

**CODE OF CONDUCT ON
THE SAFETY AND SECURITY OF
RADIOACTIVE SOURCES**

放射源安全和保安行为准则

**CODE DE CONDUITE SUR
LA SÛRETÉ ET LA SÉCURITÉ
DES SOURCES RADIOACTIVES**

**КОДЕКС ПОВЕДЕНИЯ ПО
ОБЕСПЕЧЕНИЮ БЕЗОПАСНОСТИ И
СОХРАННОСТИ РАДИОАКТИВНЫХ
ИСТОЧНИКОВ**

**CÓDIGO DE CONDUCTA
SOBRE SEGURIDAD TECNOLÓGICA
Y FÍSICA DE LAS FUENTES
RADIATIVAS**

مدونة قواعد السلوك بشأن أمان المصادر
المتشعة وأمنها



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RADIOACTIVE SOURCES

INTERNATIONAL ATOMIC ENERGY AGENCY

FOREWORD

This Code of Conduct on the Safety and Security of Radioactive Sources was approved by the Board of Governors of the International Atomic Energy Agency (IAEA) on 8 September 2003. It replaces the version published (with the symbol IAEA/CODEOC/2001) by the IAEA in March 2001. It reflects the important findings produced by the *International Conference on Security of Radioactive Sources* held in Vienna in March 2003 (the Hofburg Conference).

The G-8 annual summit held in Evian, France, in June 2003 issued a statement on “non-proliferation of weapons of mass destruction — securing radioactive sources” in which it encouraged all countries to strengthen controls on radioactive sources and observe the Code of Conduct.¹

The Code of Conduct marks the culmination of developments and efforts spanning the past several years that are described below.

The International Conference on the Safety of Radiation Sources and Security of Radioactive Materials held in Dijon, France, in September 1998 produced findings in the light of which the IAEA’s Board of Governors requested the Secretariat to the IAEA to prepare an action plan.

The action plan subsequently approved by the Board of Governors, in September 1999, called for the development of a Code of Conduct on the Safety and Security of Radioactive Sources. In September 2000, the Board of Governors took note of the Code, and the General Conference invited IAEA Member States to take note of it and to consider, as appropriate, means of ensuring its wide application.

International support for the Code was soon expressed at the International Conference of National Regulatory Authorities with Competence in the Safety of Radiation Sources and the Security of Radioactive Material held in Buenos Aires in December 2000. The Buenos Aires Conference called upon States to provide for the application and implementation of the Code.²

¹ The G-8 also issued an action plan in which it lent its political support to the IAEA in connection with the Code.

² Further support for the Code was expressed in April 2001 by the First Africa Workshop on the Establishment of a Legal Framework Governing Radiation Protection, the Safety of Radiation Sources and the Safe Management of Radioactive Waste. The workshop, held in Addis Ababa, adopted a “Common Position” in which it called upon the IAEA to “create a forum for African countries to consider the Code of Conduct on the Safety and Security of Radioactive Materials, and give it a legally binding effect so that the safe and peaceful use of nuclear technology is not compromised”.

In 2001, the Secretariat, taking into account — inter alia — the major findings of the Buenos Aires Conference and the “Common Position”², produced a Revised Action Plan for the Safety and Security of Radiation Sources (the Revised Action Plan, approved by the Board of Governors on 10 September 2001). The Revised Action Plan called for the Secretariat to consult Member States on their experience in implementing the Code. The effectiveness of the Code was therefore reviewed at a meeting of technical and legal experts in August 2002. At that meeting, the Code’s provisions relating to the security of sources were strengthened in the light of the events of 11 September 2001 and consensus was reached on a number of previously unresolved issues. It was recognized that further work was needed, however, especially in relation to the scope of the Code. A draft revised Code was made available to the Board of Governors and the General Conference in an IAEA document issued in August 2002.

At a second meeting of technical and legal experts, held in March 2003, changes were made to some of the definitions in the Code and language encouraging the harmonization of the formats of national registers of radioactive sources was added. Also, progress was made towards defining the scope of the Code and with regard to the inclusion of provisions relating to import and export controls. As final consensus was not reached, however, the experts agreed that the resulting text should be circulated to all IAEA Member States for comment.

Besides being circulated to all IAEA Member States, the text was made available to the Hofburg Conference. The Findings of the Conference’s President included a recommendation that States make a concerted effort to follow the principles contained in the Code, which was currently being revised.

Finally, at a third meeting of technical and legal experts, held in July 2003, consensus was reached on the scope of the revised Code and on the revised Code’s text.

On 19 September 2003, following approval of the revised Code by the Board of Governors, the General Conference, having welcomed the Board’s decision, urged each State to write to the Director General stating:

- that it fully supports and endorses the IAEA’s efforts to enhance the safety and security of radioactive sources; and
- that it is working towards following the guidance contained in the revised Code.

In addition, it requested the Director General, subject to the availability of resources, to compile, maintain and publish a list of States that make a political commitment by writing to him as urged by the General Conference.

Although the vast majority of radioactive sources used around the world are managed safely and securely, and bring many benefits to humankind, accidents

involving radioactive sources have occurred, some with serious — even fatal — consequences, and in the 1990s there was growing concern about radioactive sources that for one reason or another were not subject to regulatory control or over which regulatory control had been lost. The IAEA Secretariat expects that implementation of this Code of Conduct will help national authorities to ensure that radioactive sources are used within an appropriate framework of radiation safety and security.

THE IAEA'S MEMBER STATES

Noting that radioactive sources are used throughout the world for a wide variety of beneficial purposes, e.g. in industry, medicine, research, agriculture and education,

Aware that the use of these radioactive sources involves risks due to potential radiation exposure,

Recognizing the need to protect individuals, society and the environment from the harmful effects of possible accidents and malicious acts involving radioactive sources,

Noting that ineffective, interrupted or sporadic regulatory or management control of radioactive sources has led to serious accidents, or malicious acts, or to the existence of orphan sources,

Aware that the risks arising from such incidents must be minimized and protected against through the application of appropriate radiation safety and security standards,

Recognizing the importance of fostering a safety and security culture in all organizations and among all individuals engaged in the regulatory control or the management of radioactive sources,

Recognizing the need for effective and continuous regulatory control, in particular to reduce the vulnerability of radioactive sources during transfers, within and between States,

Recognizing that States should take due care in authorizing exports, particularly because a number of States may lack appropriate infrastructure for the safe management and secure protection of radioactive sources, and that States should make efforts to harmonize their systems of export control of radioactive sources,

Recognizing the need for technical facilities, including appropriate equipment and qualified staff, to ensure the safe management and secure protection of radioactive sources,

Noting that the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources contain recommendations for protection against exposure to ionizing radiation and for the safety and security of radioactive sources,

Recalling the IAEA's Safety Requirements document on Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety,

Taking account of the provisions of the Convention on Early Notification of a Nuclear Accident (1986) and of the provisions of the Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency (1986),

Taking account of the provisions of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997), in particular those provisions which relate to the transboundary movement of radioactive waste and to the possession, remanufacturing or disposal of disused sealed sources,

Recognizing that, while unsealed radioactive material is excluded from this Code, there may be circumstances where it should be managed in accordance with the objectives of this Code,

Recognizing the global role of the IAEA in the area of the safety and security of radioactive sources,

Taking account of the IAEA's categorization of radioactive sources, currently found in IAEA-TECDOC-1344 entitled "Categorization of radioactive sources", while recognizing that TECDOC-1344 is based on deterministic health effects and does not fully take into account the range of impacts that could result from accidents or malicious acts involving radioactive sources, and

Taking account of the approval by the Board of Governors of the activities regarding protection against nuclear terrorism proposed to it in March 2002, including activities relating to the security of radioactive material other than nuclear material,

DECIDE that the following Code of Conduct should serve as guidance to States for — *inter alia* — the development and harmonization of policies, laws and regulations on the safety and security of radioactive sources.

I. DEFINITIONS

1. For the purposes of this Code:

“authorization” means a permission granted in a document by a regulatory body to a natural or legal person who has submitted an application to manage a radioactive source. The authorization can take the form of a registration, a licence or alternative effective legal control measures which achieve the objectives of the Code.

“disposal” means the emplacement of radioactive sources in an appropriate facility without the intention of retrieval.

“disused source” means a radioactive source which is no longer used, and is not intended to be used, for the practice for which an authorization has been granted.

“management” means the administrative and operational activities that are involved in the manufacture, supply, receipt, possession, storage, use, transfer, import, export, transport, maintenance, recycling or disposal of radioactive sources.

“orphan source” means a radioactive source which is not under regulatory control, either because it has never been under regulatory control, or because it has been abandoned, lost, misplaced, stolen or transferred without proper authorization.

“radioactive source” means radioactive material that is permanently sealed in a capsule or closely bonded, in a solid form and which is not exempt from regulatory control. It also means any radioactive material released if the radioactive source is leaking or broken, but does not mean material encapsulated for disposal, or nuclear material within the nuclear fuel cycles of research and power reactors.

“regulatory body” means an entity or organization or a system of entities or organizations designated by the government of a State as having legal authority for exercising regulatory control with respect to radioactive sources, including issuing authorizations, and thereby regulating one or more aspects of the safety or security of radioactive sources.

“regulatory control” means any form of control or regulation applied to facilities or activities by a regulatory body for reasons related to radiation protection or to the safety or security of radioactive sources.

“safety” means measures intended to minimize the likelihood of accidents involving radioactive sources and, should such an accident occur, to mitigate its consequences.

“safety culture” means the assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, protection and safety issues receive the attention warranted by their significance.

“security” means measures to prevent unauthorized access or damage to, and loss, theft or unauthorized transfer of, radioactive sources.

“security culture” means characteristics and attitudes in organizations and of individuals which establish that security issues receive the attention warranted by their significance.

“storage” means the holding of radioactive sources in a facility that provides for their containment with the intention of retrieval.

II. SCOPE AND OBJECTIVES

2. This Code applies to all radioactive sources that may pose a significant risk to individuals, society and the environment, that is the sources referred to in Annex I of this Code. States should also devote appropriate attention to the regulation of other potentially harmful radioactive sources.
3. This Code does not apply to nuclear material as defined in the Convention on the Physical Protection of Nuclear Material, except for sources incorporating plutonium-239.
4. This Code does not apply to radioactive sources within military or defence programmes.
5. (a) The objectives of this Code are, through the development, harmonization and implementation of national policies, laws and regulations, and through the fostering of international co-operation, to:
 - (i) achieve and maintain a high level of safety and security of radioactive sources;
 - (ii) prevent unauthorized access or damage to, and loss, theft or unauthorized transfer of, radioactive sources, so as to reduce the likelihood of accidental harmful exposure to such sources or the malicious use of such sources to cause harm to individuals, society or the environment; and

- (iii) mitigate or minimize the radiological consequences of any accident or malicious act involving a radioactive source.
 - (b) These objectives should be achieved through the establishment of an adequate system of regulatory control of radioactive sources, applicable from the stage of initial production to their final disposal, and a system for the restoration of such control if it has been lost.
- 6. This Code relies on existing international standards relating to nuclear, radiation, radioactive waste and transport safety and to the control of radioactive sources. It is intended to complement existing international standards in these areas.

III. BASIC PRINCIPLES

GENERAL

- 7. Every State should, in order to protect individuals, society and the environment, take the appropriate measures necessary to ensure:
 - (a) that the radioactive sources within its territory, or under its jurisdiction or control, are safely managed and securely protected during their useful lives and at the end of their useful lives; and
 - (b) the promotion of safety culture and of security culture with respect to radioactive sources.
- 8. Every State should have in place an effective national legislative and regulatory system of control over the management and protection of radioactive sources. Such a system should:
 - (a) place the prime responsibility for the safe management of, and the security of, radioactive sources on the persons being granted the relevant authorizations;
 - (b) minimize the likelihood of a loss of control;
 - (c) include national strategies for gaining or regaining control over orphan sources;
 - (d) provide for rapid response for the purpose of regaining control over orphan sources;
 - (e) foster ongoing communication between the regulatory body and users;

- (f) provide for measures to reduce the likelihood of malicious acts, including sabotage, consistent with the threat defined by the State;
 - (g) mitigate or minimize the radiological consequences of accidents or malicious acts involving radioactive sources; and.
 - (h) provide for its own continuous improvement.
9. Every State should ensure that appropriate facilities and services for radiation protection, safety and security are available to, and used by, the persons who are authorized to manage radioactive sources. Such facilities and services should include, but are not limited to, those needed for:
- (a) searching for missing sources and securing found sources;
 - (b) intervention in the event of an accident or malicious act involving a radioactive source;
 - (c) personal dosimetry and environmental monitoring; and
 - (d) the calibration of radiation monitoring equipment.
10. Every State should ensure that adequate arrangements are in place for the appropriate training of the staff of its regulatory body, its law enforcement agencies and its emergency services organizations.
11. Every State should establish a national register of radioactive sources. This register should, as a minimum, include Category 1 and 2 radioactive sources as described in Annex 1 to this Code. The information contained in that register should be appropriately protected. For the purpose of introducing efficiency in the exchange of radioactive source information between States, States should endeavour to harmonize the formats of their registers.
12. Every State should ensure that information concerning any loss of control over radioactive sources, or any incidents, with potential transboundary effects involving radioactive sources, is provided promptly to potentially affected States through established IAEA or other mechanisms.
13. Every State should:
- (a) promote awareness among industry, health professionals, the public, and government bodies of the safety and security hazards associated with orphan sources; and
 - (b) encourage bodies and persons likely to encounter orphan sources during the course of their operations (such as scrap metal recyclers

and customs posts) to implement appropriate monitoring programmes to detect such sources.

14. Every State should encourage the reuse or recycling of radioactive sources, when practicable and consistent with considerations of safety and security.
15. Every State should, in implementing this Code, emphasize to designers, manufacturers (both manufacturers of radioactive sources and manufacturers of devices in which radioactive sources are incorporated), suppliers and users and those managing disused sources their responsibilities for the safety and security of radioactive sources.
16. Every State should define its domestic threat, and assess its vulnerability with respect to this threat for the variety of sources used within its territory, based on the potential for loss of control and malicious acts involving one or more radioactive sources.
17. Each State should take appropriate measures consistent with its national law to protect the confidentiality of any information that it receives in confidence under this Code of Conduct from another State or through participation in an activity carried out for the implementation of this Code of Conduct. If any State provides information to international organizations in confidence, steps should be taken to ensure that the confidentiality of such information is protected. A State that has received information in confidence from another State should only provide this information to third parties with the consent of that other State. A State is not expected to provide any information that it is not permitted to communicate pursuant to its national law or which would jeopardize the security of that State.

LEGISLATION AND REGULATIONS

18. Every State should have in place legislation and regulations that:
 - (a) prescribe and assign governmental responsibilities to assure the safety and security of radioactive sources;
 - (b) provide for the effective control of radioactive sources;
 - (c) specify the requirements for protection against exposure to ionizing radiation; and
 - (d) specify the requirements for the safety and security of radioactive sources and of the devices in which sources are incorporated.

19. Such legislation and/or regulations should provide for, in particular:
- (a) the establishment of a regulatory body whose regulatory functions are effectively independent of other functions with respect to radioactive sources, such as the management of radioactive sources or the promotion of the use of radioactive sources. This body should have the powers and characteristics listed in paragraphs 20 to 22;
 - (b) measures to protect individuals, society and the environment from the deleterious effects of ionizing radiation from radioactive sources;
 - (c) administrative requirements relating to the authorization of the management of radioactive sources;
 - (d) provisions for exemption, as appropriate, from the administrative requirements referred to in paragraph (c) above;
 - (e) administrative requirements relating to notifications to the regulatory body of actions involved in the management of radioactive sources that may engender a significant risk to individuals, society or the environment;
 - (f) managerial requirements relating in particular to the establishment of adequate policies, procedures and measures for the control of radioactive sources;
 - (g) requirements for security measures to deter, detect and delay the unauthorized access to, or the theft, loss or unauthorized use or removal of radioactive sources during all stages of management;
 - (h) requirements relating to the verification of the safety and security of radioactive sources, through safety and security assessments, monitoring and verification of compliance, and the maintenance of appropriate records; and
 - (i) the capacity to take appropriate enforcement actions.

REGULATORY BODY

20. Every State should ensure that the regulatory body established by its legislation has the authority to:
- (a) establish regulations and issue guidance relating to the safety and security of radioactive sources;
 - (b) require those who intend to manage radioactive sources to seek an authorization, and to submit:

- (i) a safety assessment; and
- (ii) a security plan or assessment as appropriate

for the source and/or the facility in which the source is to be managed, if deemed necessary in the light of the risks posed and, in the case of security, the current national threat assessment;

- (c) obtain all relevant information from an applicant for an authorization;
- (d) issue, amend, suspend or revoke, as necessary, authorizations for the management of radioactive sources.
- (e) attach clear and unambiguous conditions to the authorizations issued by it, including conditions relating to:
 - (i) responsibilities;
 - (ii) minimum operator competencies;
 - (iii) minimum design and performance criteria, and maintenance requirements for radioactive sources and the devices in which they are incorporated;
 - (iv) minimum performance criteria and maintenance requirements for equipment and systems used to ensure the safety and security of radioactive sources;
 - (v) requirements for emergency procedures and communication links;
 - (vi) work procedures to be followed;
 - (vii) the safe and secure management of disused sources, including, where applicable, agreements regarding the return of disused sources to a supplier;
 - (viii) measures to determine, as appropriate, the trustworthiness of individuals involved in the management of radioactive sources; and
 - (ix) the confidentiality of information relating to the security of sources;
- (f) obtain any relevant and necessary information from a person with an authorization, in particular if that is warranted by revised safety or security assessments;
- (g) require those supplying or transferring radioactive sources or devices incorporating radioactive sources to provide the recipient with all relevant technical information to permit their safe and secure management.

- (h) enter premises in order to undertake inspections for the verification of compliance with regulatory requirements;
- (i) enforce regulatory requirements;
- (j) monitor, or request other authorized bodies to monitor, at appropriate checkpoints for the purpose of detecting orphan sources;
- (k) ensure that corrective actions are taken when a radioactive source is in an unsafe or non-secure condition;
- (l) provide, on a case-by-case basis, to a person with an authorization and the public any information that is deemed necessary in order to protect individuals, society and the environment;
- (m) liaise and co-ordinate with other governmental bodies and with relevant non-governmental bodies in all areas relating to the safety and security of radioactive sources;
- (n) liaise with regulatory bodies of other countries and with international organizations to promote co-operation and the exchange of regulatory information;
- (o) establish criteria for intervention in emergency situations;
- (p) ensure that radioactive sources are stored in facilities appropriate for the purpose of such storage; and
- (q) ensure that, where disused sources are stored for extended periods of time, the facilities in which they are stored are fit for that purpose.

21. Every State should ensure that its regulatory body:

- (a) is staffed by qualified personnel;
- (b) has the financial resources and the facilities and equipment necessary to undertake its functions in an effective manner; and
- (c) is able to draw upon specialist resources and expertise from other relevant governmental agencies.

22. Every State should ensure that its regulatory body:

- (a) establishes procedures for dealing with applications for authorization;
- (b) ensures that arrangements are made for the safe management and secure protection of radioactive sources, including financial provisions where appropriate, once they have become disused;
- (c) maintains appropriate records of persons with authorizations in respect of radioactive sources, with a clear indication of the type(s) of radioactive sources that they are authorized to use, and appropriate records of the transfer and disposal of the radioactive sources on termination of the authorizations. These records should be properly

- secured against unauthorized access or alteration, and back-up copies should be made;
- (d) promotes the establishment of a safety culture and of a security culture among all individuals and in all bodies involved in the management of radioactive sources;
 - (e) establishes systems for ensuring that, where practicable, both radioactive sources and their containers, are marked by users with an appropriate sign to warn members of the public of the radiation hazard, but where this is not practicable, at least the container is so marked;
 - (f) establishes systems for ensuring that the areas where radioactive sources are managed are marked by users with appropriate signs to warn workers or members of the public, as applicable, of the radiation hazard;
 - (g) establishes systems for ensuring that, where practicable, radioactive sources are identifiable and traceable, or where this is not practicable, ensures that alternative processes for identifying and tracing those sources are in place;
 - (h) ensures that inventory controls are conducted on a regular basis by persons with authorizations;
 - (i) carries out both announced and unannounced inspections at an appropriate frequency taking into account past performance and the risks presented by the radioactive source;
 - (j) takes enforcement actions, as appropriate, to ensure compliance with regulatory requirements;
 - (k) ensures that the regulatory principles and criteria remain adequate and valid and take into account, as applicable, operating experience and internationally endorsed standards and recommendations;
 - (l) requires the prompt reporting by authorized persons of loss of control over, and of incidents in connection with, radioactive sources;
 - (m) provides guidance on appropriate levels of information, instruction and training on the safety and security of radioactive sources and the devices or facilities in which they are housed, to manufacturers, suppliers and users of radioactive sources;
 - (n) requires authorized persons to prepare emergency plans, as appropriate;
 - (o) is prepared, or has established provisions, to recover and restore appropriate control over orphan sources, and to deal with radiological emergencies and has established appropriate response plans and measures;

- (p) is prepared in respect of orphan sources that may have originated within the State to assist in obtaining technical information relating to their safe and secure management.

IMPORT AND EXPORT OF RADIOACTIVE SOURCES

- 23. Every State involved in the import or export of radioactive sources should take appropriate steps to ensure that transfers are undertaken in a manner consistent with the provisions of the Code and that transfers of radioactive sources in Categories 1 and 2 of Annex 1 of this Code take place only with the prior notification by the exporting State and, as appropriate, consent by the importing State in accordance with their respective laws and regulations.
- 24. Every State intending to authorize the import of radioactive sources in Categories 1 and 2 of Annex 1 to this Code should consent to their import only if the recipient is authorized to receive and possess the source under its national law and the State has the appropriate technical and administrative capability, resources and regulatory structure needed to ensure that the source will be managed in a manner consistent with the provisions of this Code.
- 25. Every State intending to authorize the export of radioactive sources in Categories 1 and 2 of Annex 1 to this Code should consent to its export only if it can satisfy itself, insofar as practicable, that the receiving State has authorized the recipient to receive and possess the source and has the appropriate technical and administrative capability, resources and regulatory structure needed to ensure that the source will be managed in a manner consistent with the provisions of this Code.
- 26. If the conditions in paragraphs 24 and 25 with respect to a particular import or export cannot be satisfied, that import or export may be authorized in exceptional circumstances with the consent of the importing State if an alternative arrangement has been made to ensure the source will be managed in a safe and secure manner.
- 27. Every State should allow for re-entry into its territory of disused radioactive sources if, in the framework of its national law, it has accepted that they be returned to a manufacturer authorized to manage the disused sources.
- 28. Every State which authorizes the import or export of a radioactive source should take appropriate steps to ensure that such import or export is

conducted in a manner consistent with existing relevant international standards relating to the transport of radioactive materials.

29. Although not subject to the authorization procedures outlined in paragraphs 24 and 25 above, the transport of radioactive sources through the territory of a transit or transshipment state should be conducted in a manner consistent with existing relevant international standards relating to the transport of radioactive materials, in particular paying careful attention to maintaining continuity of control during international transport.

ROLE OF THE IAEA

30. The IAEA should:
 - (a) continue to collect and disseminate information on laws, regulations and technical standards relating to the safe management and secure protection of radioactive sources, develop and establish relevant technical standards and provide for the application of these standards at the request of any State, inter alia by advising and assisting on all aspects of the safe management and secure protection of radioactive sources;
 - (b) disseminate this Code and related information widely; and
 - (c) in particular, implement the measures approved by its policy-making organs.

DISSEMINATION OF THE CODE

31. Every State should, as appropriate, inform persons involved in the management of radioactive sources, such as industry, health professionals, and government bodies, and the public, of the measures it has taken to implement this Code, and should take steps to disseminate that information.

ANNEX I: LIST OF SOURCES COVERED BY THE CODE

Category 1 sources, if not safely managed or securely protected would be likely to cause permanent injury to a person who handled them, or were otherwise in contact with them, for more than a few minutes. It would probably be fatal to be close to this amount of unshielded material for a period of a few minutes to an hour. These sources are typically used in practices such as radiothermal generators, irradiators and radiation teletherapy.

Category 2 sources, if not safely managed or securely protected, could cause permanent injury to a person who handled them, or were otherwise in contact with them, for a short time (minutes to hours). It could possibly be fatal to be close to this amount of unshielded radioactive material for a period of hours to days. These sources are typically used in practices such as industrial gamma radiography, high dose rate brachytherapy and medium dose rate brachytherapy.

Category 3 sources, if not safely managed or securely protected, could cause permanent injury to a person who handled them, or were otherwise in contact with them, for some hours. It could possibly — although it is unlikely — be fatal to be close to this amount of unshielded radioactive material for a period of days to weeks. These sources are typically used in practices such as fixed industrial gauges involving high activity sources (for example, level gauges, dredger gauges, conveyor gauges and spinning pipe gauges) and well logging.

Table I provides a categorization by activity levels for radionuclides that are commonly used. These are based on D-values which define a dangerous source i.e.: a source that could, if not under control, give rise to exposure sufficient to cause severe deterministic effects. A more complete listing of radionuclides and associated activity levels corresponding to each category, and a fuller explanation of the derivation of the D-values, may be found in TECDOC-1344, which also provides the underlying methodology that could be applied to radionuclides not listed. Typical source uses are noted above for illustrative purposes only.

In addition to these categories, States should give appropriate attention to radioactive sources considered by them to have the potential to cause unacceptable consequences if employed for malicious purposes, and to aggregations of lower activity sources (as defined by TECDOC 1344) which require management under the principles of this Code.

TABLE I. ACTIVITIES CORRESPONDING TO THRESHOLDS OF CATEGORIES

Radionuclide	Category 1		Category 2		Category 3	
	1000 x D		10 x D		D	
	(TBq)	(Ci) ^a	(TBq)	(Ci) ^a	(TBq)	(Ci) ^a
Am-241	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Am-241/Be	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Cf-252	2.E+01	5.E+02	2.E-01	5.E-00	2.E-02	5.E-01
Cm-244	5.E+01	1.E+03	5.E-01	1.E+01	5.E-02	1.E+00
Co-60	3.E+01	8.E+02	3.E-01	8.E+00	3.E-02	8.E-01
Cs-137	1.E+02	3.E+03	1.E+00	3.E+01	1.E-01	3.E+00
Gd-153	1.E+03	3.E+04	1.E+01	3.E+02	1.E+00	3.E+01
Ir-192	8.E+01	2.E+03	8.E-01	2.E+01	8.E-02	2.E+00
Pm-147	4.E+04	1.E+06	4.E+02	1.E+04	4.E+01	1.E+03
Pu-238	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Pu-239 ^b /Be	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Ra-226	4.E+01	1.E+03	4.E-01	1.E+01	4.E-02	1.E+00
Se-75	2.E+02	5.E+03	2.E+00	5.E+01	2.E-01	5.E+00
Sr-90 (Y-90)	1.E+03	3.E+04	1.E+01	3.E+02	1.E+00	3.E+01
Tm-170	2.E+04	5.E+05	2.E+02	5.E+03	2.E+01	5.E+02
Yb-169	3.E+02	8.E+03	3.E+00	8.E+01	3.E-01	8.E+00

Au-198*	2.E+02	5.E+03	2.E+00	5.E+01	2.E-01	5.E+00
Cd-109*	2.E+04	5.E+05	2.E+02	5.E+03	2.E+01	5.E+02
Co-57*	7.E+02	2.E+04	7.E+00	2.E+02	7.E-01	2.E+01
Fe-55*	8.E+05	2.E+07	8.E+03	2.E+05	8.E+02	2.E+04
Ge-68*	7.E+02	2.E+04	7.E+00	2.E+02	7.E-01	2.E+01
Ni-63*	6.E+04	2.E+06	6.E+02	2.E+04	6.E+01	2.E+03
Pd-103*	9.E+04	2.E+06	9.E+02	2.E+04	9.E+01	2.E+03
Po-210*	6.E+02	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Ru-106 (Rh-106)*	3.E+02	8.E+03	3.E+00	8.E+01	3.E-01	8.E+00
Tl-204*	2.E+04	5.E+05	2.E+02	5.E+03	2.E+01	5.E+02

* These radionuclides are very unlikely to be used in individual radioactive sources with activity levels that would place them within Categories 1, 2 or 3 and would therefore not be subject to the paragraph relating to national registries (11) or the paragraphs relating to import and export control (23 to 26).

^a The primary values to be used are given in TBq. Curie values are provided for practical usefulness and are rounded after conversion.

^b Criticality and safeguard issues will need to be considered for multiples of D.