irreversibility of the choice which is important but also the idea that a risk involves not just any sort of loss, no matter how great, but the loss of others and thus, one's own. Ethical considerations in radiological protection are inevitably linked to the fact that action leaves a mark on reality and that this mark, in that it implies decisions involving a residual risk artificially created by man, must, to be bearable, result from an "altruism" based on a logical "cautious" attitude [10].

The principle of caution, as a substitute for scientific certainty, involves the new idea that as science approaches its limits, "social" considerations must take over. This development led to the adoption, in 1950, of the idea of reducing exposures and substituting the concept of "maximum permissible dose" for that of tolerable dose, which resulted logically from the model of the threshold for the appearance of deterministic effects. By making this semantic change, the ICRP thus recognised that the management of radiological risk should henceforth be based on the idea of the acceptability of the risk as concerns stochastic effects [11]. By adopting the concept of "permissible dose", the ICRP recognises that the maximum dose limits, meant to represent a compromise between health and economic considerations, do not represent a tolerable level of exposure without any risk to the organism since it has been admitted that the only way to avoid all risk whatsoever is by zero exposure. The philosophy of nuclear risk management laid down by the ICRP may be summarised in the statement made by the Commission in its Publication 26 of 1977 to the effect that the goal of protection against radiation should be to prevent non-stochastic detriment and limit the likelihood of the appearance of stochastic effects to levels deemed acceptable [1].

Providing for radiological protection is therefore not exclusively a scientific preserve. Such arrangements are in fact the result of a long maturing process involving a degree of analysis without precedent in the sphere of the management of technological risks. Lauriston S. Taylor declared in this connection in 1980 "In 1957 I argued (cite) "Radiation protection is not only a matter for science. It is a problem of philosophy, morality and the utmost wisdom." He later added "economics", politics and public involvement" but these were all elements of an overall ideological approach [12]. Obligated to accept maximum doses not as a guarantee of absolute safety but rather as a compromise between the need to protect health and that of allowing scientific and economic progress to develop fully, protection no longer falls into the scientific domain alone but incorporates an element of social acceptability. Dose limits no longer correspond to the concept of a threshold between what is safe and what is dangerous but to the borderline between what is considered, on the basis of scientific and technical valuations and deductions but also inevitably on value judgments of an economic, social and moral kind, as a socially unacceptable risk and a socially tolerable one.

## 2.2 Reducing exposures and "zero risk"

If the argument in favour of no threshold is accepted, the logical objective of protection should be to maintain exposures as low as possible, or even reduce them to zero. However, even though the "zero risk" objective may at first sight appear logical and, moreover, attractive, it is not realistic from an economic or ethical point of view. Having regard to the law of diminishing returns - applicable also in the field of protection - reducing exposures becomes increasingly expensive as the figure zero is approached, and beyond a certain level of protection, marginal gains from avoided doses become negligible [13]. It is difficult to justify that protection resources be monopolised in this way for extremely marginal benefits whereas there are other situations in which modest expenditure can achieve a significant reduction in risk levels. From the viewpoint of the social allocation of protection resources, the quest for zero risk in any given context is not acceptable, the more so in that it usually involves transferring risk from the group for which protection is sought to other groups. Thus, those who advocate eradicating risk as the only acceptable solution are adopting a basically egotistical approach. The slogan "NIMBY" (Not In My

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Backyard), popular in recent years in the United States with regard to the disposal of radioactive waste, is altogether representative of this individualistic and anti-social attitude, combining complacency with lack of regard for the concerns of others

It is interesting to note that the concept of optimisation was not accepted immediately as the logical way of reducing exposures, an objective born of the caution dictated by scientific uncertainty as to the effects of low doses. Referring to ICRP publications, it can be seen that following its initial formulation, the economic and ethical aspects of the concept have evolved, over nearly three decades. In its 1955 Recommendation [14], on the basis of the no-threshold hypothesis, the ICRP recommended that exposures be reduced "to the lowest possible level". It is this wording which in fact encouraged the "zero risk" objective and it is only in 1959, in Publication 1 [15], that the first outline of the principle of optimisation is to be found. There, it is recommended that exposures be maintained "As Low As Practicable". Six years later, the formula "As Low As Practicable" (ALAP) was replaced by "As Low As Readily Achievable", and furthermore, in its Publication 9 [16], the ICRP provided that two specific considerations, namely economic and social, should be taken into account in determining the exposure levels which could be considered as acceptable. Publication 22 of 1973 [17] took an important step forward. On the one hand, the term "readily" was replaced by "reasonably" and, on the other hand, it was specifically said that not only economic and social considerations had to be taken into account, but also ethical ones. Subsequent publications did not make any significant changes and Publication 26 [1] introduced the formula which has since become the standard one, namely As Low As Reasonably Achievable (ALARA) economic and social factors being taken into account.

As regards methodology, Publication 22 opened the way for the formalisation of the concept of optimisation by introducing a cost-benefit model and a monetary value for the collective dose unit (the value "alpha") [17]. This latter concept, the subject of vigorous debate, is the cornerstone of the principle of optimisation. It is to this principle what limits are to the principle of limitation and it is not too much to say that it crystallises, from the practical viewpoint, the search for caution, efficiency and equity.

The optimisation of radiological protection should be understood as the quest for a balance between the costs of protection and the levels of residual exposure, a balance based on an efficient use of protection resources and one which ensures equity in the distribution of individual risks. It amounts, in fact, to an ethical response to those who favour the "zero risk" approach. If the irreversible trend towards an ever-increasing level of protection for certain populations is not to lead to the squandering of available resources and the creation of risks for other groups, the principle of optimisation has to be recognised as the means of finding the best compromise, for the common good, between the desire to protect populations as far as possible and that of using as efficiently as possible the resources available for that purpose [18].

### **2.3 The introduction of equity in exposure reduction**

The latest ICRP Recommendations (Publication 60 [2]) reflect an interesting conceptual development inasmuch as they highlight one of the ethical aspects of the principle of optimisation, namely the equitable distribution of individual doses.

The account taken of equity is an important development in the system of radiological protection. For the first time, explicit recognition was given to the fact that the situations in which persons are exposed and also the measures of protection adopted can give rise to inequalities of exposure deemed sufficiently important to require correction. The objective of optimisation is therefore no longer simply to keep exposures as low as is reasonably possible having regard to economic constraints but also to ensure that the differences in dose levels between the least exposed persons and those most exposed also remain reasonable.

The sources of exposure "inequities" are numerous. The advantages and disadvantages (including exposures) of any given activity are not distributed equally amongst the population, there are disparities in exposure levels for the same activity but for different sources, close levels within an exposed group may be different and there may be exposure to multiple sources and exposure transfers from one group to another. These inequities have to be taken into account if the consequences of a blind application of basic radiological protection principles are to be avoided. Whether as regards compliance with limits or the application of optimisation, if there is no control then there is nothing to guarantee that individual exposure levels are "fair". The quest for equity thus corresponds to practical measures based essentially on an ethical assessment of what is considered as being in line with the rights of each individual and with justice [19].

Major problems remain, however, in achieving this objective in practice. The ICRP recommends the use of constraints, but the concept remains vague. Initial analysis in this sphere has not yet led to very clear solutions [20, 21, 22]. Given the multiplicity of sources of inequity and of different situations, the concept of constraint would need to take many different forms, from the introduction of different monetary values for collective dose units depending on individual exposure levels [23] to take account of differences in dose distributions, to that of "reference" doses in order to reduce differences between sources within the same practice.

From the regulatory viewpoint, the concept of constraint is thus difficult to define. As specified in the ICRP, a distinction has to be made between this concept and the provisions laying down dose limits as usually defined in national legislation. Mandatory dose constraints are difficult to transpose into regulatory provisions inasmuch as they are rather like a reference for good practice and are supposed to play the role of a management tool, able to adapt to the special circumstances of each particular situation.

## **2.4 The changing concept of limits**

In ICRP Publication 26 [1] and more recently in Publication 60 [2], an important change can be seen in the ranking of the basic radiological protection principles recommended by the ICRP. The system it proposes is no longer based exclusively, as it was before, on maximum permissible doses used as an upper limit of an acceptable risk. The limit is now considered as the lowest frontier in the area of unacceptable doses. Levels above the limit must be prohibited by law, and doses below the limit are considered acceptable only inasmuch as residual exposure levels are optimised.

Dose limitation must therefore no longer be seen as the purpose of radiological protection nor be presented as the one and only principle underlying the radiological

protection system. Thus, in paragraph 124 of its Publication 60 of 1991, the ICRP points out that in practice, several misconceptions have arisen about the definition and function of dose limits. These latter are widely, but erroneously, regarded as a line of demarcation between "safe" and "dangerous" and secondly, as the most simple and effective way of keeping exposures low and forcing improvements, given that these limits are commonly seen as the sole measure of the stringency of a system of protection. These misconceptions are, to some extent, strengthened by the incorporation of dose limits into regulatory instruments. Exceeding these limits then becomes an infraction of the rules. Against this background, it is not surprising that the competent authorities prefer to base their measures of control on compliance with dose limits even when the sources are partly, or even totally, beyond their control, and when optimisation of protection is the more appropriate course of action.

The fundamental role given to the principle of optimisation, enshrined in ICRP Publication 60, shows that this principle, which could henceforth be described as the "cornerstone" of the system of radiological protection, is the guarantee not only of the level of protection which used to be considered "sufficient" under the system of dose limitation, but of a new concept of rational and effective protection based on a balance between the costs of protection and individual and collective residual exposure levels. Laying down a limit may indeed look like a makeshift, rather than an ideal solution if it is recognised that low doses may have some effects. It does not include any incentive to reduce exposure levels below the maximum laid down by the law even where such reduction seems technically and economically feasible [24]. It is the concept of optimisation that stimulates operators to endeavour to reduce doses while ensuring the optimum allocation of their resources.

The principle of optimisation does indeed constitute an important innovation compared to the general state of practices concerning safety and protection standards. It is probably the first time in these fields that there has been agreement to go beyond a legal-type concept of standards expressed as a figure denoting a maximum limit. The principle of dose limitation will henceforth play a role of an individual guarantee, acting to correct or check unbridled optimisation. It gives special meaning to the principles of justification and optimisation which, taken separately or together, could give rise to fears that misconceived economic or social considerations could produce mistaken or even dangerous choices. From this viewpoint, optimisation can be seen as "protective" at both individual and collective level since it gives the best possible protection to all individuals, with limitation playing a role of individual guarantee solely in cases where certain individuals would receive excessive doses. That is why ICRP Publication 60 [2], restating the essential role of optimisation, specifies that doses and risks must be optimised in the context of specified dose and risk limits for individuals.

In this publication, the ICRP confirms the change in the place and functions of the concepts of limits and of optimisation, giving a clearer definition of the model of acceptability of radiological risk. The concept of a limit is now therefore based on the idea of tolerability of the risk. Exposure limits are defined as the line of demarcation between "unacceptable" and "tolerable". The ICRP uses the term "unacceptable" to indicate that in normal circumstances, everything must be done, beyond the line of demarcation to reduce exposures towards the "tolerable". However, in abnormal situations such as those arising in the event of an accident, such exposure levels could be tolerated. As to the word "tolerable", an additional distinction should be drawn between situations which though not



really satisfactory are nevertheless considered as "tolerable" and those which are not only "tolerable" but also "acceptable" when protection is optimised. Thus, "tolerable" may become "acceptable" whenever protection is optimised.

### **3 THE PRETEXT FOR A "NEW" LAW**

Even though the exposure-risk relationship associated with ionizing radiation is pragmatic rather than cognitive in nature, the consensus reached has made it possible to evaluate the risk which can result from a given level of exposure. From this starting point, it is possible to decide on the level below which the risk is tolerable for workers and the population. The choice of what this level should be is the practical phase of determining tolerable risk based on the interaction between two fields: that of science and that of social and ethical values. Having defined what constitutes a tolerable risk, the law-maker can then quantify, in regulations, a system of individual exposure limits. While the ICRP concentrates on the principle of optimisation, dose limits and possibly constraints acting to correct or check "unbridled" optimisation, it is paradoxically the fixing of limits which remains the main concern of those responsible for transcribing the system of radiological risk management recommended by the ICRP into legal standards [25].

The law of radiological protection uses the administrative system and the traditional legal techniques of "classical" administrative law (legal certainty), based on the concept of threshold, which moreover bear witness to the limits of the law but which nevertheless remain to a large extent altogether capable of effectively curtailing radiological risks. Incorporating the principle of dose limitation facilitates the application of, and compliance with regulations by introducing an objective and quantifiable difference between risks deemed unacceptable and those which are considered tolerable.

It is felt by many that the law on radiological protection not only constrains those subjects to it but also serves the nuclear industry inasmuch as it is based on a procedural concept of regulations, sometimes described as a veritable "codification of confidence" given to scientists, reflecting a body of rules which, having failed to keep ahead of scientific development, has followed it too closely.

It is felt by some [26], that the law on radiological protection has followed scientific and technical developments too closely whereas it should have given itself a minimum abstract content and cultivated the artificial to a greater extent inasmuch as the law implies an intent, "man aiming to change base reality" [27]. The principle of optimisation perhaps gives lawyers the opportunity to exercise their function which is that of giving meaning to reality and starting a process back to a general rule [28]. The law on radiological protection must endeavour to escape from technical requirements, from simply laying down standards and incorporate instead general principles such as justification of a given activity, the limitation of individual doses and above all optimisation of protection which, by giving consideration to economic, political and social aspects, also guide regulatory action towards constructing a social consensus on technological options involving the use of ionizing radiation.

In the context of a "legislative overproduction" by the government, giving rise to complex rules frequently changed and sometimes difficult to apply, the principle of optimisation offers an opportunity to replace rules by intention, which in the end no doubt

corresponds better to risk management defined as the quest for what is acceptable at a given moment in a given context. The approach implied by the principle of optimisation constitutes an alternative to a certain "esotericism" in the law on radiological protection which results in authoritarian rules based on compartmentalised and hermetic provisions. Optimisation calls on procedures to control behaviour [29], procedures which basically require the use of more flexible techniques such as incentives and collaboration. Administrative law traditionally refers to "standards and rules", a conventional approach which is well-suited to transposing the principle of limitation of individual doses into legal provisions but which cannot altogether solve the problems raised by the application of the optimisation principle. From the mandatory standards traditionally imposed by government, it seems necessary to move towards obligations as to the behaviour of the persons involved which, on the one hand makes the principle of optimisation difficult to qualify legally and, on the other, makes it difficult to set up a system to control its effective application. Analysing the basis and scope of the principle of optimisation does not, however, cover all the legal problems involved in its application. Consideration has still to be given to the question of how the courts interpret the principle of optimisation and how disputes as to the proper application of this principle are solved.

### **3.1 Legal definition of the principle of optimisation [30]**

The principle of optimisation is a forward-looking rule laying down a qualitative objective to be attained. It is not directly applicable and simply defines the operator's obligations by indicating the goal or result he must endeavour to achieve, leaving the operator to choose the means by which to do so. In this respect, the principle of optimisation resembles an objective standard. It operates differently from a regulatory act which specifies a rule constituting the means of reaching the goal laid down [31].

In our law, the principle of optimisation is different from the obligations generally imposed on the operator and from the plethora of rules and instructions - each one more detailed, demanding or technical than the last - laid down by the regulatory authorities. The concept of optimisation does not lend itself to a set of strict legal obligations or to formal regulatory provisions, unlike laws or regulations laying down strict, precisely-defined rules. That is why regulations cannot impose optimisation other than as a general requirement, its implementing regulations, supplemented by written guidelines, requiring, on the contrary, to be flexible [32].

Communication 85/C347/03 of 31 December 1985 [33] of the Commission of the European Communities concerning the implementation of Council Directives 80/836/Euratom of 15 July 1980 [34] and 84/467/Euratom of 3 September 1984 [35], states this clearly, moreover, specifying that "the basic principles of justification and optimisation of exposures, which were formulated in ICRP Publication 26 and which are reproduced in Title III, Article 6 of the 1980 Directive, are clearly only of general value, something which must be taken into account when introducing them into national, legislative and administrative provisions". It adds that "the third principle (dose limits) for its part, can be transformed into national legislation in a binding form without restrictions."

A number of criticisms have been levelled against the over-general nature of the principle of optimisation as introduced in regulations [36]. It is said to create a situation of regulatory uncertainty for those who must apply and comply with this principle: be they

operators of nuclear installations and users of radioactive substances and ionizing radiation, or exposed workers. If the principle is to be introduced into legislation, it is therefore necessary to make provisions sufficiently clear since in the absence of practical standards or means, there is no guidance as to how to apply it in practice and at the end of the day, it is the courts which will decide and which then act as law-makers

Rather than adopting an approach of the type advocated by the principle of optimisation, certain countries such as Germany have chosen to fix goals in terms of limits, at levels low enough to avoid the need to make additional efforts to reduce exposures further once these goals have been achieved. If such objectives are sufficiently ambitious, the principle of optimisation becomes irrelevant since levels are almost inevitably lower than the optimum level of protection [18]

This approach amounts to considering that, in pursuance of Article 161 of the Euratom Treaty, the principle of optimisation is binding as to the result to be achieved and not as to the choice of methods, and that exact and specific limits have to be prescribed, no matter how difficult that may seem. The concept of "practicability" which underlies the principle of optimisation has a positive effect when it encourages innovation and initiative but not when it is assimilated to a limit to be observed

The principle of optimisation may be considered as similar to a "rule book" containing guidelines on how to proceed, whether at an intellectual or material level. They are "made up either of highly detailed requirements dictating what action should be taken or not taken, or by an invitation to adopt arrangements based on prudence and diligence, and likely to help avoid certain drawbacks" [37]

The principle of optimisation corresponds rather to the second of these two, requiring a high degree of expertise, and must be understood as a way of obliging operators to exercise optimum vigilance. Behaviour is in this instance the object of the obligation, an obligation constituted by the constant endeavour required of the operator to achieve an end simply expressed as desirable. Since the end forms an integral part of the obligation as to means, operators must continue to strive until the desired end is achieved. The principle of optimisation involves behaviour intended to achieve a goal which the operator does not promise to attain. All obligations are directed towards a stated goal but this does not mean that the operator is obliged to achieve it, and indeed he is not liable if he fails to do so. By promising to act with diligence, operators will not incur liability unless they are at fault, which fault could be wrong action when there is an obvious contradiction between the action taken and the behaviour promised, or negligence. The principle of optimisation therefore excludes the system of absolute no-fault liability

Thus, as far as optimisation is concerned, detailed and mandatory requirements are difficult to formulate. Behavioural standards should be adopted instead, allowing operators, in the competitive context in which they find themselves, to act in their own best interests and in those of the community, avoiding oppressive and constant controls by the public authorities. The law has long been familiar with the obligation to act and manage affairs as a "bonus paterfamilias" which corresponds to the obligation imposed on a standard citizen the reasonable man. The operator's obligation, in the case of optimisation, is to act as a bonus paterfamilias. This may be compared to the case of an expert in a given field (for example a doctor) who can only promise to act with due care

### **3 2 Control of the implementation of the principle of optimisation by the competent authorities [38]**

Inasmuch as the principle of optimisation is by nature a qualitative criterion, the competent authorities have some difficulty in obliging operators to optimise radiological protection. It is extremely difficult to determine, from a regulatory point of view, whether optimisation has been achieved since, considered as a qualitative objective rather than a specific dose limit, the goal has to be defined differently depending on the particular circumstances of the situation in question (different allocation of resources, development of available technologies, etc )

It is, for example, by means of the licensing procedure, with a view to encouraging application of the optimisation principle, that regulations may require operators first to introduce a radiological protection programme including measures intended to maintain doses as low as reasonably possible and secondly to carry out evaluations of operations with a view to introducing early corrective measures to reduce exposures and ensure that doses are optimised, thus providing a basis for control of application of the principle

These general rules can be completed by more specific licensing conditions aimed at ensuring the application of optimisation. One example of this approach is the introduction of an administrative programme for the application of optimisation, defining an organizational structure and procedures for the effective implementation of ALARA. This is the method adopted in the United States by the Nuclear Regulatory Commission (NRC) which accords optimisation the status of an enforceable principle over which the competent authority can exercise control

Thus, while data on doses continue to be a valid indicator of performance, other factors, like the existence of a structure such as an ALARA Committee or the implementation of an ALARA programme, can also constitute evaluation criteria. These types of indicators should not be based simply on the formal intention to implement ALARA but on the actual implementation of optimisation. In order to favour optimisation the inspection of nuclear activities must be based not only on an analysis of dosimetric readings but also on a constant monitoring of good relations between operators and staff

This type of reasoning, also to be found in the United Kingdom approach to optimisation, is of similar practical effect. A climate favourable to the implementation of optimisation is created by means of a pragmatic and motivating inspection programme. There is no "a priori" control by the authorities of day-to-day activities, but operators are required to have an internal radiological protection service which has been "converted" to the ALARA "culture". Given that there are no set numerical values for assessing the level of application of optimisation, and since inspections are essentially based on quantitative evaluation, the effectiveness of the United Kingdom system is founded mainly on the confidence, credibility and competence of inspectors and on an informal optimisation programme agreed amongst themselves. In the United Kingdom it is the development of a climate associating motivation, personal and community interest and information exchange especially on the state of the art, which constitutes the main driving force behind the effective implementation of optimisation. Some countries such as Sweden or Switzerland, have preferred to establish an "a priori" control by their public authorities over the implementation of radiological protection actions. In Sweden for example, every task

carried out in a nuclear installation and which a priori exceeds a collective dose of 100 man mSv has to be discussed with the authorities, the same applies in Spain

Whether the control by the competent authorities of the implementation of the optimisation principle is "a priori" or "a posteriori", it is in practice the development of a climate associating prudence, motivation, personal interest, collective responsibility, economic efficiency and the sharing of information especially about the state of the art, which constitutes the main driving force towards achieving compliance with optimisation. Since the principle of optimisation constitutes a yardstick, a reference for companies reminding them of the need for the best possible allocation of protection resources and for avoiding wastage, it is incorporated in the very strategy of enterprise management. The principle of optimisation acts to correct unreasonable protection costs and ensures that efforts to achieve a "rational" reduction of exposures are "profitable"

Thus incorporated into enterprise management, the principle of optimisation coincides with the economic goals of operators who genuinely strive to apply this principle in their own interests given the competitive environment in which they operate. This policy is also based on the concern of operators to present a good "image" to the public and to their staff by reducing doses. The principle of optimisation becomes a veritable dynamic criterion of professional responsibility in activities involving the use of ionizing radiation, compliance with which is imperative and self-imposing. It is by creating general awareness and a sense of responsibility that optimisation can be achieved. This requires motivating the actors concerned. In addition to regulatory constraints, input by operators and awareness on the part of their staff are necessary.

### **3 3 Interpretation of the principle of optimisation by the courts**

It is impossible to address this delicate question of the interpretation of the principle of optimisation of radiological protection by the courts without mentioning the decision of the Court of Justice of the European Communities of 25 November 1992 dismissing the action brought by the Commission of the European Communities against Belgium for failure to comply with its obligations [39]. Belgium had adopted dose limits for apprentices and students lower than those contained in Directive 80/836/Euratom of 15 July 1980, basing its action on the rationale of dose reduction inherent in the principle of optimisation as understood in the generic sense of the term and not as an obligation to act in a given way in a given situation. This judgment shows that while optimisation is a principle which the ICRP has developed and perfected in remarkable fashion at a conceptual level, the advantages it has to offer and above all the way in which it relates to other fundamental principles of radiological protection are not yet properly understood by lawyers who, by mixing up the principle of the limitation of individual doses with that of optimisation, are confusing the latter principle with a limit to be observed, thus divesting it of all interest. This should serve as a lesson to the international and national competent authorities responsible for converting the fundamental principles of radiological protection - and in particular that of optimisation - into legal rules, that their task is not so much to constrain as to explain these principles so as to build effectively at a regulatory and practical level, on the altogether exceptional doctrinal foundation recommended by the ICRP.

By rejecting the Commission's arguments and dismissing the action it brought against Belgium for failure to act, the Court of Justice has opened the way for Member States of

the European Community to adopt stricter dose limits than those laid down in the Directive. It may be wondered what impact this decision could have on the policy of standardizing radiological protection norms in the European Community which has been conducted by the Commission for more than 30 years. The Court held the uniformity of safety standards did not mean that more rigorous protection could not be provided. This argument, though defensible from a strict health viewpoint, is questionable from the standpoint of Community law by reason of the consequences it could have for a future standard level of radiological protection in Europe. But above all, the Court of Justice based its decision on the principle of optimisation, the definition and function of which it does not seem to have understood entirely correctly. The result is a confused legal and scientific situation, the consequences of which will probably be difficult to manage in practice and which can be summarised by the recital in the Court's preamble which specifies that given the purpose of the Directive and the principle of the optimisation of protection, had the Community legislator intended to prohibit Member States from introducing protection of a higher level than that laid down by the Directive, he would have said so expressly in the Directive's provisions.

There is little national case law in the Member States of the European Economic Community concerning the application of the optimisation principle except in the United Kingdom, where optimisation has for many decades formed an integral part of legislation on safety at work and where the principle has often been interpreted in court decisions [40]. The interpretation of the ALARP principle (As Low As Reasonably Practicable) was essentially laid down in the 1949 case of *Edwards v National Coal Board* in which it was held that unless the "sacrifice", in time or in money, made when adopting measures to prevent damage is in gross disproportion to the risk, the "sacrifice" must be made.

In the context of radiological protection, the ALARP principle cannot be considered as an innovation but rather as a long-standing fundamental principle of safety at work which has, in the field of radiological protection, incorporated the ICRP thinking on optimisation. Optimisation, which can be described as a general, non-quantified requirement, is thus an enforceable obligation in the United Kingdom for inspectors and the courts, and considered to be an argument which the public and workers can use in support of a claim for compensation for prejudice suffered. For example, it was on the basis of this reasoning, founded on a qualitative judgment, that British Nuclear Fuels (BNFL) was sued in 1985 and found to have breached the principle of optimisation when dumping radioactive waste in the Irish Sea in 1983 [41]. The ground for complaint was not that persons off-site had been exposed to significant doses but rather that it was not necessary to dump such a volume of radioactive waste into the sea and that this could have been avoided had BNFL acted reasonably, the ALARA condition had therefore not been respected.

In France, in June 1993 for the first time to our knowledge the courts sentenced the President-Director-General of a company using a device emitting ionizing radiation [42] for unintentional assault on the basis of non-compliance with Section 4 of the Decree of 2 October 1986, as amended, concerning the protection of workers against the dangers of ionizing radiation [43]. The court found that the director of the company had acquired company property, was the only person with access to and control of the devices concerned and, having taken the decision alone to start production, was then under an obligation, given that several members of staff were concerned, to ensure that the

equipment, procedures and organisation of work were such as to allow exposures to be kept as low as reasonably possible

This innovative or even "original" decision of the court, henceforth setting a precedent in France as regards interpretation of the principle of the optimisation of radiological protection, calls for two specific comments. In the case in question, given the seriousness of the injury to the health of the three members of staff concerned, the doses they received must have far exceeded the individual dose limits laid down by the regulations, inasmuch as they gave rise to deterministic effects (more than 10 times higher than the dose limits). It was not, however, for breaching the requirements as to dose limits that the Director of the company was sentenced by the court, but for non-compliance with Section 4 of the above-mentioned Decree of 1986. The court took a fairly rigorous line in that it did not base its decision on what the Director should have done "as a minimum", namely comply with the dose limits, but on what he should have done "for best", namely reduce exposures as far as reasonably possible below the dose limits. This pragmatic approach by the court, based on a qualitative judgment, used to judge the absence of a proper implementation of the ALARA principle, gives rise to an interesting parallel with the assessment procedures of the implementation in the United Kingdom of the ALARP principle by the Nuclear Installations Inspectorate, responsible in that country for the regulation, licensing and inspection of nuclear installations, and by the courts.

From the scientific viewpoint, the principle of the optimisation of protection, the legal dimension of which is contained in Section 4 of the 1986 Decree, normally relates to certain exposures. For, until ICRP Publication 60, the system of radiological protection applied to all situations in which the exposure of persons was anticipated and the source could be controlled. Publication 60 contains some important changes as to the philosophy of risk management, notably by broadening the principle of optimisation to likely, and not simply certain, exposures. The court's decision thus confirms this wider application. It may be wondered whether the reference by the court to the implementation of optimisation did not, in the case in question, consist of an application of good radiological protection practice in the case of potential exposures rather than an optimisation of radiological protection as usually defined by the ICRP, namely a compromise between the costs of protection and the levels of residual exposure.

#### **4 CONCLUSION**

Like the law, science cannot escape from the reality that an acceptable risk must also be a risk accepted. More than ever, the management of radiological risk recommended by the ICRP, which sets out a real risk "philosophy", offers to the law and to science the opportunity to become reconciled with each other in an osmosis which is today's nuclear challenge for tomorrow. The current discussions by experts of ethics in radiological protection are no passing fashion but a growing awareness of the fact that the nature of risk analysis is philosophical rather than technical, and must be conducted jointly by all the disciplines concerned [44]. But while these same experts are aware that ethics constitute a fundamental aspect of radiological protection, they are not exactly sure how to define ethics and for the moment simply refer to the concept without a precise understanding of its crucial role in the process of having the nuclear risk accepted and not simply perceived as acceptable.

The science of ethics, which constitutes a "relational", "global" and "forward-looking" approach in preparation for action, "endeavours to work out and then to propose to man, reasonable behaviour which maintains his chances not only of survival but of a well-ordered life" [45] This statement describes the very foundations of the ethical debate about the common good and responsible behaviour Having regard to this definition, ethics in radiological protection can perhaps be summarised and condensed in a single principle, that of the optimisation of protection They constitute reasonable behaviour by virtue of which rules of conduct are drawn up which are capable, with an eye to equity, of protecting the health of all individuals (a relational approach) They incorporate economic, social and political aspects (global approach) and meet the need for the management of the stochastic effects at low doses and of uncertain future risk (forward-looking approach) "certainty is the mark of determinism, the negation of human freedom, of responsibility, and in short, of ethics", "uncertainty is the raw material, from which starting point man searches questions, develops, creates and acts" [46] and reflects on ethics Given the scientific uncertainty as to the existence of effects at low doses it is ethics which offers the alternative of either not choosing and preferring inaction, or choosing "objectives" based on value judgments of a social, economic and political nature which alone allow the taking of radiological protection measures and on which the optimisation approach depends It is interesting to note here that this "will to act" is not totally without a certain "risk", namely that consisting, in the absence of certainty, of adhering to the technological choices adopted by society

Other, particularly critical commentators such as R Johnston and B Gillespie are even of the opinion that the structure of the scientific problem, as presented by politicians, cannot claim anonymous status and is in fact determined by ethical, social, economic and political aspects if risk cannot be other than a social construction, attempts to build an exclusively objective basis on which to measure it reflect either scientific crassness or political trickery [47] In fact, in a more moderate fashion "social risk" implies in addition to the need for the technical and health control of the risk a need for accepting the political and social consequences of the development of the use of ionizing radiation

In the long term more mature analysis of ethics in radiological protection will mean that in practice, political and administrative traditions will be comprehensively reviewed we can no longer be content solely with perceiving the government as the actor and the place housing the scientific information available and providing the balance between the interests of protection and of the promotion of techniques involving the use of ionizing radiation

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# ACHIEVEMENTS IN ASSESSING SAFETY CULTURE\*

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## BACKGROUND

Safety culture is a concept which has only been clearly expressed in recent years and the IAEA has had a leading role in its promotion. The term was first employed by the Agency's International Nuclear Safety Advisory Group (INSAG) in its 1986 Chernobyl Accident document and was further expanded in its Basic Safety Principles for Nuclear Power Plants issued in 1988. The term 'safety culture' has been increasingly employed internationally and is now in common use. Until recently its meaning was open to interpretation and guidance was lacking on how it could be assessed. This void was filled with the innovative publication IAEA Safety Series No. 75-INSAG-4 issued in 1991. According to INSAG,

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

More simply, it is the aggregate qualities, both in organisations and in individuals, which make safety an overriding priority.

Safety culture has two major components. One is concerned with the individuals' attitudes and responses, and the other is the organisational framework within which they work. Attitudes can be influenced by education and training and perhaps more so by psychological and environmental factors. Organisational styles can also be influential in the promotion of policies which encourage attitudes favourable to safety. Safety culture is necessary not only at the operational level of the utility and the plant, but also at the governmental level, in the regulatory body and as well in design, construction and research organisations.

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\*\* Responsibility for the ideas expressed and the facts given rests solely with the author.

What are some identifying features of good safety culture? In individuals, obviously a good education and training are essential. Other features are a questioning attitude, a rigorous and prudent approach to activities, striving to do everything correctly, and effective communication.

The features of good safety culture at the governmental level includes a legal framework for the use of nuclear energy and a regulatory body with a high level of responsibilities and sufficient resources.

At the organisational level, such as the electricity utility, some identifying features of good safety culture are,

- a corporate level safety policy,
- a nuclear safety review committee,
- analysis of significant events in close co-operation with concerned staff,
- training of all staff categories on safety aspects of their jobs, and
- use of external reviews such as IAEA operational safety reviews

As a first attempt to provide indicators to judge safety culture effectiveness, INSAG developed a set of questions to encourage self-examination in organisations and by individuals. To examine the relations between plant management and staff one could ask,

- is there a process for more junior staff to report safety concerns directly to the plant manager? and
- is there a system for reporting individuals' errors?

Certainly, answers to such questions differ in the various countries as they are influenced by cultural factors and adequately assessing the responses requires cultural insights. Although there are features of safety culture which are universal, every national group has unique qualities which result in distinctive individual attitudes and behaviours that must be respected. Due allowance must be given for not only linguistic but also cultural and social differences when assessing safety culture on a worldwide basis.

## **ASCOT**

Early in 1993 a new Agency safety service - ASCOT - became available. ASCOT (Assessment of Safety Culture in Organisations Team) services are intended to review the effectiveness of safety culture based on the principles and recommendations contained in INSAG-4. For this purpose ASCOT Guidelines have been developed, which may also be used by an organisation wishing to conduct self assessment of safety culture. Three types of ASCOT services were envisaged: the first one being a stand-alone ASCOT mission, the second where ASCOT services are combined with other IAEA services such as ASSETs (Assessment of Safety Significant Event Teams) and OSARTs (Operational Safety Review Teams) which would, in addition to areas covered by these missions, cover the less

tangible aspects of safety culture as laid down in INSAG-4 and would cover important NPP (Nuclear Power Plant) interactions and interfaces with the regulators, utility headquarters and support organisations beyond the NPP boundaries, and the third type being the ASCOT Advisory Service (or Seminars) which have the objective of promoting safety culture concepts, demonstrating basic approach and principles of ASCOT and preparing the recipient country for possible future self-assessment of safety culture

The stand-alone ASCOT review is not intended to be an inspection or an audit against set codes and standards but rather an opportunity to exchange experience and views. At the same time it would give an opportunity to disseminate good practices throughout the nuclear community and to promote safety culture aspects. Such stand-alone ASCOT missions have not yet been offered to Member States as the IAEA Secretariat wishes to learn more about Member States' needs through combined missions and the feedback from seminars.

Where ASCOT reviews are combined with another safety review (OSART, ASSET), the main objective is still to review the effectiveness of safety culture. A review was conducted in November 1992, during a Pre-OSART Mission to the Sizewell B nuclear power plant (NPP) in the United Kingdom with the main objective of testing the methodology developed for the assessment of safety culture. The outcome of this pilot is reported in the following section. The practice of combining an ASCOT review with an existing service was continued with the ASSET review in June 1993 to the Borssele NPP in the Netherlands.

The third form of the ASCOT service is a seminar designed to prepare organisations for possible self-assessment of safety culture. A few such seminars have already been conducted and several more have been requested. For this purpose a 'standard syllabus' has been prepared.

## **REVIEWING SAFETY CULTURE WITHIN OSART MISSIONS**

Since the autumn of 1992, the Nuclear Operational Safety Services Section (NOSS) of the IAEA has been reviewing safety culture explicitly as an integral part of OSART missions to nuclear power plants in Member States. In carrying out specific reviews of safety culture, it was found that many of the questions posed by INSAG-4 already existed in the OSART Guidelines and hence safety culture had effectively already been assessed in previous OSART missions. The OSART Guidelines are in the process of being revised and it appears that only relatively minor changes are required in order to harmonise them with INSAG-4.

Six missions have taken place between October 1992 and July 1993 in which safety culture has been explicitly reviewed, but using slightly different approaches in the various reviews to refine the assessment methodology.

As previously mentioned, the first mission in which safety culture was explicitly reviewed was the Pre-OSART mission to the Sizewell B NPP. The methodology used was to follow the principles as stated in INSAG-4 and for team members to ask specific questions using the ASCOT Guidelines. An assistant team leader carried out specific reviews of the safety culture aspects in the interfaces between the power station and both

the corporate headquarters and the regulatory body, and with contributions from the team prepared a separate report on safety culture

Following this mission both the utility management and the Pre-OSART team leader expressed the opinion that since safety culture is a topic which should be all pervading through the organisation of a nuclear power plant, it should not be considered as a separate subject. Further, it was stated that safety culture cannot be reviewed by the experts simply asking the questions from INSAG-4, these are too oriented towards management and policy and when asked directly would most likely result in obvious answers. To overcome these pitfalls it was decided that evaluators must be equipped to review safety culture in their specific areas. Therefore, the reviewers must question the staff about programmes and procedures and observe how people perform work in order to develop opinions about the safety culture of the NPP. Only then should the reviewers themselves answer the questions in INSAG-4 and assess safety culture in their area. It was also decided to report the specific findings on safety culture in each review area and that an overview would be prepared by the team leader or assistant team leader. This overview would then be included in the introduction to the OSART or pre-OSART Technical Notes and not produced as a separate section in the report.

This suggested method of reviewing safety culture was followed during the subsequent OSART and Pre-OSART missions in 1993. It was noticed in carrying out reviews of safety culture using this method that there is a wide variation in expertise and familiarity with the topic by the various team members. Generally the expert reviewing Management, Organisation and Administration is a senior nuclear manager from an NPP in an industrialized country and is fairly familiar with the subject. The capabilities of the other experts to assess safety culture vary considerably and depend on their backgrounds, country of origin and familiarity with INSAG-4. It has also become apparent during recent missions that emerging safety culture issues do not crystallise until the second week of a three week mission. Consequently, it would be very difficult to carry out a comprehensive review of safety culture within a shorter mission.

During the six OSART reviews in which safety culture was specifically addressed, there was a wide variation in the results. Understanding of safety culture varied considerably from plant to plant but most notable were the differences in the understanding of the subject between plants in industrialized countries versus those in developing countries.

In industrialized countries, safety culture was fairly well understood at the plant management level, but not necessarily all that well understood at either the corporate level or at the lower levels in the plant hierarchy. Improvements were recommended and will be achieved in the areas of clearer communication of plant safety policy, setting of goals and objectives, monitoring of safety performance indicators and more visible involvement by managers in daily plant activities. At the corporate level, there was a need for the corporate safety policy and corporate commitment of safety to be more clearly stated. At plant staff level, many staff had been made aware of the concept of safety culture but they did not have a clear understanding of the subject. Training programmes could be improved by encompassing safety culture within existing courses.

The understanding of safety culture in NPPs in developing countries varies considerably. It is somewhat difficult to draw general conclusions since the plants visited

were at different stages of development. The cultural and socioeconomic backgrounds of the plant management and staff also differed considerably. The importance of nuclear safety is well understood by plant management and most supervisory staff. INSAG-4 is familiar to plant management and in some cases training is being given or will be given to all plant staff. INSAG-4 has been translated into many different languages, however many of the concepts stated in INSAG-4 are new to many and are different from the ways in which plants were managed, operated and maintained in previous years. Safety culture requires the development of distinctly different attitudes towards work. In particular, managerial involvement, delegation of responsibilities, quality assurance, setting of goals and objectives, adherence to industrial safety rules, questioning attitude, monitoring of safety performance, adherence to procedures and a positive approach to discipline are new concepts for many.

Although the methodology being used has been effective in assessing safety culture, NOSS will review the experiences of the past six missions in order to further strengthen the methodology of reviewing safety culture before carrying out the next OSART mission.

## **SAFETY CULTURE REVIEWS DURING ASSET MISSIONS**

Between 1986 and the end of 1993 the Agency, at the request of its Member States, will have carried out 60 ASSET missions and, much as for OSARTs, it is considered that the spirit of safety culture has always been addressed even if the words were not explicitly mentioned.

The ASSET process is a root cause analysis of plant performance deviations to identify any weak aspects of the plant industrial safety culture. The recommendations are therefore based on facts and do not challenge the various national safety cultures as long as plant safety performances are satisfactory.

The ASSET process concentrates on achievement of the safety objective and prevention of accidents. This is done by assessing, on the basis of real events, the effectiveness of the plant safety provisions in both the hardware and software areas to prevent any failure of equipment, personnel or procedure during operation. The safety aspect of the industrial culture of plant staff and management has therefore always been given attention by the ASSET missions.

The ASSET methodology has a great deal to do with the concepts of safety culture. ASSETs not only indicate the direct cause of an event, "why did it happen?", but also ask "why was it not prevented?" ASSET missions look beyond the event itself to the weaknesses in equipment, procedures and personnel that could exist in spite of established programmes of quality control, preventive maintenance and surveillance. In addressing these programmes, communications, responsibilities, and supervisory attitudes all of the safety culture aspects get discussed, even if the words "safety culture" themselves may not be mentioned. Corrective measures brought out by ASSET missions always cover a wide range of areas, including multiple levels of responsibility.



In answering the question "why was it not prevented?", the ASSET team, in co-operation with plant staff, probe two particular areas of concern

- the deficiency in the surveillance programme because of which the latent weakness was not detected before it caused the event, or the deficiency in the operating experience feedback programme because of which the latent weakness was not corrected in a timely manner, and
- inadequacies in management policy for surveillance or operating experience feedback

The latter of these two areas provides answers and corrective measures that address plant management. It underlines that an event may not be sufficiently corrected by repairing the direct cause, to really remedy the root cause of an event may require consideration of the whole network of responsibilities.

As mentioned earlier the ASSET and ASCOT services have co-operated insofar that in one of the more recent ASSET missions to the Borssele NPP an ASCOT representative successfully evaluated the ASCOT review procedures, by participating in the ASSET review and doing the ASCOT work in parallel. Also, on request of a Member State, during one week a combination of two ASCOT seminars and one mini-ASSET seminar will be performed. Further co-operation can be expected because of the close relationship between the ASSET philosophy and the concepts of safety culture. However the two services, ASSET and ASCOT, do have different approaches.

Where other IAEA services may review structures, the ASSET mission approach is to strictly analyse operational events that really occurred in a nuclear power plant, to identify pending safety problems and to analyse the root causes of these problems, with the objective of making recommendations for structural improvement and enhancement of the prevention of incidents at the plant. In doing so the ASSET mission will identify problems of safety culture if there are any, among other problems of many different kinds. ASSET missions will, always in co-operation with plant staff, and referring to the events that really occurred, come to suggested corrective measures, including the safety culture problems.

Giving proper attention to the package of corrective actions as suggested by ASSET missions would mean giving due credit to personnel directly involved and could give an opportunity for management to show their interest in daily operation of the plant. From this, simple structural improvements in plant organisation could be made, which would be visible for all. This would enhance safety culture by demonstrating that its application brings real benefits.

The practical recommendations resulting from the ASSET process have increasingly attracted the interest of both regulatory bodies and operating organisations. Twenty-five seminars in 19 different countries to teach the ASSET methodology on prevention of incidents will have been carried out by the end of 1993. It is anticipated that there will be a continuing average of 15 to 18 requests per year for ASSET missions to be held, and safety culture will continue to receive the attention that it rightly deserves.

## **FUTURE DIRECTIONS**

In addition to the continuing and developing activities already mentioned the Agency proposes to further develop its activities in the area of safety culture into other review services. In particular it is anticipated that in 1994 the IRRT (International Regulatory Review Team) missions and INSARR (Integrated Safety Assessment of Research Reactor) missions will build on the experience gained by OSART, ASSET and ASCOT missions to encompass specific elements of a safety culture review. It is also anticipated that in 1995 the Agency will start a programme directed at developing the attributes of good safety culture in regulatory bodies, operating organisations and supporting organisations, together with the collection and dissemination of good practices. 1995 will also be an important year because the American Nuclear Society, in co-operation with the Agency, will be organising a conference in Vienna on the topic of Nuclear Safety Culture. By then it is expected that there will be even more evidence than has been heard today of the solid progress being made internationally to develop good safety culture in all organisations involved in nuclear safety.

Lastly a reminder that safety culture is a concept that everyone - governments, regulators, NPP managements and staff at all levels - has a role to play in developing and maintaining.

# CASE LAW AND ADMINISTRATIVE DECISIONS

## CASE LAW

### *France*

#### **Judgment of the Tribunal de grande instance de Sarreguemines concerning the radiation accident at Forbach (1993)**

On 29 June 1993, the Tribunal de Grande Instance of Sarreguemines (Moselle) delivered its judgment in this case. The facts are as follows:

In mid-April 1991, Philippe Magnen established a company, Electron Beam Service (EBS), on the industrial site of Forbach-Sud. Its business consisted of the depolymerization by ionization of polytetrafluorethylene - PFTE (commercially known as teflon). Michel Roche was technical manager of EBS, and Patrick Muller was manager of the factory. On 27 June 1991, Mr Magnen took possession of a building and a particle accelerator (of the type Van de Graaf 2.5 MV, 35mA), of a conveyor belt and trays which held the PFTE for the purpose of its passage through the irradiation chamber. On 28 June, EBS received its first batch of PFTE for treatment. On 29 June, Mr Muller contacted a temporary employment agency and recruited, for a fixed period, Jean-Marc Bies, who was given responsibility for the operation of the particle accelerator. On 17 July, a fire broke out. Mr Bies entered the irradiation chamber in order to put it out, and so received a first radiation dose which was not revealed until August, when the dosimeters were checked. On 1 and 6 August, Giovanni Nespola et Daniel Leroy were engaged by Mr Muller, on a temporary basis, as packers. Jean-Marc Bies was also confirmed in his post as machine operator, on a permanent basis. On 13 August, a serious accident occurred. Mr Leroy entered the irradiation chamber, which was still switched on, in order to make repairs. A few minutes later, the head of the team, Mr Bies, sent Mr Nespola into the chamber to assist his colleague, and then entered himself. The three men were thus heavily exposed to ionizing radiation. Shortly afterwards, all three showed the first symptoms of acute radiation exposure (itching, headaches, burns, abnormal pigmentation of the skin in certain places, hair loss). Mr Leroy was the most seriously affected (burns to 60 per cent of his body). The two packers and the head of the team, suffering from severe radiation exposure, were put on sick leave. The company's production was stopped.

The case was brought before the Tribunal of Sarreguemines. A preliminary inquiry was carried out: the victims, witnesses and the directors of EBS (renamed IB Process Ltd) gave evidence, during late 1991 and 1992. EBS obtained a decision of the Court of Appeal

of Metz on 9 December 1991 allowing the installation to recommence work. The case was brought before the Tribunal on 19 April 1993. The Tribunal, sitting as a court of first instance, gave its judgment on 29 June. It found, inter alia, that criminal offences in the form of breaches of applicable regulations (1-2) had been committed, and that a causal link had been established between the accident and the injuries of the three victims (3), and it passed sentence on the accused (4-5).

**1 Breaches of Decree 86-1103 of 2 October 1986 concerning the protection of workers against the dangers of ionizing radiation**

The Tribunal stated the principal breaches committed by EBS

- the compulsory declaration of possession of an electric generator of ionizing radiation [Section 15 1] to the Labour Inspector (who would then transmit it to the Central Service for Protection against Ionizing Radiation (SCPRI) with the necessary information) had not been made
- the compulsory check of the installations before they were started [Section 29] - in this case the particle accelerator - was not carried out
- the division of the building into restricted area and controlled area, and the notification of these areas [Section 23], was not carried out
- Section 4, by virtue of which "the materials, procedures and organisation of work must be such that individual and collective occupational exposure is maintained at as low a level as is reasonably possible below the limits prescribed in this Decree " had been breached. Moreover, the crowding of the conveyor, the absence of an appropriate opening and closing mechanism for the door, and the unsuitability of the conveyor, on the one hand, and the absence of definition of the workstations and the low level of qualifications of the employees, on the other hand, resulted in the employees being subjected to numerous high level exposures
- The absence of a physical obstacle at the exit of the conveyor, so as to establish around the source a perimeter, the crossing of which was forbidden during its operation, so as to protect the workers from external exposure [Section 25]
- The failure of the employer to designate a competent person, who had previously followed an approved course in radiation protection [Section 17]. It is the responsibility of the designated person to ensure compliance with radiation protection measures, to participate in the safety training of exposed workers, and to check periodically the workstations subject to exposure [Section 17 2]
- The lack of training and information of the workers

"The employer is required to organise training in radiation protection for exposed workers, he must also provide each worker who works within the

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restricted area or who is required to enter that area occasionally, with a written memorandum That memorandum must set out

- a) the dangers created by exposure to ionizing radiation and the dangers involved in his or her work,
- b) the measures adopted to avoid these dangers,
- c) the working methods offering the best guarantees of safety " [Section 19],

The three victims received neither training nor an individual memorandum

- the employees operating the accelerator were carrying individual dosimeters, allowing radiation doses to be measured, as required by Section 34, but they had not undergone a medical examination, followed by a certificate of aptitude for each worker who is assigned to work involving exposure to ionizing radiation [Section 36] The prescribed medical examination, carried out on 20 August 1991 for Messrs Leroy and Nespola, took place after the accident

## 2 Breaches of provisions of the Labour Code, concerning temporary employment

- Article L 124-2 provides "a temporary contract of employment must not have either the aim or the effect of providing long term work related to the normal and permanent work of the employing enterprise" The positions of workers at EBS were always filled by temporary employees
- Article L 124-2-3 provides "a contract of temporary employment may not in any case be concluded for the carrying out of particularly hazardous work included on a list established by Order of the Ministry of Labour or the Ministry of Agriculture" In addition, Section 1 of the Ministerial Order of 8 October 1990, operating by virtue of Article L 124-2-3, provides "employees of temporary employment enterprises may not be called upon to undertake the following work work involving exposure to the following fluorine gas and hydrofluoric acid"

During ionization, hydrofluoric acid is given off by PTFE, and this did not take place within a rigorously closed apparatus

3 The Tribunal found that the immediate and direct cause of the victims' injuries was their presence in the enterprise and their exposure to ionizing radiation

4 The Tribunal therefore found Messrs Magnen and Muller guilty of the misdemeanor of involuntary injury through negligence, imprudence, and breach of the regulations, against the persons of Messrs Leroy Nespola and Bies, having resulted for each of them in total absence from work of between 5 months and more than a year Michel Roche was found guilty of the same offence, by virtue of his negligence

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5 Taking into account that 23 months after the event, the public order was still disturbed, and that the accident had caused for at least two of the victims grave physical consequences, and for all three serious psychological effects because of medical uncertainty as to their future (Daniel Leroy's condition, in particular, has become worse since the beginning of 1993, he is partially paralysed and has again been hospitalised), the Tribunal therefore sentenced Patrick Muller to one year of imprisonment, of which 6 months were suspended, and a fine of 20,000 francs, Philippe Magnen to a suspended sentence of 12 months imprisonment and a fine of 20,000 francs, Michel Roche to a suspended sentence of 6 months imprisonment, and a fine of 20,000 francs, the Tribunal finding that he was less involved in the damage suffered by the three victims than his co-accused

This case is not yet closed, the three managers having lodged an appeal. The hearing of the appeal was scheduled for early December

## ***Japan***

### ***Supreme Court Rulings on the Monju Prototype FBR and Ikata-1 and Fukushima-II-1 Nuclear Power Plants (1992)\****

#### ***The Supreme Court rules plaintiffs competence regarding the Monju lawsuit***

On 22 September 1992, the Supreme Court ruled that 21 residents in Tsuruga City, Fukui Prefecture, can sue the Government to nullify the installation permit for the prototype FBR Monju (280 MW) and remanded the case over to the Fukui District Court. With the ruling, the District Court examinations concerning the permit of the installation will enter their seventh year, ever since 38 plaintiffs, led by farmer Jinzo Isobe first filed two suits with the Court in September 1985. The new ruling is the first time that the Supreme Court has ruled in favour of the plaintiff in a suit on a nuclear power plant. The ruling should open the way for an administrative lawsuit that may affect the other nuclear power cases in litigation.

The presiding justice of the No. 3 Petty Bench, said that the plaintiff residents live in areas that would suffer immediate and grave casualties due to an accident that might occur if the licensing safety examination for a reactor installation permit were made incorrectly.

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One of the central points at issue in the suit was whether the Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (hereafter the Regulation Law) aimed at the physical protection and the health preservation of individual residents? If so, how many residents should be subject to it in terms of distance from the reactor?

The court ruled that residents surrounding the reactor would suffer injuries in the event of a reactor accident, and that the Regulation Law lays down conditions for the technical capability of a reactor installer, standards on safety assurance, and so forth. As regards the Regulation Law, then, the court pointed out that it emphasizes the need to protect both the general public and individual members who live in areas anticipated to be susceptible to injuries.

As far as the number of residents to be included was concerned, the ruling outlined a concept whereby such a question should be reasonably judged with reference to common ideas—mainly, the distance between the reactor and the residential areas, taking into consideration such conditions as type, structure, and size of the reactor.

After making these general observations, the court touched upon this suit. Monju is a fast breeder reactor still in the research- and-development stage, and uranium-plutonium mixed oxides are used as the core fuel. Referring to the fact that the breeding of highly toxic plutonium is done in the core, the court judged that all those plaintiffs should be regarded as residents who live in the areas susceptible to immediate and grave injuries during an accident, and thus approved the plaintiffs' competence. The plaintiff who lives farthest from Monju lives at a distance of some 58 kilometers. The ruling was the unanimous conclusion of five judges.

The suit was filed with Fukui District Court in September 1985. That court did not approve all 40 plaintiffs' competence, saying that a civil suit would be a more effective and appropriate method for the essential resolution of contention, and rejected the appeal in December 1987.

In July 1989, the Kanazawa Branch of the Nagoya High Court approved the plaintiffs' competence only for 17 residents who lived within a radius of 20 kilometers, for the reason that those people had the greatest fear of suffering injuries directly from an anticipated high-class accident. In contrast, it rejected the appeals from 23 residents living further out, saying they had the possibility to take timely refuge. Both the residents and the nation had appealed to the Supreme Court.

The Monju ruling is considered to affect other administrative lawsuits with the Supreme Court currently under litigation dealing with plaintiffs' competence (see following Note).

### ***Supreme Court Dismisses Residents' Final Appeal on Nuclear Safety Issue***

The Supreme Court, on 29 October 1992, ruled that the government permission for the installation of nuclear reactors was legal, in connection with two administrative lawsuits filed by local residents. This ruling, which is the first decision by the Supreme

Court on the safety of nuclear power plants, is expected to have a major influence on Japan's future nuclear policy and residents' movements

In the first Petty Bench of the Supreme Court, the presiding judges upheld the rulings of the first and second courts in earlier administrative lawsuits filed by residents the plaintiffs, in which they had demanded the nullification of the government permission for the construction of Shikoku Electric Power Co 's Ikata Nuclear Power Plant Unit 1 and Tokyo Electric Power Co 's Fukushima II Nuclear Power Plant Unit 1 (see Nuclear Law Bulletin Nos 35 and 45) Both the first and second courts had ruled for the legality of the government's licensing safety examination and permission to install nuclear power plants The Supreme Court's rulings came 19 years after the Ikata lawsuit was first filed and 17 years after the Fukushima lawsuit, and represented a complete defeat for the residents concerned

The main points of dispute in the **Ikata lawsuit** concerned three questions 1) whether or not the government permission procedures for permission to install a nuclear reactor were in violation of Article 31 of the Constitution, which guarantees due process of law, 2) how the legal examination of the safety of nuclear plants should be made and 3) the extent of the safety examination

In the **Ikata lawsuit**, the residents argued the fact that residents were not allowed to take part in the procedures for the permission to install a nuclear reactor For instance, there were no prior notifications or hearings, as specified in the Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (hereafter called the Regulation Law) This fact constituted a violation of Article 31 of the Constitution they said which guarantees the due process of law

In connection with these points of dispute, the Supreme Court verdict noted that the **Regulation Law stipulates that "the examination requires a highly specialized and technical judgment, and for this purpose the Atomic Energy Commission (in charge of the safety examination at the time the lawsuits were filed, though now handled by the Nuclear Safety Commission) should be consulted and its opinion respected"** It stated that the Government's permission to install a nuclear power plant could not be regarded as a violation of Article 31 of the Constitution

The safety examination of nuclear facilities is made from many angles and in an integrated way, particularly with respect to the engineered safety of nuclear facilities, radiation effects on workers during normal operation, radiation effects on neighbouring residents and the environment, and radiation effects on the neighbouring areas in case of an accident Also considered are natural conditions in construction sites such as terrain geological and climatic conditions, as well as social conditions such as population distribution, and the technical capacity of the organisations

The Regulation Law provides that the Prime Minister, when giving permission for the installation of a nuclear reactor must consult the Atomic Energy Commission (AEC) as to the propriety of the standards thereby as stipulated by the same law, and respect its opinion The Supreme Court ruling recognized the right of discretion of the Government on this matter, stating that it was reasonable to interpret this provision as meaning that the permission to install a reactor should be entrusted to the rational judgment of the Prime Minister, who makes his decision by respecting opinions based on the scientific and



specialized technical findings of the AEC, which has knowledgeable persons in various specialist fields

On this basis, the ruling stated that the court examination and judgment concerning the safety of an installed reactor should be made from the standpoint of whether there was any irrational point in the Government's judgment based on the specialized and technical research, examination and judgment of the AEC or the Advisory Committee on Examination of Nuclear Reactor Safety

Referring to the court examination on safety, the ruling continued to state that in case of any irrational point in the examination standards for the permission for installation of a reactor in the light of present levels of science and technology, and in case of any recognized errors or defects that could not be ignored in the process of examination and judgment of the AEC or the (then) Advisory Committee on Reactor Safety, based upon which the Government issued permission for the reactor, the judgment should be regarded as irrational and the permission to install a reactor likewise regarded as illegal. That means that there is a limit to examination by the court, and that the court could not concern itself with individual matters

However, in reference to the responsibility for proving such an irrationality, the court ruling, noting that the Government possessed all the materials relating to safety examination, stated, "it is necessary for the government to assert and prove that there is no irrational judgment in the specific examination standards and in the process of investigation, deliberation and judgment, on the basis of related grounds and materials, and asserted that in case the Government did not carry out such processes exhaustively, it could be assumed that there was irrationality in the Government's judgment

With respect to the objects of examination, the ruling stated that all matters related to the safety of an installed reactor facility could not be objects of study in the safety examination when determining the permission to install a reactor, but that it was proper to believe that only matters relating to the safety of basic design should be examined. Furthermore, it upheld the decision of the second court, by which matters related to the terminal disposal method for solid wastes, the method for reprocessing and transportation of spent fuel, and the effect of warmed water should not be included as items of examination when determining the permission to install a reactor

The residents, referring to the accident in Unit 2 at Three Mile Island that occurred after the lawsuits were first filed, insisted that there was a defect in any safety examination that did not presuppose an accident. However, the Supreme Court ruling upheld the decision of the second instance court that stated that "the Three Mile Island accident and its causes do not have an effect on the rationality of the safety examination "

The lawsuit concerning the Ikata Nuclear Power Plant Unit 1 was instituted by 35 local residents in January 1973, making it Japan's first lawsuit concerning a nuclear reactor stating that there was a defect in the government's safety examination. In April 1978, the first court, the Matsuyama District Court, recognized the plaintiff residents' competence to institute a lawsuit but dismissed their claim, stating that the government safety examination was proper. In December 1984, the Takamatsu High Court, as the second court, basically upheld the decision of the first instance court and dismissed the claim of the plaintiffs

On the other hand, the gist of the Supreme Court ruling for the lawsuit over Fukushima II-1 was almost the same as the one for the Ikata Plant, upholding the decision of the second court. It stated that the reactor installation permit was legal, that the Government's permission could not be regarded as a violation of Article 31 of the Constitution, and that the examination should be only made on safety items in the basic design.

In the administrative lawsuit over Fukushima II-1, filed in January 1975 by 401 residents from neighbouring areas, the Fukushima District Court dismissed the claim of the residents stating the safety examination was legal, in August 1984, and the Sendai High Court, as the second court, upheld the decision of the first court in March 1990. In the final appeal to the Supreme Court, the number of plaintiffs had dwindled to 17 persons.

### ***Commentary on the Supreme Court Decisions on Ikata-I and Fukushima II-1 Nuclear Power Plants Milestones in Nuclear Cases***

Two long-standing legal disputes over reactor safety have finally reached their conclusion. Local residents appealing against lower-court decisions on the construction of Shikoku Electric Power Co.'s Ikata Nuclear Power Plant Unit 1 and Tokyo Electric Power Co.'s Fukushima II Nuclear Power Plant Unit 1 were dismissed by the Supreme Court, which upheld the legality of the government's permission for the reactor installations. Nuclear interests welcomed the Supreme Court ruling, describing it as a very reasonable judgment. Many lessons have been learned through these legal arguments about Japan's regulatory systems and the ways that nuclear interests have explained safety.

The focus of attention in this matter was on how far the court would be able to go in handling such a sophisticated case of science and technology, one that tested the propriety of permission for the installation of reactor facilities.

State authorities speaking out in defence of their having permitted the reactor installations said that they had examined them for their engineered safety, as well as the effects and possible consequences of radiation ensuing from an accident onto the plant vicinity. They added that they had given the matter consideration from many angles in view of the correlation with social conditions and the technical competence of reactor operators. The defendants emphasized that they had exercised comprehensive judgment based on an advanced knowledge of nuclear engineering, as well as up-to-date expertise in all other fields of science and technology. They said that they had found the reactor installations permissible from standards provided for in the Law for the Regulation of Nuclear Source Materials, Nuclear Fuel Materials and Reactors, after contacting Atomic Energy Commission experts from all fields of learning and with a broad range of experience for their opinions on the adaptability of the standards.

On the other hand, the plaintiffs said that a severe nuclear power plant accident could never be played out without serious damage to their lives and health. The residents insisted that the court maintain its own standards by which to examine safety in the reactor installations.

The court ruling said, "Court judgment should be exercised in determining whether anything was unreasonable about the judgment of the administrative authorities concerned " The task before the court was to see if the administrative authorities had made a gross error in their examinations and judgments Phrased differently, the court took the position that it was enjoined to see whether or not the authorities had gone through proper procedures for safety examination

In addition to Ikata 1 and Fukushima II-1, Japan has a total of eleven nuclear facility cases currently facing litigation, most of them administrative-related, over the revocation of permission for such facilities A Supreme Court decision on the prototype FBR Monju case in September 1992 acknowledged that the residents in the vicinity of the reactor site were entitled to pursue legal action and that other residents in the vicinity were qualified to sue But the Supreme Court has now decided to put limits on court intervention, namely to the extent of finding out whether anything is illegal about the procedures for safety examination This seemed to affect the future for all other cases now in administrative litigation

In most cases of litigation, it is usually the plaintiffs who must present certification But when nuclear facilities are on trial for safety examination, all relevant materials are in the hands of the administrative authorities From this point of view, the Supreme Court holds the authorities liable for both maintaining and certifying that nothing is unreasonable in their judgments

What will be the future course of nuclear-related litigation? Will residents be discouraged by the decisions? In the court examinations, the residents claimed that scientifically suitable arguments could not be made in the safety examinations, and that the committee had accepted opinions from one-sided scholars Furthermore, they said that outsiders could not know the scope of the examination

The rulings for the Ikata and Fukushima cases established a pattern for administrative litigations In future litigation, residents must aim to win a suit by citing gross error or procedural fault in safety examinations by the Government Judging from the actual state of the Government's safety examinations, there is little hope for that

If a problem does exist, that would be in civil cases, in which residents go to court against electric power companies with nuclear plants and fuel-cycle facility owners Each point of contention differs greatly case by case, such as whether or not individual rights are being ignored and whether or not the environmental rights of residents are being trampled on Therefore, each case calls for various stages of progress and applicable laws

The Japanese juridical system is generally believed to involve "too much time and money " The legal disputes about Ikata and Fukushima took 19 and 17 years, respectively, from the time when action was initiated until they reached the Supreme Court decision, passing through the first and second courts on the way The judges have examined the overall nuclear safety issue "As nuclear cases include many points of contention and cover a wide range of questions, so the length of the time taken is unavoidable to some extent," one lawyer commented

Nuclear interests were worried that the TMI and Chernobyl accidents could have a negative effect on the suits The motivation for residents in instigating legal action against

nuclear interests, whether the cases are administrative or civil, is the residents' distrust of the Government and electric power companies. It is the pressing task of nuclear interests to dispel such distrust. As far as court struggles are concerned, measures must be considered thoroughly to deal with anti-nuclear activists. Opponents' claims about safety examinations are expected to become more severe than ever. Whether court struggles will be induced or discouraged depends upon the response of the nuclear interests. The Supreme Court's latest rulings will serve as milestones in a series of legal nuclear arguments.

The Editor, Atoms in Japan

## ***European Communities***

### **Community Undertakings in the Nuclear Field placed under Administration (1993)**

Under Article 77 of the Euratom Treaty, the Commission is responsible for ensuring that ores, source materials and special fissile materials are not diverted from their intended uses as declared by the users, and that the provisions relating to supply and any particular safeguarding obligations assumed by the European Atomic Energy Community in an agreement concluded with eg an international organisation are complied with. To this effect, the Commission requires that statements of operations be submitted so that these substances can be accounted for. These obligations were specified in Commission Regulation No 3227/76 of 19 October 1976. The Commission may send inspectors to undertakings holding such substances. This is a brief summary of the basic elements of the so-called Euratom security control.

The Treaty has even provided for sanctions against persons or undertakings infringing these obligations. Accordingly, the Commission may decide the following sanctions, by order of severity:

- a) a warning,
- b) the withdrawal of special benefits such as financial or technical assistance
- c) the placing of the undertaking, for a period not exceeding four months, under the administration of a person or board appointed by common accord of the Commission and the Member State having jurisdiction over the undertaking,
- d) total or partial withdrawal of source materials or special fissile materials

On 11 May 1990, three casks containing uranium oxide enriched to 2.70 per cent and uranium enriched to 3.95 per cent were inadvertently loaded on a truck by a worker of the company Advanced Nuclear Fuels GmbH, established in Lingen, Germany, and carried to the airport at Luxembourg. The casks were then carried to Seattle (United States) to the company Advanced Nuclear Fuels Richland where the error was discovered. ANF Lingen immediately informed the Commission of the facts and on the day following discovery of

the error, the company also decided to change its own system of organisation so as to avoid any such occurrence in future. This modification became operational on 1 August 1990.

Nevertheless, the Commission, by decision 90/413 of 1 August 1990 (Official Journal of the European Communities L 209) placed ANF Lingen under administration for four months (see Nuclear Law Bulletin No 47). The company reacted by appealing for an annulment to the Court of Justice of the European Communities, under Article 146 of the Euratom Treaty.

In support of its appeal, ANF Lingen asserted that the unintentional export, due to a simple error, could not be considered as a serious violation of Article 79 of the Euratom Treaty and Commission Regulation 3227/76.

On 21 January 1993, the Court noted that the above-mentioned Regulation determined the nature and scope of the obligations referred to in Article 79. Any failure to recognise these obligations therefore constituted a violation of this provision and was likely to entail a sanction provided under Article 83 of the Treaty. The facts blamed on ANF Lingen kept the Commission from determining at all times the accounting stock of nuclear materials as laid down by the Regulation and constituted an impediment to its control duties.

The second defence argument was that the Commission had sanctioned the company after the infringement was over. On the date of the Commission's decision, the unintentional export had already taken place and the changes in the system of organisation concerning the handling of transport containers, decided on the day following discovery of the export, had been put into operation.

However, the Court noted that Article 83 listed the sanctions without specifying whether or not the infraction had ended. That Article ensured the usefulness of the security control by providing the Commission with wide powers relating to even non-financial sanctions so as to guarantee that nuclear materials were not diverted to uses other than those intended.

Finally ANF Lingen contested the proportionality of the sanction. The Commission had exaggerated the importance of the infraction and the sanction had therefore been unnecessary. According to ANF Lingen, the Commission had powers of control through inspectors, under Article 81 of the Treaty and, furthermore, the measures taken after discovery of the incident had made it superfluous to place the company under administration. In any event, that step had simply resulted in some recommendations made by the Commission's administrators, in view of the co-operation extended by ANF Lingen.

The Court considered, however, that the provisions aiming to avoid the diversion of nuclear materials were fundamental for the accomplishment of Euratom's duties. In that context, observance of the rules was essential. Any misapprehension of those rules constituted a serious violation.

The sanction consisting of placing an undertaking under administration enabled the board to give specific instructions and to impose them against the will of the management of the undertaking. Thus that sanction made it possible to prescribe measures to avoid

similar infringements in future. Sending inspectors simply to verify the accounting was clearly insufficient in this respect.

The co-operative attitude of ANF Lingen could not be invoked to contest the necessity of the sanction. In effect, it had not been established that without that sanction, the improvements adopted by the undertaking on its own initiative would have been considered fully satisfactory by the Commission.

## ***ADMINISTRATIVE DECISIONS***

### ***Finland***

#### ***Reversal of Decision in Principle to construct a nuclear reactor (1993)***

On 24 September 1993, the Finnish Parliament voted on whether or not a fifth nuclear reactor should be constructed, following a positive Decision in Principle by the Council of State (the Government) on 25 February 1993 that construction of a new nuclear reactor was judged to be in line with "the overall good of society" (see Nuclear Law Bulletin No. 51). Parliament voted in majority against such construction, thus reversing the Government's decision.

### ***Switzerland***

#### ***Central Interim Repository for Storage of Radioactive Waste (1993)***

On 16 July 1990, the ZWILAG Ltd. Company (Zwischenlager Würenlingen AG) submitted an application to the Federal Council (the Government) for a general licence to construct an interim central repository on land belonging to the Swiss Confederation near the Paul Scherrer Institute at Würenlingen (Argau Canton) (see Nuclear Law Bulletin No. 49). This Company, made up of nuclear power plant operators, plans to construct a central interim repository for the temporary storage of all categories of radioactive waste. The project includes plans for the construction for the conditioning and incineration of low

and medium level radioactive waste. These facilities will also treat waste which the Swiss Confederation is responsible for collecting (radioactive waste from medical uses, industry and research). The Confederation must therefore participate in the financing of these facilities.

A general licence sets out the outline of the project and, when it concerns radioactive waste repositories, the storage capacity, the categories of waste and the approximate structure of the underground and surface premises. By decision dated 27 June 1993, the Federal Council granted the general licence to ZWILAG AG. This general licence must be approved by the Federal Assembly (Parliament), which will decide in 1994. According to the law, prior delivery of the general licence is a condition governing the grant of construction and operating licences.

The application included a technical report, a report on the environmental impact as well as proof of need of the repository.

The public inquiry procedure, lasting 90 days as from 1 September 1990, recorded many objections lodged by more than 10 000 people, organisations and communes. 87 per cent of the objections came from Germany and Austria.

In its expert opinion, the Principal Division for the Safety of Nuclear Installations came to the conclusion that the design submitted enabled interim storage and safe treatment of the radioactive waste, both from the viewpoint of safety and of radiation protection. The Federal Commission for the Safety of Nuclear Installation concurred. On 15 July 1993, ZWILLAG AG submitted an application for construction and operating licences. The time-limit for lodging objections ran from 17 August to 16 November 1993.

#### ***Selection of site for a final radioactive waste repository (1993)***

The National Corporation for the Disposal of Radioactive Waste (CEDRA) has selected the Wellenberg site (in the Nidwald Canton) to construct the final repository for low and medium level short-lived radioactive waste.

This mountainous region, in central Switzerland, was selected from among the four potential, thoroughly investigated, sites. This selection of CEDRA was communicated to the Federal Council (the Government) on 29 June 1993. The Government will take its decision in spring 1994, after having considered the studies conducted at Wellenberg and at the other three sites.

CEDRA will submit an application for a general licence in accordance with the atomic legislation in mid-1994.

# NATIONAL LEGISLATIVE AND REGULATORY ACTIVITIES

## **ARGENTINA**

### **REGULATIONS ON NUCLEAR TRADE**

#### ***Amendment of Decree establishing controls on sensitive exports and war materiel (1993)***

Decree No 603/92 of 9 April 1992 (see Nuclear Law Bulletin No 50) was amended by Decree No 1291/93 of 24 June 1993, published in the Official Gazette (Boletín Oficial) on 28 June 1993

The amendments concern, in particular, a further definition of the competence of the National Commission for Control of Sensitive Exports and War Materiel and the inclusion of an Annex (Annex C) listing sensitive nuclear or nuclear-related articles subject to controls

Henceforth, the Commission is the authority responsible for granting the prior export licences for the articles listed in Annexes A, B and C of the Decree as amended, as well as import licences, in accordance with the related regulations

The amending Decree also provides that the Ministers for Foreign Relations, International Trade, Culture, Defence and Economy may in future, by joint resolution, amend the lists of articles set out in the Annexes which must remain under the control of the Commission

## **BRAZIL**

### **RADIATION PROTECTION**

#### ***Decree organising the National Civil Defence System - SINDEC (1993)***

Decree No 895 of 16 August 1993, published in the Official Gazette (Diário Oficial) of 17 August 1993 provides for the organisation of the national civil defence system (SINDEC)



The purpose of SINDEC is to organise and promote a permanent system of defence against natural or man-made disasters, lay down emergency plans for disaster situations, prevent or minimize hazards and assist the population

The National Board of Civil Defence (CONDEC) is SINDEC's supervisory authority and is made up of representatives of all the Ministries concerned. The Ministry for Regional Integration provides the Secretariat (SEDEC) and regional bodies have been constituted to implement SINDEC

The Decree stipulates that the Secretariat for Strategic Affairs of the Presidency of the Republic must provide SINDEC with information on the national nuclear policy and programme and on the control of all types of radioactive products with a view to preventing or minimizing nuclear or radioactive accidents

## **BULGARIA**

### **GENERAL LEGISLATION**

#### ***Review of nuclear legislation (1993)<sup>1</sup>***

The application of atomic energy in Bulgaria is based on the Law on the Use of Atomic Energy for Peaceful Purposes (the Nuclear Law), adopted by the National Assembly on 4 October 1985

The Nuclear Law establishes a system of state control for the management of the safe use of nuclear energy. Its purpose is to ensure the protection of workers, the population and the environment against the hazards of ionizing radiation sources through preventive measures to avoid nuclear or radiation accidents, and by appropriate actions to enhance the safety and reliability of installations

The Council of Ministers is the competent authority regarding the Nuclear Law. The Committee on the Use of Atomic Energy for Peaceful Purposes, placed under authority of the Council, ensures implementation of the State policy on atomic energy

In accordance with the Nuclear Law, the Committee's tasks are to

- develop programmes for the long term use of atomic energy,
- co-ordinate the activities of the different Ministries and administrations in this field,
- determine the requirements for the safe use of atomic energy,

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<sup>1</sup> This note is based on information kindly provided by Mr Anguel Petrov, Bulgarian Committee on the Use of Atomic Energy for Peaceful Purposes

- determine the systems for accounting, storage and transport of nuclear materials,
- establish the criteria for the training and professional qualifications of personnel in the field of atomic energy,
- collect and provide information on events related to nuclear safety and radiation protection to the bodies and organisations concerned,
- implement Bulgaria's economic, scientific and technical co-operation with international organisations in the nuclear field

The Inspectorate on the Safe Use of Atomic Energy within the Committee, together with other specialised agencies, as the case may be, exercises control over all bodies, organisations and officials engaged in nuclear activities to ensure that safety requirements are met. The Nuclear Law specifies the duties and powers of the officials of the Inspectorate.

All activities in the field of atomic energy require a licence issued by the Inspectorate. The licensing conditions and procedures are determined by the Nuclear Law and regulations made in its implementation.

The provisions on radiation protection have been revised to take into account the recommendations of the International Commission on Radiological Protection.

It is provided that the State must ensure the physical protection of nuclear materials and installations and other sources of ionizing radiation, as well as their protection against unlawful uses, in accordance with the applicable regulations and the international agreements to which Bulgaria is a Party.

The Nuclear Law establishes a regime of civil liability to ensure compensation for damage due to a nuclear accident. If radioactive damage is caused by a nuclear accident, liability lies with the organisation operating the nuclear installation, or which uses or carries the nuclear materials involved. Where the assets of the organisation having caused the accident are insufficient to compensate the damage, the State will compensate the part which cannot be covered. The State also compensates damage due to force majeure. When transboundary damage is caused by an accident having occurred in Bulgaria, liability is determined on the basis of an international treaty, failing which, on that of reciprocity. Claims for nuclear damage come under the exclusive jurisdiction of the Bulgarian courts, the competent court being the Sofia City Court.

Several Regulations have been issued in implementation of the Nuclear Law. They cover the following:

- Procedures for reporting operational changes, events and accidents related to nuclear and radiation safety to the Committee,
- Nuclear power plant safety during design, construction and operation,
- Accounting for, storage and transport of nuclear materials,

- Licensing of the use of atomic energy,
- Criteria and requirements for training, qualification and certification of personnel working in the field of atomic energy,
- Collection, treatment, storage, transport and final disposal of radioactive wastes

## **CANADA**

### **ORGANISATION AND STRUCTURE**

#### ***AECB Cost Recovery Fees Regulations 1993***

The Atomic Energy Control Board (AECB) Cost Recovery Fees Regulations 1990 and subsequent amendments were reported in the Nuclear Law Bulletin (Nos 46, 49 and 50). These have now been revoked and replaced by new Regulations (SOR/93 of 30 March 1993), which entered into force on 1 April 1993.

The Regulations were first made in 1990 in order to carry out the Government's policy of introducing the principle of "user pay" for the cost incurred by the AECB in its regulatory activities. The objective of the policy was to shift the cost of Government regulatory efforts for the taxpayer at large to those who most benefited from or whose activities were the reason for such effort.

This new version of the Regulations reflects licensees' comments, eg extension of the period for review of proposed fees, and sets out increases in the fees.

## **FINLAND**

### **REGULATIONS ON NUCLEAR TRADE**

#### ***Amendment of the 1988 Nuclear Energy Decree to take account of export controls (1993)***

The Nuclear Energy Decree - Decree No 161/88 - of 12 February 1988 (see Nuclear Law Bulletin No 43) was amended by Decree No 278/93 to take account of Finland's adherence to the Nuclear Suppliers Group Guidelines for the Export of Nuclear Material, Equipment or Technology (issued under IAEA reference INFCIRC/254). The amendments entered into force on 29 March 1993.

The Guidelines cover the export of sensitive nuclear and nuclear-related items. Their purpose is to harmonise export policies from the safeguards and non-proliferation angle, and they also provide for physical protection measures.

## **FRANCE**

### **ORGANISATION AND STRUCTURE**

#### ***Order to amend the 1976 Order setting up the Institute for Protection and Nuclear Safety (1993)***

The Ministerial Order of 20 August 1993 (published in the Journal officiel de la République française - JORF - of 4 September 1993) further amends the Order of 2 November 1976 setting up the above Institute - IPSN (see Nuclear Law Bulletin Nos 18 and 46).

The 1993 Order strengthens the composition of the Institute's directing bodies: its Steering Committee and its Scientific Committee, in particular by widening their membership to include other leading experts.

The Institute's duties include the preparation of studies, research and work on protection and nuclear safety it has been entrusted with by the different Ministries and agencies concerned. It also provides technical support to the Directorate for the Safety of Nuclear Installations of the Ministry for Industry.

### **REGIME OF NUCLEAR INSTALLATIONS**

#### ***Decree amending the 1963 Decree on nuclear installations (1993)***

Decree No 93-816 of 12 May 1993 (published in the JORF of 13 May 1993) further amends Decree No 63-1228 of 11 December 1963, as amended, on nuclear installations (the text of the 1963 Decree is reproduced in the Supplement to Nuclear Law Bulletin No 12).

The 1993 Decree amends the licensing procedure for nuclear installations. Henceforth, the public inquiry procedure can be extended by one further month. This extension must be authorised by decree made following a report by the Ministers for Energy and for Major Technological Risks.

The Decree entered into force on the date of its publication.

## **RADIOACTIVE WASTE MANAGEMENT**

### ***Decree in implementation of the 1991 Act concerning research on radioactive waste management (1993)***

Several Decrees have been made in implementation of the above Act (the text of the Act is reproduced in Nuclear Law Bulletin No 49, see also Bulletin No 51 which reports on the Decrees)

Decree No 93-940 of 16 July 1993 (published in the JORF of 23 July 1993) was also made in implementation of the 1991 Act and deals with the licensing of an underground laboratory. The purpose of the laboratory is the study of the appropriateness of deep geological formations for the storage of radioactive waste.

The Decree determines the contents of the file accompanying the application for a licence to be submitted by the National Radioactive Waste Management Agency - ANDRA. It specifies the procedure for the public inquiry and states that a decree by the Council of State (Conseil d'Etat) will fix the duration of the licence and the conditions for its renewal. That decree will specify in particular, the perimeter and characteristics of the facilities, the measures for the safety of persons and property during construction and operation and after termination of work at the laboratory, as well as the conditions for restoring the site if it is not used subsequently for underground storage.

## **FOOD IRRADIATION**

### ***Order on treatment by ionizing radiation of camembert cheese made with unpasteurized milk (1993)***

This Order of 23 March 1993 (published in the JORF of 27 March 1993) fixes the licensing conditions for the sale of camembert cheese made with unpasteurized milk, except for that which enjoys a registered designation of origin.

The reduction of overall microbic decontamination must be obtained through exposure to cobalt 60 or caesium 137 gamma radiation. The absorbed dose must range from 2.25 to 3.5 kilogray (kGy).

Establishments responsible for irradiating camembert cheese must keep records of the quantity of goods treated and dispatched, the date of dispatch, the names and addresses of the consignees, etc.

This work is subject to control by the competent authorities, in accordance with the Decree of 8 May 1970 on repression of fraudulent practices in trade in irradiated products.

# **GERMANY**

## **RADIATION PROTECTION**

### ***Ordinance to amend the Radiation Protection Ordinance (1993)***

The Radiation Protection Ordinance 1976/1989 as last amended in 1990 (see Nuclear Law Bulletin No 46) has been amended by the Third Ordinance of 30 July 1993 on the Amendment of the Radiation Protection Ordinance of (Bundesgesetzblatt 1993 I p 1432). The amendment is of minor importance and deals with the extension of licences granted under the First Radiation Protection Ordinance of 1960. Those licences expired on 30 October 1993 unless the licensee has applied for a further extension. This may be granted if considered in the public interest.

## **FOOD IRRADIATION**

### ***Foodstuffs and Consumers Goods Act (1992)***

The Act of 15 August 1974 concerning the circulation of foodstuffs, tobacco products, cosmetics and other consumer goods as last amended on 18 December 1992 (Bundesgesetzblatt 1975 I p 2652, 1992 I p 2022) was published in a consolidated version on 8 July 1993 (Bundesgesetzblatt 1993 I p 1169).

According to Section 13 of the Act, it is prohibited to irradiate foodstuffs for commercial purposes or to bring into circulation irradiated foodstuffs for commercial purposes. The competent Federal Minister, however, is authorised to permit exemptions from that prohibition, either generally or in special cases provided the protection of the consumers is guaranteed. The Minister may also prescribe certain technical procedures to be applied to the irradiation process.

Products which do not meet the requirements of the Act must not be introduced into the territory of Germany (Section 47). This prohibition does not apply to the introduction of products which were brought lawfully into circulation in the territories of the Member States of the European Communities (Section 47a). After the entry into force of the Agreement of 2 May 1992 between the European Community states and the EFTA (European Free Trade Association) states on the European Economic Area, the exemption will be extended to goods from the other States of the European Economic Area.

# **GHANA**

## **ORGANISATION AND STRUCTURE**

### ***Atomic Energy Commission (Amendment) Law, 1993***

Act No 204 of 3 December 1963 establishing the Atomic Energy Commission (Atomic Energy Commission Act) (see Nuclear Law Bulletin No 7) was amended by the Atomic Energy Commission (Amendment) Law of 5 January 1993 (published in the Gazette of 5 February 1993)

The 1993 Act amends Act No 204 to establish a Radiation Protection Board within the Commission. The Board is the licensing authority in Ghana for licences required for radiation protection purposes. Its powers and functions will be determined by instruments made in implementation of the Act (see below)

### ***Radiation Protection Instrument, 1993***

This Instrument (the Regulations) of 5 January 1993 was made in implementation of the Act of 1963 as amended and establishes the membership and functions of the Radiation Protection Board as well as the licensing procedure for radioactive materials and irradiating devices (published in the Gazette of 2 April 1993)

The Board is made up of ten members, including the Chairman. The members include, inter alia, Ministerial and university representatives as well as the Chief Radiation Protection Officer established under the Regulations.

The functions of the Board are in particular the following:

- advise the Commission on radiation protection and radioactive waste disposal,
- establish radiation protection measures,
- license and monitor the use of irradiating devices and radioactive materials,
- ensure that operations relating to such devices and materials are carried out without risk to public health and safety and that devices and facilities are designed, constructed and operated in accordance with prescribed standards,
- keep records of owners of irradiating devices, radioactive materials and other sources of ionizing radiation imported into or manufactured in Ghana, as well as records of premises licensed to dispose of radioactive waste

The Chief Radiation Protection Officer established under these Regulations is appointed by the Commission and is the Director of the Board. He may enter and inspect any premises and make such examinations and inquiries considered necessary to ascertain whether the Regulations are being complied with.

The Act provides that no person may manufacture, possess or use, sell, import, export or transport any irradiating device or radioactive materials without a licence issued under the Regulations. Also, no person may apply ionizing radiation for medical or dental treatment or diagnosis unless this is prescribed by a doctor or a dentist registered under the Medical and Dental Decree, 1972

Licences are issued for a specific period as determined by the Board and contain such conditions as are necessary to ensure the safe disposal of all radioactive material resulting from the operation, process or facility concerned

Licensees must ensure that exposure to ionizing radiation resulting from their operations, storage conditions, transport or disposal is kept as low as reasonably achievable. Facility owners must appoint a Radiation Safety Officer responsible, inter alia, for ensuring that

- persons working in the facility are supplied with monitoring devices and protective equipment,
- radiation workers are given proper instruction on radiation safety measures,
- radioactive waste resulting from operations is disposed of in accordance with the licence conditions

The radiation protection standards to be observed under the Regulations and issued by the Board are based on the recommendations of the International Commission on Radiological Protection, the International Atomic Energy Agency and the World Health Organisation

## ***Hungary***

### **REGIME OF NUCLEAR INSTALLATIONS**

#### ***Decree on the safety of nuclear power plants (1993)***

Decree No 4/1993 TNM (published in *Magyar Közlöny* - the Hungarian Gazette - No 77 of 1993) regulates questions related to the safety of nuclear power plants. It also amends a Decree of 1979 on the same subject. The Decree of 1993 modifies the licensing procedure and administrative provisions on nuclear safety of the earlier Decree. The Decree focusses on nuclear safety, which will be regulated comprehensively in new regulations presently being prepared.



## **REGIME OF RADIOACTIVE MATERIALS**

### ***Decree on registration of radioactive materials (1993)***

Decree No 5/1993 TNM (published in the Hungarian Gazette No 90 of 1993) lays down procedures for the licensing and registration of radioactive materials and products. It extends these procedures to nuclear wastes.

## **REGULATIONS ON NUCLEAR TRADE**

### ***Decree on registration of and safeguards for nuclear materials (1993)***

Decree No 8/1993 TNM (published in the Hungarian Gazette No 104 of 1993) lays down procedures for the registration of nuclear materials and their safeguards and specifies the related powers of the administrative authorities. Its provisions are in conformity with the system of registration and control of nuclear materials under the safeguards agreements concluded on the basis of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). The Decree also governs questions related to verification under the International Atomic Energy Agency Safeguards.

## **INDONESIA**

### **RADIATION PROTECTION**

#### ***Regulation Concerning Permits for Work involving Irradiators (1993)***

The above Regulation was approved by the Director General of the National Atomic Energy Agency (BATAN), by Decree issued on 8 April 1993.

The Regulation establishes the provisions for the classification of workers on irradiating apparatus and their permits. An "irradiator worker" is classified as follows:

- irradiator operator,
- dosimetry officer,
- radiation protection officer,
- maintenance and repair officer.

Any person intending to work in an irradiating installation must obtain a permit from the National Atomic Energy Agency. The permit is granted following a successful examination by the National Atomic Energy Agency. Any person who intends to work as

an irradiator worker and has already owned a permit from abroad may obtain a permit from BATAN without taking the examination

The permit is valid for a period of five years and may be extended

## **REGIME OF NUCLEAR INSTALLATIONS**

### ***Draft Government Regulation for Construction and Operation of Nuclear Reactors (1993)***

The above draft Regulation is being considered by an Interministerial Team

This Regulation establishes the main provisions on construction and operation of nuclear reactors, including the licensing system. It is summarized below

The bodies that may construct and operate research reactors are government institutions, state corporations and private corporations. State and private corporations may also construct and operate nuclear power reactors

There are four types of licence for nuclear reactors: the site licence, the construction licence, the operating licence, and the decommissioning licence. These licences are granted by the competent authority (currently the National Atomic Energy Agency). The operating licence is granted for a period of 40 years, and in the case of nuclear reactors designed for operating more than 40 years, the operating licence can be extended to 60 years.

The competent authority undertakes inspections before issuing the site licence and during construction, before the operating licence is granted or extended. These inspections are undertaken to examine whether requirements established in the respective licences are complied with. The competent authority also verifies the accounting and physical management of nuclear fuel materials. The licensee must report periodically on the implementation of the following programmes:

- programme for monitoring of environmental and meteorological conditions,
- quality assurance programme for construction,
- training programme for personnel,
- programme for emergency situations

## **ENVIRONMENTAL PROTECTION**

### ***Regulation on Maximum Permissible Radioactivity in the Environment (1992)***

This Regulation was approved by the Director General of the National Atomic Energy Agency, by Decree issued on 11 September 1992

The Decree lays down the responsibilities of the operator of a nuclear installation in the case of possible pollution of the environment caused by radioactive releases from his

nuclear installation. He must therefore ensure that radioactive concentrations released from the nuclear installation to the environment do not exceed the maximum permissible radioactivity limit in the environment as established by the National Atomic Energy Agency. If the level of the environmental radioactivity exceeds the maximum permissible radioactivity limit, appropriate measures must be taken to protect humans and the environment from radiation hazards.

This Regulation also provides that the operator of the nuclear installation must monitor the level of the radioactivity in the area around his installation periodically, and at least once a year.

## ***ITALY***

### **TRANSPORT OF RADIOACTIVE MATERIALS**

#### ***Circular on the air transport of radioactive materials (1992)***

The above Circular No. 334096/30 was issued by the Ministry of Transport on 3 December 1992 and published in the Official Gazette (*Gazzetta Ufficiale*) of 6 March 1993.

The Circular contains all the technical and administrative provisions required to ensure the safe transport by air of radioactive materials. It provides for protection against the hazards of ionizing radiation and determines the permissible limits of radioactivity for the contents of packages, lays down the conditions for their dispatch and storage in transit, the licensing requirements and certificates, etc.

This Circular repeals a previous Circular on the same subject of 1 August 1982 reported in Nuclear Law Bulletin No. 29.

## ***MAURITIUS***

### **RADIATION PROTECTION**

#### ***Radiation Protection Act (1992)***

This Act (No. 22 of 1992), was assented to by the President of the Republic on 29 June 1992. It provides for the setting up of a Radiation Protection Board and its

**functions and also sets out the licensing conditions for radiation sources and controlled activities**

**The Board is made up of ten members, including the Chief Medical Officer who is the Chairman, a representative of the Prime Minister's Office of the different Ministries concerned and of the various medical disciplines**

**The functions of the Board are, inter alia, to**

- **advise the Minister of Health on matters relating to the use of ionizing radiation sources or other radioactive substances,**
- **grant permits for the import, production, processing handling, use, storage, transport and disposal of radioactive substances,**
- **grant permits for the use and operation of other radiation sources including X-ray apparatus for diagnosis,**
- **issue codes of practice for all persons associated with radiation,**
- **maintain a register of importers, users and operators of plants and apparatus using ionizing radiation and radioactive materials**

**The Chairman of the Board or an authorised officer may enter and inspect any premises or vehicle, etc where radioactive materials are held and take any sample in the discharge of his duties**

**No person may import, process, store or use radioactive materials or other sources of ionizing radiation without a licence from the Board. Such licences are issued subject to conditions determined by the Board**

**No person may carry out controlled activities without written authorisation from the Board. Controlled activities under the Act are**

- **the administration of radioactive substances for purposes of diagnosis treatment or research,**
- **the addition of radioactive substances in the production and manufacture of foodstuffs and medicinal products, cosmetics and household goods,**
- **the import for commercial purposes of goods containing radioactive substances**

# **MEXICO**

## **ORGANISATION AND STRUCTURE**

### ***Regulation concerning the Ministry of Energy, Mines and State-owned Industries (1993)***

This internal Regulation of 30 June 1993 (published in the Diario Oficial of 1 July 1993) provides for the organisation and competence of the above Ministry

The Ministry enjoys wide powers and nuclear energy matters are within its competence. In particular, the Regulation specifies that the Minister of Energy, Mines and State-owned Industries must

- approve the establishment and operation of facilities for the treatment of radioactive ores, the siting, design, operation, dismantling and decommissioning of nuclear and radioactive installations, the use of research reactors and the import and export of radioactive ores and nuclear materials,
- authorise the production, use and application of radioisotopes and, where necessary, direct the National Commission for Nuclear Safety and Safeguards to occupy temporarily any nuclear or radioactive installation which represents a hazard for workers and the population generally

The General Directorate for Energy Operations and the General Directorate for Energy Resources within the Ministry have been assigned specific duties by the Regulation

The General Directorate for Energy Operations is responsible, inter alia, for carrying out studies and inspections in the nuclear field, while the General Directorate for Energy Resources has many functions, the main ones being to

- authorise the Federal Electricity Commission to carry out the various industrial stages of the fuel cycle, including reprocessing, and also to import and export nuclear materials and fuels,
- authorise the above Commission and the National Institute for Nuclear Research to store, carry and safeguard nuclear fuels and radioactive waste irrespective of their origin,
- supervise, in co-operation with the Ministry's General Directorate for International Affairs and General Directorate for Legal Affairs and the National Commission for Nuclear Safety and Safeguards, the implementation of the international treaties concluded in the nuclear field which are within the competence of the Ministry

Finally, the Regulation provides that the Ministry is the supervisory authority of the National Commission for Nuclear Safety and Safeguards, although it is an independent administrative entity. The responsibilities and duties of the Commission are specified in the Act of 27 December 1984 on the administration and control of nuclear energy (see Nuclear Law Bulletin No. 35).

The Regulation entered into force on 2 July 1993.

## **ROMANIA**

### **GENERAL LEGISLATION**

#### ***Bill on protection against the hazards arising from nuclear activities (1993)***

At present, nuclear activities in Romania are carried out in accordance with Act No. 61/1974 and Act No. 6/1982 on quality assurance of nuclear projects and installations. This legislation no longer corresponds to the changed situation and the decentralised market economy in the country, which is why a Bill on protection against the hazards arising from nuclear activities has been prepared. The Bill provides a legislative framework, harmonised with existing regulations in Western countries and with the international agreements to which Romania has been a Party since 1990.

The provisions in the Bill will apply to nuclear activities, namely, to the design, construction, operation and decommissioning of nuclear installations, to ore extraction and processing of uranium and thorium ores, to the production and supply of nuclear fuels, as well as to radioactive materials and waste.

The above activities cannot be undertaken without a licence covering nuclear safety, radiation protection, quality assurance as well as non-proliferation and physical protection as the case may be. These licences are to be issued, for a given period, by the National Commission for the Control of Nuclear Activities.

A licence will be issued only after compliance with the provisions specified in the Bill for each activity and with technical standards to be published by the Commission in accordance with the Bill.

Licensees must employ personnel specifically qualified for the licensed work. This personnel must be trained and have a permit issued by the Commission.

Licensees must also ensure that the licensed activity is carried out in accordance with the licence conditions and the required arrangements for safety, physical protection, quality assurance, radiation protection and emergency planning. Where radioactive waste arises from an activity, the licensee must collect it, carry it and dispose of it in compliance with the provisions of the Bill.

Expiry, revocation or withdrawal of a licence does not exonerate the licensee from compensating any possible damage to third parties

The National Commission for the Control of Nuclear Activities is the competent authority in respect of compliance with the provisions of the Bill

## **RADIATION PROTECTION**

### ***Order on emergency preparedness in case of a nuclear accident or radiological emergency (1993)***

Regulations concerning emergency preparedness in case of a nuclear accident or radiological emergency were approved by Order No 242 of the Minister of Waterways, Forestry and Environmental Protection (published in the Official Gazette of Romania No 195 of 13 August 1993)

The National Commission for the Control of Nuclear Activities is the competent authority in accordance with the Regulations. Responsibility for supervising, approving and assessing emergency preparedness plans is shared with the Republican Action Command in Case of Nuclear Accidents

The Order specifies the responsibilities of both bodies and sets up Action Teams which deal in particular with transborder radiological emergencies

## **REGULATIONS ON NUCLEAR TRADE**

### ***Order on the licensing system for imports and exports (1993)***

Order No 2 of 29 January 1993 on the licensing system for imports and exports by the Minister of Trade (published in Official Gazette No 42 of 25 February 1993) was made in implementation of Government Decision No 594/1992 on the regime for import and export of sensitive articles and technology subject to final destination control and on control of exports from the viewpoint of non-proliferation of nuclear, biological and chemical weapons and rockets carrying them (see Nuclear Law Bulletin No 50)

This Order lays down the licensing system for the import and export of radioactive materials and nuclear installations other than the equipment and products that can be used directly for the manufacture of nuclear explosive devices

### ***Act to amend the Penal Code regarding violation of regulations on imports of wastes and residues (1992)***

Act No 88/1992 introduced a provision in the Penal Code (Article 302<sup>2</sup>) to penalise violation of regulations concerning imports of wastes and residues

Any import of wastes or residue of any nature or other articles constituting a health hazard for the population and the environment or their transit through the national territory

without observing the pertinent legal provisions is punishable by imprisonment running from two to seven years

If such violation has endangered the health of many people the sentence runs from three to ten years' imprisonment. In case of death or harm to the national economy that sentence runs from seven to twenty years

## **SPAIN**

### **RADIATION PROTECTION**

#### ***Order concerning emergency plans (1993)***

This Order of 28 April 1993 establishes the rules for granting subsidies to local bodies for the setting up of structures in the context of Provincial Nuclear Emergency Plans. The Order was published in the Official Gazette (*Boletín Oficial*) of 13 May 1993

The Nuclear Emergency Plans of each of the Provinces in which nuclear power plants are located determine the structures, directives and rules required for prevention measures and protection of the public and property that may suffer damage due to an accidental release of radioactive materials

This Order describes the installations and works which are entitled to subsidies so as to provide for the proper operation of the related Nuclear Emergency Plan. Applications are submitted to the Civil Government or to the Delegation of the Government of the autonomous Community concerned. The application must include several documents and in particular

- a report on the works or installations required, together with the plans for their execution
- a project, approved by a competent technician, which includes the details of the works or installations,
- a financing plan
- a statement indicating whether or not a subsidy has already been awarded by a public body or administration, either national or international,
- a certificate from the Secretary of the body concerned regarding the budgets for the past three years and the related accounts



The Civil Governments or their Delegations study the applications, those that meet all the requirements are forwarded to the General Directorate for Civil Protection together with a report for each case

The Order lists the criteria for granting subsidies, namely, the urgency, the type of work or installation involved, whether or not subsidies have already been granted. The decision rests with the General Directorate for Civil Protection. Its decisions regarding such grants are then published in the Official Gazette.

***Order on informing the general public in case of a radiological emergency (1993)***

The Order of 27 May 1993 (published in the Official Gazette of 4 June 1993) embodies the principles and specific provisions of Community Directive 89/618/Euratom on informing the general public about health protection measures and steps to be taken in the event of a radiological emergency (the text of the Directive is reproduced in Nuclear Law Bulletin No. 45).

The Order therefore determines the measures and methods for providing information to the general public, aimed at enhancing health protection in the event of a radiological emergency. Section 2 of the Order provides a definition of a radiological emergency.

"A radiological emergency means any situation in which a significant release of radioactive materials occurs or is likely to occur or in which abnormal levels of radioactivity may be detected which are likely to be detrimental to public health, and which are caused by the following installations or activities:

- any nuclear reactor, wherever located,
- any other nuclear fuel cycle facility,
- any radioactive waste management facility,
- the transport and storage of nuclear fuels or radioactive wastes,
- the manufacture, use, storage, disposal and transport of radioisotopes for agricultural, industrial, medical and related scientific and research purposes,
- the use of radioisotopes for power generation in space vehicles."

The provisions of the Order cover, in particular, prior information, information in the event of a radiological emergency, the information of persons likely to take part in organising assistance in such cases, and that provided to the European Communities and the Member States.

(A description of the prior information and the information to be supplied to the general public in the event of a radiological emergency is given under "United Kingdom" in this Chapter.)

# **SWEDEN**

## **ORGANISATION AND STRUCTURE**

### ***Ordinance to amend the 1988 Ordinance on Instructions for the Nuclear Power Inspectorate (1992)***

This Ordinance of 27 May 1992 (SFS 1992 480) amends the Ordinance of 2 June 1988 (SFS 1988 523) setting out the tasks of the State Nuclear Power Inspectorate (see Nuclear Law Bulletin No 44)

The Ordinance, as amended, provides that the Inspectorate shall, in particular, take measures to improve safety in nuclear power plants, follow progress in the handling and final storage of spent nuclear fuel and radioactive waste and initiate research and development of safety methods for their management, follow progress in the decommissioning of nuclear power plants and also initiate R and D in safety methods in that sector as well as in the transport of nuclear materials or wastes. The Inspectorate must also contribute to informing the general public about activities in Sweden in the fields of nuclear safety and wastes.

The Inspectorate also assists the Swedish Consultative Committee for Nuclear Waste Management (KASAM) in providing independent evaluations of programmes for research and development work regarding the safe disposal of nuclear wastes arising from nuclear activities, as provided by the 1984 Act on Nuclear Activities (the text of the Act is reproduced in the Supplement to Nuclear Law Bulletin No 33)

### ***Ordinance to amend the 1988 Ordinance on Instructions for the State Institute for Radiation Protection (1992)***

This Ordinance of 27 May 1992 (SFS 1992 484) amends the Ordinance of 19 May 1988 setting out the tasks of the State Institute for Radiation Protection (see Nuclear Law Bulletin No 44)

The Ordinance, as amended, prescribes the Institute's main duties. The Institute shall, in particular, advise the authorities responsible for protection of the public and for emergency services on the radiation protection measures required in the event of an accident occurring in a nuclear installation in Sweden or abroad, as well as on health protection measures to be taken in case of a radioactive release.

### ***Ordinance to amend the 1984 Ordinance on Nuclear Activities (1992)***

This Ordinance, also of 27 May 1992 (SFS 1992 482), amends the Ordinance of 14 January 1984 on Nuclear Activities (SFS 1984 14) (the text of the Ordinance is reproduced in the Supplement to Nuclear Law Bulletin No 33). The amendment also concerns the competence of the State Institute for Radiation Protection. The Institute is, inter alia, the authority responsible for examining the safety conditions in the context of

applications for licences to acquire, possess, transfer, transport or convey into Sweden specified nuclear waste. It must consult the State Nuclear Power Inspectorate in this work.

## **REGULATIONS ON NUCLEAR TRADE**

### ***Ordinance to amend the 1984 Ordinance on Nuclear Activities (1992)***

The Ordinance of 4 March 1992 (SFS 1992:142) amends other aspects of the above 1984 Ordinance on Nuclear Activities, adding several new sections concerning the control of the import and export of spent nuclear fuel and nuclear waste.

It is provided that any application to import such fuel or waste produced in another country must include information on how long the materials are to stay in Sweden and on their subsequent destination. The import will be authorised only if it is specified that the materials will leave Sweden within the prescribed deadline, or if an authorisation for final storage has been granted in accordance with the provisions of the 1984 Act on Nuclear Activities.

In addition, any application to export used nuclear fuel or waste must include information on the final management of the materials concerned. When these are materials resulting from nuclear activities originating in Sweden, the application must also include an undertaking by the exporter to take back the materials if they cannot be managed as planned.

A revised Annex to the Ordinance contains a list of materials or equipment which cannot be conveyed out of Sweden without permission by the Government.

## **SWITZERLAND**

### **GENERAL LEGISLATION**

#### ***Procedure for partial revision of the Federal Atomic Energy Act and Federal Order concerning the Act (1993)***

Following a motion in Parliament in January 1991, the Federal Council (the Government) was asked to submit to Parliament a draft partial revision of the nuclear legislation aiming to simplify and accelerate the licensing procedure for setting up radioactive waste repositories.

The federal administration has prepared a draft which proposes to simplify the licensing and expropriation procedure for undertaking preparatory measures for or setting up radioactive waste repositories. The draft also includes stricter provisions on the non-proliferation of nuclear weapons so as to remedy certain shortcomings which came to light.

in view of the rearming of Iraq On 27 September 1993, the Federal Council decided on the follow-up to be given to the draft, after consideration of the report setting out the results of the consultation procedure (canton governments, political parties represented in Parliament, scientific organisations and ecological groups) It has commissioned the Federal Ministry for Transport, Communication and Energy to submit to it, before the end of 1993, a Bill and message to be put before Parliament

## **UKRAINE**

### **GENERAL LEGISLATION**

#### ***Legislation on protection of the public after the Chernobyl accident (1991)***

In 1991, the President of the Ukraine Supreme Soviet adopted two Acts and a Decree organising the conditions of residence in the territories contaminated by the accident at the Chernobyl nuclear power plant and defining the status of the population affected They are briefly described below

**Act No 198** of 27 February 1991 divides the affected territories into different zones according to the level of radioactivity prevailing and sets out the conditions for both the residence and work of the population in those zones and their compulsory migration where necessary for their protection **Decree No 197** also of 27 February 1991 sets out the permissible limits of radiation levels for the zones concerned The level of radioactive contamination of the ground is the criterion applied to determine whether the population residing in a given zone must migrate to "radiologically clean localities" or may remain

**Act No 200** of 28 February 1991 concerns the status and security of the population affected by the Chernobyl accident It specifies that the State assumes total liability for loss of health, working capacity and material losses and lays down a system of compensation for victims

The Act establishes a system of medical coverage and social security and contains special labour provisions for work in contaminated territories It also sets out radioactivity limits for the sale and consumption of foodstuffs originating from the zones concerned The standards to be applied are set by the National Commission for Radiation Protection

The Act also specifies that the Council of Ministers will ensure that the population is provided with complete, prompt and reliable information on the levels of radioactive contamination of ground property and foodstuffs as well as on the requirements to be complied with for radiation protection

# **UNITED KINGDOM**

## **RADIATION PROTECTION**

### ***The Public Information for Radiation Emergency Regulations 1992***

The above Regulations of 26 November 1992 entered into force on 1 January 1993. They give effect to the Council of the European Communities' Directive 89/618/Euratom on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency (the text of the Directive is reproduced in Nuclear Law Bulletin No 45, the text of the Commission's Communication on its implementation, 91/C 103/03, is reproduced in No 48).

Employers whose undertakings give rise to a reasonably foreseeable risk of a radiation emergency are required to supply the information referred to in Schedule 2 to the Regulations to all members of the public who are in an area in which they are liable to be affected by such an emergency. That area is to be determined by the Health and Safety Executive. The prior information to be supplied and made publicly available is the following:

- the basic facts about radioactivity and its effects,
- the various types of radiation emergency covered and their consequences for the general public and the environment,
- the emergency measures envisaged to alert, protect and assist the general public in the event of a radiation emergency,
- the appropriate information on action to be taken by the public in that event,
- the authorities responsible for implementing the emergency measures.

Schedule 3 to the Regulations lists the information to be supplied in the event of a radiation emergency, which includes in particular:

- information on the type of emergency which has occurred,
- advice on health protection measures (eg restrictions on food consumption, basic rules on hygiene, instructions to stay indoors),
- announcements recommending co-operation with instructions by the competent authorities.

Employers are responsible for preparing the information listed in Schedule 2 and must consult the local authorities when so doing. The local authorities must prepare and supply the information and advice listed in Schedule 3.

(The definition of a radiological emergency is given under "Spain" in this Chapter.)

## ***United States***

### **THIRD PARTY LIABILITY**

#### ***Increase of liability limits (1993)***

The Nuclear Regulatory Commission (NRC) amended its Regulations in 10 CFR Part 140, effective on 20 August 1993, to increase the amount of the maximum standard deferred premium which operators of large power reactors are likely to pay in the event of a major nuclear accident in the United States. The premium had originally been established at \$63 million per reactor per accident and has now been raised to \$75.5 million per reactor per accident (but still not to exceed the \$10 million limit in any one year). This increase reflects the aggregate percentage change of 19.9 per cent in the Consumer Price Index from August 1988 (date of the Price Anderson Amendments Act -see Nuclear Law Bulletin No. 42) to March 1993. The aggregate amount available for compensation of nuclear damage in the United States is henceforth \$8.96 billion.

# INTERNATIONAL REGULATORY ACTIVITIES

## **NEA**

### **LEIDEN TRAINING SEMINAR ON NUCLEAR LAW (1993)**

The OECD Nuclear Energy Agency (NEA) organised from 7 to 10 September 1993 a Training Seminar on Nuclear Law, aimed at the countries of Central and Eastern Europe. It was co-sponsored by the Commission of the European Communities and the International Atomic Energy Agency and hosted by the International Institute of Energy Law at the University of Leiden, in the Netherlands. The Seminar was attended by participants from Belarus, Croatia, the Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Romania, the Russian Federation, the Slovak Republic and the Ukraine.

Under the socialist system, in much of the eastern bloc there was no specific "nuclear law" properly speaking. A nuclear installation was regarded as just one more State-owned factory among many others. No need was perceived for legislation, of the type found in western countries, establishing basic principles and an institutional framework for nuclear activities.

Following the recent political changes, most of these countries are now embarking on the establishment of such legislation and institutions, or the revision of existing arrangements. Assisting this process is one of the principal aims of co-operation between these countries and the OECD/NEA, as well as with other international nuclear agencies.

The most recent initiative within the OECD/NEA's general programme of assistance in this field was the organisation of the Leiden Training Seminar. The purpose of the Seminar was to provide training in nuclear law to lawyers and other professionals who are involved in the development and administration of nuclear legislation and regulations.

The four-day Seminar introduced the participants to most subjects which need to be dealt with in national nuclear legislation: licensing, safety standards, radiation protection, transport, radioactive waste management, nuclear insurance, measures to minimise damage in the case of a nuclear accident, liability and compensation, and safeguards against the proliferation of nuclear weapons. Participants were made aware of international regulations and guidelines on each subject and given an indication as to the methods by which they have been dealt with in national legislation in western countries.

In addition to lecturers from the three sponsoring organisations, participants were addressed by speakers from the European Insurance Committee (UK and Netherlands nuclear insurance pools) and from national authorities in Germany, Hungary, Spain,

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Sweden, and the United Kingdom. A joint session with the Academy of International Law at the Hague was also held, on the subject of nuclear law and the environment.

Since this was a training seminar, there will be no published proceedings.

## **IAEA**

### **IAEA GENERAL CONFERENCE ADOPTS RESOLUTION ON NUCLEAR SAFEGUARDS IMPLEMENTATION IN THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA (1993)**

The last issue of the Nuclear Law Bulletin (No. 51 of June 1993) reported on the series of meetings held by the International Atomic Energy Agency's Board of Governors to review the application of safeguards in the Democratic People's Republic of Korea (DPRK). The problems which arose were due to the refusal of the DPRK to have certain of its nuclear installations inspected by the IAEA, contrary to the Safeguards Agreement the DPRK had concluded with the Agency. This refusal was followed by the announcement of its intention to withdraw from the Non-Proliferation Treaty. The meetings were followed by the adoption of Resolutions directed to the DPRK, but the case continues.

The IAEA General Conference, grouping the Agency's Member States, adopted a further Resolution on 1 October 1993, at its thirty-seventh session, which supports the actions that have been taken so far by the IAEA to implement the Safeguards Agreement concluded with the DPRK. The text of the Resolution is reproduced below.

#### **\*The General Conference**

- a) **Recalling** the Board of Governors' Resolutions GOV/2636 of 25 February 1993, GOV/2639 of 18 March 1993, GOV/2645 of 1 April 1993 and GOV/2692 of 23 September 1993;
  - b) **Noting** the Director General's report contained in document GC(XXXVII)/1084 and the contents of document GC(XXXVII)/1084/Add 1,
  - c) **Recalling also** Resolution 825(1993) adopted by the Security Council of the United Nations on 11 May 1993, which - inter alia - requested the Director General to report on this matter to the Security Council and
  - d) **Deeply concerned** that essential elements of these Resolutions remain to be implemented
1. **Strongly endorses** the actions taken so far in this regard by the Board of Governors and commends the Director General and the Secretariat for their impartial



efforts to implement the safeguards agreement (INFCIRC/403) still in force between the Agency and the Democratic People's Republic of Korea (DPRK),

2 **Expresses** its grave concern that the DPRK has failed to discharge its safeguards obligations and has recently widened the area of non-compliance by not accepting scheduled Agency ad hoc and routine inspections as required by its safeguards agreement with the Agency,

3 **Urges** the DPRK to co-operate immediately with the Agency in the full implementation of the safeguards agreement, and

4 **Decides** to include in the agenda for its thirty-eighth session an item entitled "Implementation of the agreement between the Agency and the Democratic People's Republic of Korea for the application of safeguards in connection with the Treaty on the Non-Proliferation of Nuclear Weapons"

#### **FORUM ON STRENGTHENING RADIATION AND NUCLEAR SAFETY INFRASTRUCTURES IN COUNTRIES OF THE FORMER USSR**

The United Nations Development Programme (UNDP) and the IAEA convened a Forum for information exchange on the above subject in Vienna, from 4 to 7 May 1993. The Forum was attended by representatives of Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, the Republic of Moldova, the Russian Federation, Ukraine and Uzbekistan. Experts from international organisations also attended as observers (OECD Nuclear Energy Agency, the Commission of the European Communities, the Group of 24 )

The objectives of the Forum were the following

- to present to recipient countries information on the infrastructure requirements for radiation protection and nuclear safety, relevant IAEA and UNDP activities and mechanisms for providing assistance,
- to receive from recipient countries information on the radiation protection and nuclear safety situation in the country, ongoing programmes, future plans, existing shortcomings and priority assistance needs, and
- to outline the assistance required

The Proceedings of the Forum were published this year by the IAEA

# **EUROPEAN COMMUNITIES**

## **COUNCIL REGULATION ON SHIPMENTS OF RADIOACTIVE SUBSTANCES BETWEEN MEMBER STATES**

The Council of the European Communities adopted the above Regulation (Euratom) No 1493/93 on 8 June 1993 (published in the Official Journal of the European Communities L 148 of 19 June 1993)

The Regulation applies to shipments between Member States of sealed sources and other relevant sources, whenever the quantities and concentrations exceed the levels laid down in Directive 80/836/Euratom laying down revised basic standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation (see Nuclear Law Bulletin No 26)

As regards nuclear materials, the Member States must carry out the necessary controls within their own territories to ensure that the consignees of the materials, shipped from another Member State comply with the national regulations implementing the Directive

Consignors of sealed sources must, before shipping the materials, obtain a prior written declaration from the consignee to the effect that the consignee has complied with all the applicable provisions implementing the Directive. The declaration is sent by the consignee to the competent authority of the Member State to which the shipment is to be made, which confirms with its stamp that it has taken note of the declaration. The consignee then sends the declaration to the consignor who proceeds with the shipment. The latter must for his part send the authorities of the Member State of destination, within 21 days of the calendar quarter, a statement giving the particulars of the consignee, the total activity of the shipment, the type of substance, etc

The Regulation entered into force on 9 July 1993

It is provided that it ceases to apply to radioactive waste on 1 January 1994. It is recalled that the Council adopted Directive 92/3/Euratom on the supervision and control of shipments of radioactive waste between Member States and into and out of the Community and that Member States must transpose the Directive into their national legislation by 1 January 1994 (the text of the Directive is reproduced in Nuclear Law Bulletin No 49)

## **PROPOSAL FOR A COUNCIL DIRECTIVE LAYING DOWN BASIC SAFETY STANDARDS FOR RADIATION PROTECTION**

The Commission of the European Communities presented an amended proposal for a Council Directive laying down the basic safety standards for the protection of workers and the general public against the dangers arising from ionizing radiation [COM(93) 349 final]

The Explanatory Memorandum states the reasons for the proposal, in particular, that the basic safety standards have been amended several times to take account of developments in scientific knowledge and that the version currently applied dates back to 1980 (Directive 80/836/Euratom). The basic safety standards have always taken into account to a large extent, the recommendations of the International Commission on Radiological Protection (ICRP) which had in fact published its latest recommendation in 1991 in Publication 60 (see Nuclear Law Bulletin No 47).

Among the aims of the proposed Directive is the provision of radiation protection based on the most up to date scientific knowledge, and also the provision of a sound technical and scientific basis and a uniform approach to radiation protection. While the basic structure of the Directive has been retained, the proposed amendments are, inter alia, as follows:

- use of the definitions, quantities and units set out in the latest ICRP recommendations,
- the inclusion of more restrictive dose limits,
- the introduction of provisions concerning radiation protection in cases of occupational exposure to natural radiation sources,
- the prohibition of certain unjustified uses of radioactivity,
- expansion of the provisions concerning protective measures to be taken in the event of a radiological incident, etc

## ***UNITED NATIONS***

### **GENERAL ASSEMBLY RESOLUTION AND PRINCIPLES RELEVANT TO THE USE OF NUCLEAR POWER SOURCES IN OUTER SPACE**

On 14 December 1992, the UN General Assembly adopted the above Resolution. The Principles apply to nuclear power sources in or devoted to the generation of electric power on board space objects for non-propulsive purposes. They set forth requirements with respect to the use of nuclear power sources, in particular, guidelines and criteria for safe use and general goals for radiation protection and nuclear safety, and are to be reopened for revision no later than two years from their adoption.

The text of the Resolution and Principles is reproduced in the "Texts" Chapter of this issue of the Bulletin.

# AGREEMENTS

## *BILATERAL AGREEMENTS*

### *Australia-Mexico*

#### **AGREEMENT ON CO-OPERATION IN THE PEACEFUL USES OF NUCLEAR ENERGY AND NUCLEAR TRANSFERS (1992)**

The above Agreement between the Government of Australia and the Government of Mexico was concluded on 28 February 1992 and promulgated in Mexico by Decree dated 28 July 1992 (published in the Diario Oficial of 1 October 1992)

Both Australia and Mexico are States which are Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and have concluded agreements with the International Atomic Energy Agency (IAEA) for the application of safeguards in their respective countries in connection with the NPT. This Agreement aims to establish conditions, consistent with the Treaty obligations of both countries, under which nuclear material can be transferred between them.

The Agreement covers the transfer of nuclear material, research and development, information exchange, technical training, visits by scientists and projects of common interest in the nuclear field.

The Agreement specifies that the nuclear material transferred between both countries is not to be used or diverted for the manufacture of nuclear weapons or other nuclear or explosive devices or for any military purpose. Compliance with this requirement is to be ensured by the IAEA safeguards system in accordance with the agreements between each country and the IAEA. Also, nuclear material subject to the Agreement must not be transferred outside the territorial jurisdiction of the recipient Party, enriched to 20 per cent or more in the isotope U-235 or reprocessed without the prior written consent of the supplier Party.

Furthermore, each Party must take measures to ensure the physical protection of nuclear material within its jurisdiction, in accordance with the 1980 Convention on the Physical Protection of Nuclear Material to which both countries are Parties.

## ***Bulgaria-Germany***

### **AGREEMENT ON NUCLEAR SAFETY AND RADIATION PROTECTION (1993)**

On 26 March 1993, the Federal Minister for the Environment, Nature Conservation and Reactor Safety of Germany and the Committee on the Use of Atomic Energy for Peaceful Purposes under the Council of Ministers of Bulgaria concluded an Agreement concerning questions of common interest in connection with nuclear safety and radiation protection (Bundesgesetzblatt 1993 II p 1281)

The Agreement was concluded in implementation of the 1986 IAEA Convention on Early Notification of a Nuclear Accident to which both countries are Parties (the text of the Convention is reproduced in the Supplement to Nuclear Law Bulletin No 38) It supplies a framework for further exchange of information and experience in the field of nuclear safety and radiation protection, and covers, in particular, the following installations and activities

- nuclear reactors,
- transport and storage of nuclear fuel and radioactive waste,
- manufacture, use, storage, disposal and transport of radioisotopes

The Agreement entered into force on 28 June 1993

## ***China-Germany***

### **AGREEMENT ON CO-OPERATION IN THE FIELD OF NUCLEAR SAFETY (1992)**

On 12 April 1992, the Federal Minister for the Environment, Nature Conservation and Reactor Safety of Germany and the State Agency for Nuclear Safety of the People's Republic of China concluded an Agreement on co-operation in the field of nuclear safety and radiation protection (Bundesgesetzblatt 1993 II p 1266) The Agreement was concluded within the framework of the Agreement of 9 May 1984 between both countries on co-operation in the peaceful uses of nuclear energy (see Nuclear Law Bulletin No 34)

The Parties agreed to co-operate in the field of nuclear safety and radiation protection by

- exchanging information on the general development of the peaceful uses of nuclear energy and on the legal framework for the licensing and supervisory procedures regarding the design, construction and operation of nuclear installations,

- exchanging reports in the field of reactor safety and radiation protection of significance for the licensing authorities,
- exchanging information on important decisions in those fields,
- exchanging documented experience from the operation of nuclear installations,
- exchanging results of investigations in the field of nuclear safety and radiation protection

The Agreement entered into force on 14 June 1993

## ***Finland-Germany***

### **AGREEMENT ON EARLY NOTIFICATION OF A NUCLEAR ACCIDENT AND INFORMATION EXCHANGE ON NUCLEAR SAFETY AND RADIATION PROTECTION (1992)**

On 21 December 1992, the Governments of Germany and Finland concluded an Agreement on early notification of a nuclear accident and exchange of information and experience in the field of nuclear safety and radiation protection (Bundesgesetzblatt 1992 II p 1264) The Agreement was concluded in implementation of the 1986 IAEA Convention on Early Notification of a Nuclear Accident to which both countries are Parties. In addition to such notification, the Agreement provides for a comprehensive exchange of information on reactor safety and radiation protection

The International Nuclear Events Scale (INES), jointly developed by the OECD Nuclear Energy Agency and the International Atomic Energy Agency (see Nuclear Law Bulletin No 49) will be used as a basis for reporting occurrences to be notified. This scale establishes a classification system for nuclear incidents according to an order of severity

The Agreement entered into force on 28 May 1993

## ***France-Japan***

### **AGREEMENT FOR CO-OPERATION IN THE FIELD OF NUCLEAR SAFETY (1993)**

On 9 June 1993, the Institute for Protection and Nuclear Safety of the French Atomic Energy Commission and the Nuclear Power Engineering Corporation of Japan signed an Agreement establishing a general framework for co-operation in the field of nuclear safety

Co-operation could take the form of an exchange of information and will cover the following areas

- studies on and experience in serious accidents,
- containment behaviour during accidents,
- procedures and systems applied in case of nuclear emergencies,
- probabilistic safety studies,
- seismic tests and studies,
- qualification of electrical components, instrumentation and software

The Agreement entered into force on the date of its signature for a period of five years. It may be renewed by mutual agreement.

## ***France-Russian Federation***

### **AGREEMENT FOR CO-OPERATION IN THE PEACEFUL USES OF ATOMIC ENERGY (1993)**

On 10 March 1993, the French Atomic Energy Commission and the Russian Ministry responsible for Atomic Energy (MINATOM) signed an Agreement for co-operation in the peaceful uses of atomic energy, covering the following topics

- nuclear reactors,
- the fuel cycle,
- nuclear safety,
- decommissioning and dismantling of nuclear installations,
- fundamental research,
- applied research,
- public information,
- training,
- economic and legal aspects of nuclear energy

The Parties will co-operate through short expert visits, seminars, joint research programmes and special contracts

The Agreement entered into force on the date of its signature for a period of two years. It may be renewed by tacit agreement.

## ***Germany/Albania/Latvia/Lithuania***

### **AGREEMENTS IN THE FIELD OF ENVIRONMENTAL PROTECTION (1992-93)**

Germany has entered into three Agreements in the field of environmental protection, all providing a framework for overall co-operation in that field. The Agreements have been concluded with **Albania**, on 13 October 1992 (Bundesgesetzblatt 1993 II p 60), **Latvia**, on 14 April 1993 (Bundesgesetzblatt 1993 II p 901) and **Lithuania** on 16 April 1993 (Bundesgesetzblatt 1993 II p 899).

These outline Agreements could also cover co-operation in the field of nuclear safety and radiation protection.

## ***Norway-Russian Federation***

### **AGREEMENT ON EARLY NOTIFICATION OF A NUCLEAR ACCIDENT AND INFORMATION EXCHANGE ON NUCLEAR INSTALLATIONS (1993)**

On 10 January 1993, the Governments of Norway and the Russian Federation signed the above Agreement. It was concluded in implementation of the 1986 IAEA Convention on Early Notification of a Nuclear Accident which both countries have ratified (the text of the Convention is reproduced in the Supplement to Nuclear Law Bulletin No 38). The Convention provides that States Parties may enter into bilateral arrangements relating to the subject matter of the Convention when it is in their mutual interest. In addition, the Agreement provides for a more comprehensive exchange of information on nuclear installations.

### **AGREEMENT ON CO-OPERATION IN THE ENVIRONMENTAL FIELD (1992)**

On 3 September 1992, Norway and the Russian Federation concluded an Agreement on co-operation in the environmental field. The Agreement provides the basis for co-operation between both countries by means of a joint Norwegian/Russian Expert Group.



whose mandate is to investigate the possible radioactive pollution of the Barents and the Kara Seas from, in particular, dumping of radioactive waste into the sea by Russia in the past

## ***Poland-Ukraine***

### **AGREEMENT ON EARLY NOTIFICATION OF NUCLEAR ACCIDENTS AND INFORMATION EXCHANGE ON NUCLEAR SAFETY AND RADIATION PROTECTION (1993)**

On 24 May 1993, the President of the National Atomic Energy Agency of the Republic of Poland and the President of the State Committee on Nuclear and Radiation Safety of the Republic of Ukraine signed the above Agreement on Early Notification of Nuclear Accidents, Exchange of Information and Co-operation in the Field of Nuclear Safety and Radiation Protection

The Agreement was concluded in implementation of the 1986 IAEA Convention on Early Notification of Nuclear Accidents which both countries have ratified. It also provides for more comprehensive co-operation in the above-mentioned field. In accordance with the Convention, the Parties to the Agreement agree to notify each other forthwith of any accident involving a nuclear installation on their territory from which a radioactive release may occur with an effect of radiological safety significance for the other Party, and will also provide relevant information to minimise radiological consequences.

Furthermore, the Parties have undertaken to encourage and facilitate the development of scientific and technical co-operation between their respective competent authorities and institutions in the nuclear safety and radiation protection field. This will include monitoring of radioactive releases, radiation emergency planning and management of spent nuclear fuel and radioactive waste.

Both States have agreed to apply the Agreement as from the date of its signature, pending its entry into force.

## ***European Communities-Hungary/Poland***

### **EUROPE-AGREEMENTS ON THE ESTABLISHMENT OF AN ASSOCIATION BETWEEN THE EUROPEAN COMMUNITIES AND HUNGARY AND POLAND (1991)**

The Commission of the European Communities and Community Member States concluded two Agreements on 16 December 1991 with Hungary and Poland respectively on the establishment of an Association with those countries. The purpose of the Agreements is to assist them both in a variety of fields, including the nuclear field.

The provisions of the Agreement with Hungary on co-operation in the nuclear field cover

- nuclear safety and protection against nuclear catastrophes,
- radiation protection including environmental protection,
- the nuclear fuel cycle, safe storage and physical protection of nuclear material,
- radioactive waste management,
- decommissioning and removal of nuclear power plants,
- decontamination

The Agreement with Poland covers the same questions as well as improvement of Polish nuclear legislation

## ***MULTILATERAL AGREEMENTS***

### **CONVENTION ON CIVIL LIABILITY FOR DAMAGE RESULTING FROM ACTIVITIES DANGEROUS TO THE ENVIRONMENT**

On 8 March 1993, the Committee of Ministers of the Council of Europe adopted a Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment

The Convention does not apply to *damage caused by a nuclear substance*

- a) arising from a nuclear incident the liability of which is regulated either by the Paris Convention of 29 July 1960 on third party liability in the field of nuclear energy, and its Additional Protocol of 28 January 1964, or the Vienna Convention of 21 May 1963 on civil liability for nuclear damage, or*

*b) if liability for such damage is regulated by a specific internal law, provided that such law is as favourable, with regard to compensation for damage, as any of the instruments referred to under sub-paragraph a) above*

On the other hand, the Convention applies to an incident involving damage caused by a nuclear substance the liability for which is not governed by either the Paris or the Vienna Convention, or an equally favourable national law

### **PREVENTION OF MAJOR INDUSTRIAL ACCIDENTS CONVENTION, 1993**

The above Convention was adopted by the General Conference of the International Labour Office on 17 June 1993

The purpose of the Convention is the prevention of major accidents involving hazardous substances and the limitation of the consequences of such accidents. It applies to major hazard installations which are defined as installations which produce, process, use etc hazardous substances in quantities which exceed the threshold quantity, also as defined in the Convention

Nuclear installations are specifically excluded from the scope of the Convention as follows

*This Convention does not apply to*

*a) nuclear installations and plants processing radioactive substances except for facilities handling non-radioactive substances at these installations,*

## **UNITED NATIONS**

### **GENERAL ASSEMBLY RESOLUTION AND PRINCIPLES RELEVANT TO THE USE OF NUCLEAR POWER SOURCES IN OUTER SPACE (1992)**

#### **47/68 *Principles Relevant to the Use of Nuclear Power Sources in Outer Space***

##### ***The General Assembly,***

***Having considered*** the report of the Committee on the Peaceful Uses of Outer Space on the work of its thirty-fifth session and the text of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space as approved by the Committee and annexed to its report,

***Recognizing*** that for some missions in outer space nuclear power sources are particularly suited or even essential owing to their compactness, long life and other attributes,

***Recognizing also*** that the use of nuclear power sources in outer space should focus on those applications which take advantage of the particular properties of nuclear power sources,

***Recognizing further*** that the use of nuclear power sources in outer space should be based on a thorough safety assessment including probabilistic risk analysis, with particular emphasis on reducing the risk of accidental exposure of the public to harmful radiation or radioactive material,

***Recognizing*** the need, in this respect, for a set of principles containing goals and guidelines to ensure the safe use of nuclear power sources in outer space,

***Affirming*** that this set of Principles applies to nuclear power sources in outer space devoted to the generation of electric power on board space objects for non-propulsive purposes, which have characteristics generally comparable to those of systems used and missions performed at the time of the adoption of the Principles,

**Recognizing** that this set of Principles will require future revision in view of emerging nuclear power applications and of evolving international recommendations on radiological protection,

**Adopts** the Principles Relevant to the Use of Nuclear Power Sources in Outer Space as set forth below

### **Principle 1 Applicability of international law**

Activities involving the use of nuclear power sources in outer space shall be carried out in accordance with international law, including in particular the Charter of the United Nations and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies

### **Principle 2 Use of terms**

1 For the purpose of these Principles, the terms "launching State" and "State launching" mean the State which exercises jurisdiction and control over a space object with nuclear power sources on board at a given point in time relevant to the principle concerned

2 For the purpose of Principle 9, the definition of the term "launching State" as contained in that principle is applicable

3 For the purposes of Principle 3, the terms "foreseeable" and "all possible" describe a class of events or circumstances whose overall probability of occurrence is such that it is considered to encompass only credible possibilities for purposes of safety analysis. The term "general concept of defence-in-depth" when applied to nuclear power sources in outer space refers to the use of design features and mission operations in place of or in addition to active systems, to prevent or mitigate the consequences of system malfunctions. Redundant safety systems are not necessarily required for each individual component to achieve this purpose. Given the special requirements of space use and of varied missions, no particular set of systems or features can be specified as essential to achieve this objective. For the purposes of paragraph 2 (d) of Principle 3, the term "made critical" does not include actions such as zero-power testing which are fundamental to ensuring system safety

### **Principle 3 Guidelines and criteria for safe use**

In order to minimize the quantity of radioactive material in space and the risks involved, the use of nuclear power sources in outer space shall be restricted to those space missions which cannot be operated by non-nuclear energy sources in a reasonable way

1 General goals for radiation protection and nuclear safety

(a) States launching space objects with nuclear power sources on board shall endeavour to protect individuals, populations and the biosphere against radiological hazards. The design and use of space objects with nuclear power sources on board shall

ensure, with a high degree of confidence, that the hazards, in foreseeable operational or accidental circumstances, are kept below acceptable levels as defined in paragraphs 1 (b) and (c)

Such design and use shall also ensure with high reliability that radioactive material does not cause a significant contamination of outer space

(b) During the normal operation of space objects with nuclear power sources on board, including re-entry from sufficiently high orbit as defined in paragraph 2 (b), the appropriate radiation protection objective for the public recommended by the International Commission on Radiological Protection shall be observed. During such normal operation there shall be no significant radiation exposure

(c) To limit exposure in accidents, the design and construction of the nuclear power source systems shall take into account relevant and generally accepted international radiological protection guidelines

Except in cases of low-probability accidents with potentially serious radiological consequences, the design for the nuclear power source systems shall, with a high degree of confidence, restrict radiation exposure to a limited geographical region and to individuals to the principal limit of 1 mSv in a year. It is permissible to use a subsidiary dose limit of 5 mSv in a year for some years, provided that the average annual effective dose equivalent over a lifetime does not exceed the principal limit of 1 mSv in a year

The probability of accidents with potentially serious radiological consequences referred to above shall be kept extremely small by virtue of the design of the system

Future modifications of the guidelines referred to in this paragraph shall be applied as soon as practicable

(d) Systems important for safety shall be designed, constructed and operated in accordance with the general concept of defence-in-depth. Pursuant to this concept, foreseeable safety-related failures or malfunctions must be capable of being corrected or counteracted by an action or a procedure, possibly automatic

The reliability of systems important for safety shall be ensured, inter alia, by redundancy, physical separation, functional isolation and adequate independence of their components

Other measures shall also be taken to raise the level of safety

## 2 Nuclear reactors

(a) Nuclear reactors may be operated

(i) On interplanetary missions,

(ii) In sufficiently high orbits as defined in paragraph 2 (b),

(iii) In low-Earth orbits if they are stored in sufficiently high orbits after the operational part of their missions

(b) The sufficiently high orbit is one in which the orbital lifetime is long enough to allow for a sufficient decay of the fission products to approximately the activity of the actinides. The sufficiently high orbit must be such that the risks to existing and future outer space missions and of collision with other space objects are kept to a minimum. The necessity for the parts of a destroyed reactor also to attain the required decay time before re-entering the Earth's atmosphere shall be considered in determining the sufficiently high orbit altitude.

(c) Nuclear reactors shall use only highly enriched uranium 235 as fuel. The design shall take into account the radioactive decay of the fission and activation products.

(d) Nuclear reactors shall not be made critical before they have reached their operating orbit or interplanetary trajectory.

(e) The design and construction of the nuclear reactor shall ensure that it can not become critical before reaching the operating orbit during all possible events, including rocket explosion, re-entry, impact on ground or water, submersion in water or water intruding into the core.

(f) In order to reduce significantly the possibility of failures in satellites with nuclear reactors on board during operations in an orbit with a lifetime less than in the sufficiently high orbit (including operations for transfer into the sufficiently high orbit), there shall be a highly reliable operational system to ensure an effective and controlled disposal of the reactor.

### **3 Radioisotope generators**

(a) Radioisotope generators may be used for interplanetary missions and other missions leaving the gravity field of the Earth. They may also be used in Earth orbit if, after conclusion of the operational part of their mission, they are stored in a high orbit. In any case ultimate disposal is necessary.

(b) Radioisotope generators shall be protected by a containment system that is designed and constructed to withstand the heat and aerodynamic forces of re-entry in the upper atmosphere under foreseeable orbital conditions, including highly elliptical or hyperbolic orbits where relevant. Upon impact, the containment system and the physical form of the isotope shall ensure that no radioactive material is scattered into the environment so that the impact area can be completely cleared of radioactivity by a recovery operation.

## **Principle 4 Safety assessment**

1 A launching State as defined in Principle 2, paragraph 1, at the time of launch shall, prior to the launch, through co-operative arrangements, where relevant, with those which have designed, constructed or manufactured the nuclear power source, or will operate the space object, or from whose territory or facility such an object will be launched, ensure

that a thorough and comprehensive safety assessment is conducted. This assessment shall cover as well all relevant phases of the mission and shall deal with all systems involved, including the means of launching, the space platform, the nuclear power source and its equipment and the means of control and communication between ground and space.

2 This assessment shall respect the guidelines and criteria for safe use contained in Principle 3.

3 Pursuant to Article XI of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, the results of this safety assessment, together with, to the extent feasible, an indication of the approximate intended time-frame of the launch, shall be made publicly available prior to each launch, and the Secretary-General of the United Nations shall be informed on how States may obtain such results of the safety assessment as soon as possible prior to each launch.

#### **Principle 5 Notification of re-entry**

1 Any State launching a space object with nuclear power sources on board shall in a timely fashion inform States concerned in the event this space object is malfunctioning with a risk of re-entry of radioactive materials to the Earth. The information shall be in accordance with the following format:

(a) System parameters

- (i) Name of launching State or States, including the address of the authority which may be contacted for additional information or assistance in case of accident,
- (ii) International designation,
- (iii) Date and territory or location of launch,
- (iv) Information required for best prediction of orbit lifetime, trajectory and impact region,
- (v) General function of spacecraft,

(b) Information on the radiological risk of nuclear power source(s),

- (i) Type of nuclear power source: radioisotopic/reactor,
- (ii) The probable physical form, amount and general radiological characteristics of the fuel and contaminated and/or activated components likely to reach the ground. The term "fuel" refers to the nuclear material used as the source of heat or power.

This information shall also be transmitted to the Secretary-General of the United Nations



2 The information, in accordance with the format above, shall be provided by the launching State as soon as the malfunction has become known. It shall be updated as frequently as practicable and the frequency of dissemination of the updated information shall increase as the anticipated time of re-entry into the dense layers of the Earth's atmosphere approaches so that the international community will be informed of the situation and will have sufficient time to plan for any national response activities deemed necessary.

3 The updated information shall also be transmitted to the Secretary-General of the United Nations with the same frequency.

#### **Principle 6 Consultations**

States providing information in accordance with Principle 5 shall, as far as reasonably practicable, respond promptly to requests for further information or consultations sought by other States.

#### **Principle 7 Assistance to States**

1 Upon the notification of an expected re-entry into the Earth's atmosphere of a space object containing a nuclear power source on board and its components, all States possessing space monitoring and tracking facilities, in the spirit of international cooperation, shall communicate the relevant information that they may have available on the malfunctioning space object with a nuclear power source on board to the Secretary-General of the United Nations and the State concerned as promptly as possible to allow States that might be affected to assess the situation and take any precautionary measures deemed necessary.

2 After re-entry into the Earth's atmosphere of a space object containing a nuclear power source on board and its components

(a) The launching State shall promptly offer and, if requested by the affected State, provide promptly the necessary assistance to eliminate actual and possible harmful effects, including assistance to identify the location of the area of impact of the nuclear power source on the Earth's surface, to detect the re-entered material and to carry out retrieval or clean-up operations,

(b) All States, other than the launching State, with relevant technical capabilities and international organizations with such technical capabilities shall, to the extent possible, provide necessary assistance upon request by an affected State.

In providing the assistance in accordance with subparagraphs (a) and (b) above, the special needs of developing countries shall be taken into account.

### **Principle 8 Responsibility**

In accordance with Article VI of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, States shall bear international responsibility for national activities involving the use of nuclear power sources in outer space, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that such national activities are carried out in conformity with that Treaty and the recommendations contained in these Principles. When activities in outer space involving the use of nuclear power sources are carried on by an international organization, responsibility for compliance with the aforesaid Treaty and the recommendations contained in these Principles shall be borne both by the international organization and by the States participating in it.

### **Principle 9 Liability and compensation**

1 In accordance with Article VII of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, and the provisions of the Convention on International Liability for Damage Caused by Space Objects, each State which launches or procures the launching of a space object and each State from whose territory or facility a space object is launched shall be internationally liable for damage caused by such space objects or their component parts. This fully applies to the case of such a space object carrying a nuclear power source on board. Whenever two or more States jointly launch such a space object, they shall be jointly and severally liable for any damage caused, in accordance with Article V of the above-mentioned Convention.

2 The compensation that such States shall be liable to pay under the aforesaid Convention for damage shall be determined in accordance with international law and the principles of justice and equity, in order to provide such reparation in respect of the damage as will restore the person, natural or juridical, State or international organization on whose behalf a claim is presented to the condition which would have existed if the damage had not occurred.

3 For the purposes of this Principle, compensation shall include reimbursement of the duly substantiated expenses for search, recovery and clean-up operations, including expenses for assistance received from third parties.

### **Principle 10 Settlement of disputes**

Any dispute resulting from the application of these Principles shall be resolved through negotiations or other established procedures for the peaceful settlement of disputes, in accordance with the Charter of the United Nations.

### **Principle 11 Review and revision**

These principles shall be reopened for revision by the Committee on the Peaceful Uses of Outer Space no later than two years after their adoption.

# BIBLIOGRAPHY

## **NETHERLANDS**

***The International Law of Nuclear Energy - Basic Documents, edited by M ElBaradei, E I. Nwogugu, J M Rames, Martinus Nijhoff Publishers, Dordrecht, Netherlands, 1993, 2 vols , 2148 pages***

This book was edited by Mohammed ElBaradei, Assistant Director General, responsible for the Division of External Relations of the International Atomic Energy Agency, Edwin Nwogugu and James Rames, both members of the IAEA Legal Division. This compilation provides a collection of basic documents relating to the international law of nuclear energy. The series of introductions to each Part facilitate the understanding of the documents and their context.

International organisations have been the focal point for the development of international nuclear law and the constituent instruments of those involved with the use of nuclear energy are reproduced in Part I (for example, the Statutes of the IAEA, the OECD Nuclear Energy Agency, the Treaty establishing the European Atomic Energy Community).

The other Parts cover the concerns of the international community, namely that nuclear energy is used safely and peacefully. The main texts applied to meet those concerns are reproduced as follows: Part II covers the Safe Use of Nuclear Energy (ie radiation protection, nuclear safety, waste management, civil liability, emergency assistance); Part III contains the texts to ensure that nuclear materials and facilities are protected against theft and sabotage (Physical Protection) while Part IV deals with those concerning armed attack against nuclear installations. Parts V and VI cover respectively the Peaceful Uses of Nuclear Energy, that is, safeguards and the different related Treaties and the IAEA Verification under Chapter VII of the UN Charter. Finally, Part VII contains a selected bibliography.

This publication is a very useful guide and reference book for all those working in the field of international law and the regulation of the use of nuclear energy including government officials, scholars and lawyers.

## **POLAND**

***Liability for Nuclear Damage - an International Perspective, by J. Lopuski, National Atomic Energy Agency, Warsaw, 1993, 69 pages***

This book deals with some of the complex issues of liability and compensation for nuclear damage which were considered in the course of the work of the International Atomic Energy Agency (IAEA) on the revision of the Vienna Convention on Civil Liability for Nuclear Damage. The personal reflections of the author on the revision exercise are presented, based on his participation in this work in 1989-1992. The documents of the IAEA Standing Committee on Nuclear Liability are referred to and the different aspects of the revision exercise are analysed, such as the transboundary effects of nuclear incidents, the Paris/Brussels Conventions' concept of tiers of compensation in relation to the Vienna Convention, international state liability, etc.

The IAEA's work on liability for nuclear damage was initiated in the wake of the impact of the Chernobyl accident. The issues of international state liability and compensation for an accident with transboundary effects were raised. The author reflects that humanitarian ideas were confronted with calculation of the cost of financial protection for victims and the unwillingness of some states to assume liability, and conflicts of interest appeared between countries with a nuclear programme and those without. He points out that after three years of discussion, no wide consensus has yet been reached on certain basic issues such as the relationship between international state and civil liability regimes, the concept of nuclear damage, compensation limits, the role of public funds.

The author presents his approach to these controversial issues and attempts to provide a theoretical outline of future international legislation on nuclear liability.

## **IAEA**

***Safety Culture, a Report by the International Nuclear Safety Advisory Group, Safety Series No 75-INSAG-4, IAEA, Vienna, 1991, 31 pages and The Safety of Nuclear Installations - Safety Fundamentals, Safety Series No 110, IAEA, Vienna, 1993, 26 pages***

These reports belong to the IAEA's series of publications on the different aspects of nuclear safety and provide overall guidance on the methods and principles to be applied to achieve that objective.

The concept of "Safety Culture" was first introduced in INSAG's *Summary Report on the Post-Accident Review Meeting on the Chernobyl Accident*, published in 1986 as Safety Series No 75-INSAG-1 and further expanded on in *Basic Safety Principles for Nuclear*

*Power Plants* in 1988 (No 75-INSAG-3) Since then, the term Safety Culture has been used increasingly in connection with nuclear plant safety

**Report No 75-INSAG-4** deals with the concept of safety culture as it relates to organisations 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 It has been prepared for use by governmental authorities and by the nuclear industry and is intended to promote practical action at all levels to enhance safety

The report on the **Safety of Nuclear Installations** (Safety Series No 110), a Safety Fundamentals publication, defines the fundamental safety principles which, when effectively applied, contribute to the reduction to very low levels of any detrimental effects from the use of nuclear technology

It sets out basic objectives, concepts and principles for ensuring safety that can be used both by the IAEA in its international assistance operations and by Member States in their national nuclear programmes Guidance on the application of these fundamental safety principles is given in the Agency's Safety Series publications

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**INFORMATION BY SUBJECT**

Please enumerate by order of interest

- General Legislation/Organisation and Structure
- Radiation Protection
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