



THE REGULATORY CONTROL OF RADIOACTIVE SOURCES IN ARGENTINA

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Abstract

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Argentina has been conducting nuclear activities for more than forty years, and had established a Regulatory Authority as early as in 1956. Procedures for compliance monitoring and enforcement have been in use in the regulatory control of radioactive sources, and regulatory standards and regulations were in force in Argentina before the accident in Goiânia.

The conclusions drawn from the Goiânia accident encouraged the Argentine authorities to improve some regulatory procedures and helped to enhance the quality of the regulatory process. As a result, the effectiveness of the control of spent radioactive sources has gradually increased, and enforcement actions to prevent radioactive sources ending up in the public domain have improved.

Lessons learned in Argentina from the accident in Goiânia are presented as well as the main characteristics of an effective enforcement programme to prevent radiological accidents when radioactive sources are used for industrial, medical, research and teaching purposes.

1. INTRODUCTION

The radiological accident in Goiânia in 1987 [1] confronted the regulatory bodies with the necessity of a thorough revision of their strategies to deal with the problem of spent radioactive sources [2]. Lessons have been learnt from accidents such as those which occurred in Goiânia [3, 4] and Ciudad Juarez [5]. Other accidents involved patients in medical institutions (Zaragoza [6] and recently Costa Rica), while others still happened in irradiation installations [7] as in El Salvador and Soreq. Unfortunately, in some instances where members of the public were injured, there was a lack of or deficient control by the authorities. Attention has been paid to the enforcement actions by regulatory bodies to prevent radioactive sources ending up in the public domain [8].

Accidents with radioactive sources may stem from the disruptive release of energy (fire, explosion, etc.) at a site where the sources are being used or stored, or when sequences of economic events coincide to create a dangerous situation (bankruptcy plus abandonment, spent source plus loss of corporate memory, etc.), or if radiological safety is affected by an initiating event (improper maintenance of a gamma radiography container, etc.).

Licensees are responsible for the safety of radioactive sources, and must implement measures to prevent accidents. Compliance monitoring and enforcement actions by regulatory bodies must control these measures. If necessary, the intervention of the authority should preclude the development of conditions leading to radiological accidents. In addition, deterrence provided by an effective enforcement policy and by sanctions imposed on persons responsible for non-compliance with the regulations helps to prevent accidents.

The regulatory control of radioactive sources requires effective licensing, compliance monitoring and enforcement actions. To this end,

- regulations and standards are assertive in the description of what is acceptable and what is not; enforcement actions are clearly specified and have sound legal support;
- a compliance monitoring programme able to detect deviations from the conditions

spelled out in the licences or to detect sequences of adverse events that may produce radiological accidents will timely lead to enforcement actions.

2. THE CONTROL OF RADIOACTIVE SOURCES IN ARGENTINA

A law of 1956 empowered the Argentine Atomic Energy Commission to control all radioactive materials and ionizing radiation sources, with the exception of X ray equipment, which falls under the purview of the federal and provincial departments in charge of public health. In 1994, a presidential decree separated the regulatory branch from the Atomic Energy Commission, and in 1997 the Parliament created by law an independent regulatory body today called the Nuclear Regulatory Authority (hereinafter the Authority) [9].

The Authority has the power to set regulations and standards on radiological safety, physical protection and safeguards. Inspections to verify compliance with regulations are periodically conducted by the Authority based on the associated radiological risks.

Authorizations to operate installations using radioactive sources in medicine, industry, research and teaching are issued by the Authority to applicants who fulfil the requirements. The applicant must appoint an individual as the person responsible for the safety of the sources who must hold a permit for the specific practice. Permits are issued to those individuals who fulfil the requirements and demonstrate knowledge and training in radiological safety.

In order to assure appropriate control of imports and exports of radioactive materials, an agreement was reached with the governmental department in charge of customs. To deal with fires, explosions, or other situations in radiological accidents, the Authority relies on the support and advice of the Fire Department of the Federal Police.

Communications, requirements, and enforcement actions by the Authority are addressed to the individual designated as responsible for safety (the safety officer). The licensee must supervise the activities carried out by the safety officer and must provide him with all the resources needed to discharge his responsibilities.

The enforcement actions by the Authority can be broken down into three broad categories:

1. Impositions to correct minor deviations from the requirements set in the regulations. These actions are usually imposed during inspections and after a meeting with the safety officer.
2. Impositions to correct safety problems, or for repeated violations of minor importance. The commitment of the licensee with respect to safety culture, or the ability of the safety officer to cope with safety, are both under criticism. These actions are imposed as soon as possible after a review of the safety of the site, and corrections must be carried out within a short time frame.
3. Impositions to curtail or suspend operations in installations due to threats to the health of the workers or the public. These actions taken during inspections are imposed to urgently secure or shield radioactive sources, or to decontaminate the installations. As necessary, the Authority petitions a judge to order the preventive sequester of the sources, or any other appropriate measures.

3. INFLUENCE OF THE ACCIDENT IN GOIANIA ON REGULATORY TASKS IN ARGENTINA

The conclusions drawn from the accident in Goiânia sped up the improvement of some regulatory procedures in Argentina and helped to enhance the quality of the regulatory process. Therefore, the effectiveness of the control of spent radioactive sources has gradually

increased, and enforcement actions to prevent radioactive sources ending up in the public domain have improved.

In connection with enforcement, the following are highlights of the control of radioactive sources in Argentina prior to the accident in Goiânia:

- Regulations stressed the responsibilities of both licensees and individuals directly responsible for the safety of radioactive sources, and the Authority had the power to impose penalties for violations of regulations.
- The Authority kept a registry of the radioactive sources used for medical, industrial, research and teaching purposes. The registry was updated regularly and covered the import, export, transfer and disposal of sources.
- An agreement was reached with the government department in charge of customs, and any import or export of radioactive materials had to be cleared by the Authority.
- The Authority inspected the safety of spent sources on a non-systematic basis following a case by case assessment.
- Spent radiotherapy sources received special attention and were checked frequently. For bankruptcies, the Authority petitioned the judge to prevent the winding up of the radioactive sources by order of the court, and the sources were removed from the premises and deposited at a safe site.

The lessons learnt in Argentina from the accident in Goiânia deal primarily with the effectiveness of the control of spent sources and the enforcement actions aimed at preventing sources ending up in the public domain. The following lessons were gradually implemented in Argentina according to a programme to incorporate quality practices in regulatory activities:

- Managers should encourage the use of the '*correct from the very beginning*' concept in regulatory tasks. This helps avoid oversights by the inspection staff and facilitates the follow-up of spent sources.
- The registry of radioactive sources used for medical, industrial, research and teaching purposes should be updated timely to reflect the transfer or import of sources, as well as bankruptcies or detected unsafe conditions. This information is key to preclude the development of accidents due to the unauthorized use of radioactive sources or delays or interruptions in the licensing of imported sources.
- The Authority should systematically inspect every spent source to check its safety and security, and should require licensees to remove spent sources from their premises duly and in accordance with the regulations, as for instance, whenever a source is transferred to another authorized licensee, sent abroad to the manufacturer, or disposed of as radioactive waste. The Authority should stress that licensees are responsible for the safety of their spent sources while these sources are in their custody.
- Besides petitioning the bankruptcy judge to prevent the winding up of a radioactive source by order of the court, the bankruptcy administrator should be instructed to carry out measures to secure the source until the judge authorizes the Authority to remove it to a safe site.
- Enforcement actions should be registered and inspectors should verify compliance shortly after the deadlines established. For repeated cases of non-compliance, experienced staff should carry out upgraded enforcement actions. These actions guarantee the credibility of the enforcement policy.
- In order to detect deviations from safe conditions in potentially risky practises such as gamma radiography, teletherapy, etc., the Authority should set up special inspections to assess specific features of the installations, such as radiation beam calibration or safety interlocks in radiotherapy, maintenance of gamma radiography equipment, etc.

4. EFFECTIVE COMPLIANCE MONITORING AND ENFORCEMENT ACTIONS

Beyond the lessons learned from the accident in Goiânia, other noteworthy characteristics of an effective compliance monitoring and enforcement programme can be mentioned, on the basis of the Argentine experience:

- The Authority should be empowered to impose penalties on a safety officer, licensee or any unauthorized individual who has caused unnecessary exposures or potential exposures of persons to ionizing radiation. Penalties such as curtailment, suspension or revocation of permits and authorizations to operate installations, or fines, should be imposed, in accordance with the regulations. The exercise of the rights of the persons prosecuted for violations by the Authority shall be guaranteed.
- Regulations should be clear enough to stress the responsibilities of both licensees and individuals who are directly responsible for the safety of radioactive sources used or stored in installations. If the Authority determines that harm has been caused to an individual as a consequence of a regulatory offence, it should report this finding to a criminal court.
- Enforcement actions should be carried out by experienced staff and should be imposed in writing on the individual directly responsible for the safety of the installation or the legal representative of the licensee. As necessary, these actions should be followed by interviews in person or by telephone with the individual responsible for safety, in order to obtaining his commitment to comply with the requirements of the enforcement actions.
- The following factors exert influence on the enforcement actions: relevance of the detected deviation for the safe performance of the installation and complexity of the necessary corrections, severity of the violation, repeated or wilful violations, attitude and course of action taken by the safety officer.
- The most experienced inspectors should be empowered to carry out enforcement actions during inspections. If safety is degraded and urgent enforcement actions are needed at the site, inspectors shall make every attempt to inform their managers in order to obtain approval for the enforcement action, especially if curtailment or suspension of the operations affects patients under medical treatment. The enforcement actions in medical centres should take into account the protection of the patients and any detriment that might be caused by the actions.
- Licensees should be required to take spent sources out of their installations and to dispose of or deposit the sources at an authorized site. If urgent actions are necessary because unsecured radioactive sources threaten the health or the properties of persons, the Authority shall take actions to secure the sources in situ or to sequester and transfer them to a safe site. In case of a deliberate obstruction to such actions, Authority managers should be entitled to petition the judge to provide police assistance to gain access to the premises and sources considered.

5. CONCLUSIONS

The regulatory control of radioactive sources requires effective compliance monitoring and enforcement actions aimed at controlling the radiological safety of the sources and compliance with requirements. As necessary, regulatory bodies must implement actions not only to prevent, but also to interrupt, the development of conditions leading to radiological accidents.

From this standpoint, one of the most important lessons learnt from the accident in Goiânia is that the regulatory control of spent radioactive sources is as important as, or even more important, than the safety of radioactive sources being used in the installations.

An effective enforcement and compliance monitoring programme should incorporate quality practises to appropriately prevent sources ending up in the public domain.

To deal with the problem of spent sources, regulations should stress that licensees are responsible for the safety of their sources until the regulatory body relieves them of their responsibility, e.g., when sources are transferred to another authorized licensee, are sent abroad to the manufacturer, or are disposed of as radioactive waste. Regulatory bodies should implement measures to identify, locate, and secure spent sources in their countries.

Licensees should be required to remove spent sources from their installations, duly and in accordance with the regulations, and inspectors should make certain that licensees take the necessary steps to provide for the safety and security of each source. Any oversight by the inspection staff might increase the risk of a spent source ending up in the public domain.

Regulatory bodies should have procedures at their disposal for intervention in instances where sources are unsecured, particularly for licensee bankruptcies. If there is deliberate obstruction to the intervention, managers should be entitled to petition the corresponding judge to provide police assistance in order to gain access to the premises and sources concerned.

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