IAEA Incident and Trafficking Database (ITDB)

2023 Factsheet

Incidents of nuclear and other radioactive material out of regulatory control

The IAEA Incident and Trafficking Database (ITDB) is a component of the IAEA information management systems and supports the implementation of the IAEA Nuclear Security Plan. The ITDB contains authoritative information, voluntarily reported by participating States through their officially nominated Points of Contact (PoC). This information is disseminated through the IAEA to participating States and relevant international organizations.

Following the joining of Myanmar, the number of ITDB participating States increased to 143 in 2022.

143
ITDB participating States

The information in this Factsheet summarizes the details of confirmed incidents, as voluntarily reported by the participating States, and represents a cross-section of the aggregated ITDB data that has been made available for the public domain.

Scope of the ITDB

As originally established, the ITDB recorded incidents of illicit trafficking of nuclear and other radioactive material. Its scope was later expanded to include all incidents in which nuclear and other radioactive material is or was out of regulatory control.

The ITDB scope covers all types of nuclear material as defined by the Statute of the Agency (i.e. uranium, plutonium and thorium), naturally occurring and artificially produced radioisotopes and radioactively contaminated material, such as scrap metal. States are also encouraged to voluntarily report incidents involving scams or hoaxes where material is purported to be nuclear or otherwise radioactive.

Communication with participating States is maintained through the network of national PoCs. The ITDB receives information from PoCs on incidents ranging from illegal possession, attempted sale and smuggling to unauthorized disposal of material and discovery of lost radioactive sources.

The IAEA Secretariat reviews all reported incidents with a view to identify common threats, trends, and patterns; to assist States in determining what actions may need to be taken with respect to particular events or to help formulate policy towards combating illicit trafficking of such materials; and to support the Agency's nuclear security activities.

IAEA
International Atomic Energy Agency

ITDB at a glance

The ITDB was established by the IAEA Secretariat and its Member States in 1995 to:

- **assist States with the timely exchange of authoritative information** on incidents involving illicit trafficking and other related unauthorized activities involving nuclear and other radioactive materials;
- **maintain and analyze reported information** with a view to identifying common threats, trends, and patterns; to assist States in determining what **actions may need to be taken** with respect to particular events or to help formulate policy towards combating illicit trafficking of such materials; and **support the Agency's nuclear security activities;** and
- **provide a reliable source of basic information to the media** concerning trafficking incidents by providing authoritative information about such events, when appropriate.

Confidentiality and security of ITDB information

The ITDB is a resource for information sharing among State authorities and the IAEA. In order to protect the confidentiality of information reported by States, the IAEA upholds strict procedures for handling and dissemination of sensitive ITDB information. Information on reported incidents is only communicated via the PoC network. Access to the complete database is limited to a small number of IAEA staff.

ITDB highlights during the period of 1993–2022

In 2022, 146 incidents were reported to the ITDB by 31 States, an increase of 26 incidents from 2021. These indicate that unauthorized activities and events involving nuclear and other radioactive material, including incidents of trafficking and malicious use, continue to follow historical averages.

The groups[1] of incident types used in ITDB are the following:

- Group I: incidents that are, or are likely to be, connected with trafficking or malicious use;
- Group II: incidents of undetermined intent; and
- Group III: incidents that are not, or are unlikely to be, connected with trafficking or malicious use.

Figure 1. The number of the incidents recorded in ITDB during the period 1993-2022 per incident type group.

[1] The classification into the three groups described here was approved in 2015, and then it was applied retroactively to all reported incidents. Therefore, the graphs and figures presented in this Factsheet cannot be directly compared to Factsheets produced prior to the change in groupings.

As of 31 December 2022, the ITDB contained a total of 4 075 confirmed incidents reported by participating States since 1993. Of the 4 075[2] confirmed incidents there are 344 within Group I, 1 036 incidents within Group II and 2 695 incidents within Group III.

The majority of industrial sources that are reported stolen, lost or missing are those used for non-destructive testing and for applications in construction and mining. Most such devices use relatively long-lived isotopes, such as caesium-137 and americium-241.

The ITDB categorizes the activity of sealed radioactive sources in accordance with the IAEA Safety Standards[3], which ranks them from Category 1 to Category 5 in terms of their potential to cause harmful health effects[4]. Incidents reported to the ITDB in 2022 include incidents involving sources of Category 5 up to and including Category 2. The information reported underscores the need to provide appropriate security measures for such sources as well as to enhance the regulatory arrangements governing their use, storage, transport and disposal.

Globally, the recovery rate for Category 1–3 radioactive sources[5] is higher, compared to the Categories 4 and 5 radioactive sources[6]. This can be attributed to the concerted effort made by the authorities to recover such sources. However, these dangerous sources comprise only around 12% of the total number of stolen sources. The majority of incidents relating to Categories 4 and 5 radioactive sources do not have a follow-up report confirming their recovery. Thefts of these sources that are unlikely to be dangerous comprise around 88% of the total.

ITDB incidents 1993–2022

Type of material

- 14% of all incidents involved nuclear material;
- 59% involved other radioactive material;
- Around 27% involved radioactively contaminated and other material.

14%
involved nuclear material

Trafficking or malicious use intent in reported thefts

- 3.5% of the reported thefts have been confirmed to be related to trafficking;
- Around 8.5% have been confirmed to be not related to trafficking or malicious use;
- The trafficking or malicious use intent of around 88% of thefts remains undetermined.

Thefts/losses/missing

The majority of materials reported to the ITDB as stolen or lost (or otherwise missing under uncertain circumstances), involve radioactive sources that are used in industrial, material analysis or medical applications. Devices containing radioactive sources can be attractive to a potential thief as they may be perceived to have a high resale or scrap metal value.

Transport-related

Overall, about 52% of all thefts reported to the ITDB since 1993 have occurred during the authorized transport of such materials. This figure stands at almost 62% in the last decade, which highlights the ongoing importance of strengthening transport security measures.

52%
occurred during authorized transport

[2] In 2022, the ongoing data quality review and standardization process identified one incident circumstances of which justified disaggregation of this incident into two separate incidents. This led to the increase of the total number of confirmed incidents by one additional incident, in comparison with the 2022 Factsheet.

[3] INTERNATIONAL ATOMIC ENERGY AGENCY, Categorization of Radioactive Sources, IAEA Safety Standards Series No. RS-G-1.9, IAEA, Vienna (2005).

[4] The exposure of only a few minutes to an unshielded Category 1 source can be fatal. Category 5 sources are the least dangerous; however, such sources could give rise to detrimental health consequences if misused.

[5] Category 1, 2 and 3 sources are defined in the IAEA Safety Standards referenced in footnote 3 respectively as extremely dangerous to the person, very dangerous to the person and dangerous to the person.

[6] Category 4 and 5 sources are defined in the IAEA Safety Standards referenced in footnote 3 respectively as unlikely to be dangerous to the person and most unlikely to be dangerous to the person. Despite the lower concern from a safety perspective, these sources are still relevant from a security perspective.

Analysis per Group of incident types

Group I: Incidents of trafficking or malicious use, 1993–2022

Incidents in this group are those for which there is sufficient information to determine that the incident is connected with trafficking or malicious use. This group also includes scams and frauds as such acts may indicate the intent to acquire or provide nuclear and/or other radioactive material, in particular, for trafficking or malicious use.

In recent years, incidents related to trafficking or malicious use have been reported at steady levels, although the frequency has remained low. Trafficking-related incidents and attempts constitute around 85.5% of the Group I total while scams/frauds and attempts are almost 13% and malicious use and attempts are less than 2%.

In the period between 1993 and 2022, confirmed incidents in this group included high enriched uranium (13)[7], plutonium (3), and plutonium-beryllium neutron sources[8] (5).

By type of material, 47% of Group I incidents involved nuclear material, around 37% involved other radioactive materials and around 16% involved other materials, mostly non-radioactive materials used in scam/frauds.

A small number of the above incidents involved seizures of kilogram quantities of potentially weapons-usable nuclear material, but the majority involved gram quantities[9]. In some of these cases, circumstantial information suggested that the seized materials were samples from larger unsecured stockpiles. Some of these incidents involved attempts to sell or traffic these materials across international borders.

Trafficking incidents have declined significantly in the last years. However, scam attempts involving hoax (non-radioactive) material that is purported to be nuclear or other radioactive material have remained fairly constant in the same period and suggests the perceived demand for such material continues.

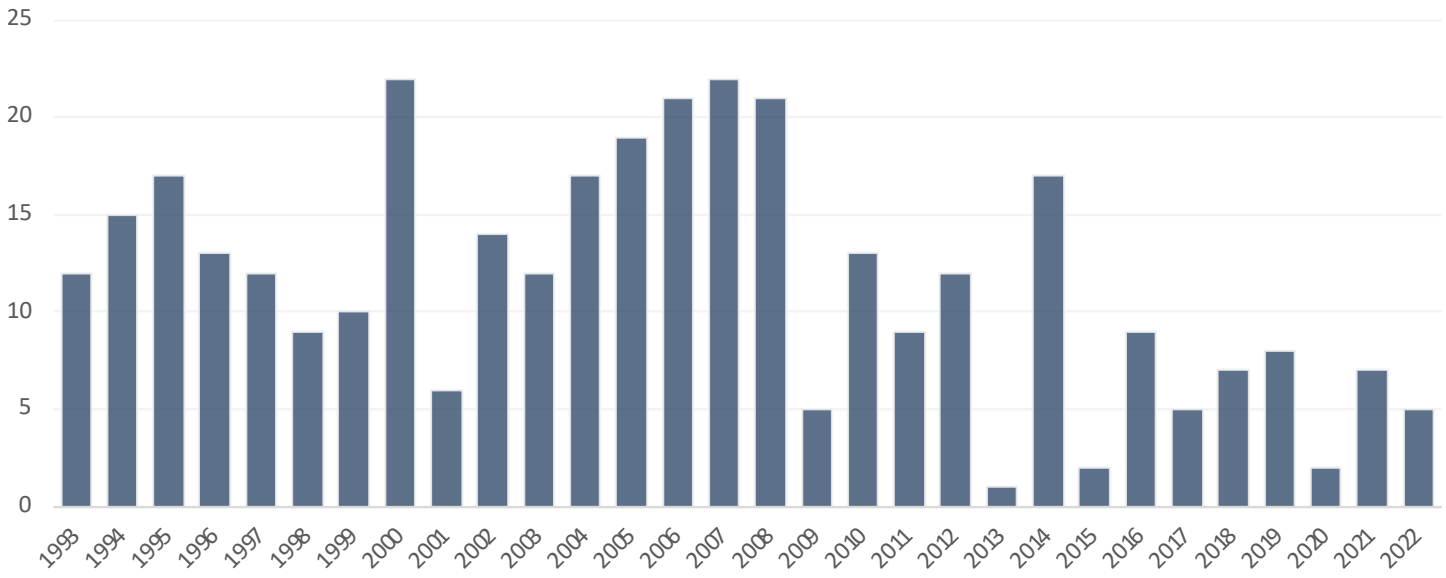

Figure 2. Incidents reported to the ITDB that are confirmed, or likely, to be connected with trafficking or malicious use, 1993–2022.

[7] The total number of Group I incidents involving high enriched uranium increased from 12 to 13. However, this increase is not due to the occurrence of a new incident but due to the reclassification of an incident from the year 1992 from Group II to Group I. This reclassification was the result of the ongoing data quality review and standardization process that was completed in 2022.

[8] Incidents involving plutonium-based smoke detectors and other small plutonium sources are counted separately and totaled 13 in Group I. However, one of these 13 incidents comprised one small (calibration) plutonium source together with a plutonium-beryllium neutron source among other sources so this incident is also counted within the 5 incidents that involved plutonium-beryllium neutron sources. Consequently, the incidents involving both plutonium-beryllium neutron sources and small plutonium sources totaled 17 and not 18.

[9] The latest incident that involved kilogram quantities of weapons usable nuclear material occurred in 1994.

It should be noted that incidents involving attempts to sell nuclear or other radioactive material are often detected through sting operations. The number of successful transactions is not known and therefore it is difficult to accurately characterize an actual 'illicit nuclear market'. Where information on motives is available, it indicates financial gain to be the principal incentive behind the majority of events. Most trafficking incidents could be characterized as 'amateur' or opportunistic in nature, as demonstrated by ad-hoc planning and a lack of resources and technical proficiency. However, there are a few significant cases that appear more organized, better resourced and that involved perpetrators with a track record in trafficking nuclear/radioactive material or other criminal activities. Such cases have been relatively rare, and none have occurred for almost a decade.

Group II: Incidents of undetermined intent, 1993–2022

Incidents in this group are those for which there is insufficient information to determine whether the incident is either connected or unconnected with trafficking or malicious use. The majority of incidents in this group involve stolen or missing material. Such occurrences can mark the beginning of an illicit trafficking incident. Thefts and missing material are also indicative of vulnerabilities in security and control systems at the originating facility, temporary storage or during transport. The remaining incidents are unauthorized possessions where there is no information regarding the intent of the individuals involved.

In the period between 1993 and 2022, confirmed incidents in Group II included high enriched uranium (2)[11], and plutonium-beryllium neutron sources (3)[12]. No such materials were reported in 2022. Overall, in the 1993-2022 period the majority of Group II incidents were comprised of radioactive sources (83%). In 2022 alone, this figure was 87.5% and included three incidents; two Category-2 and one Category-3 radioactive sources.

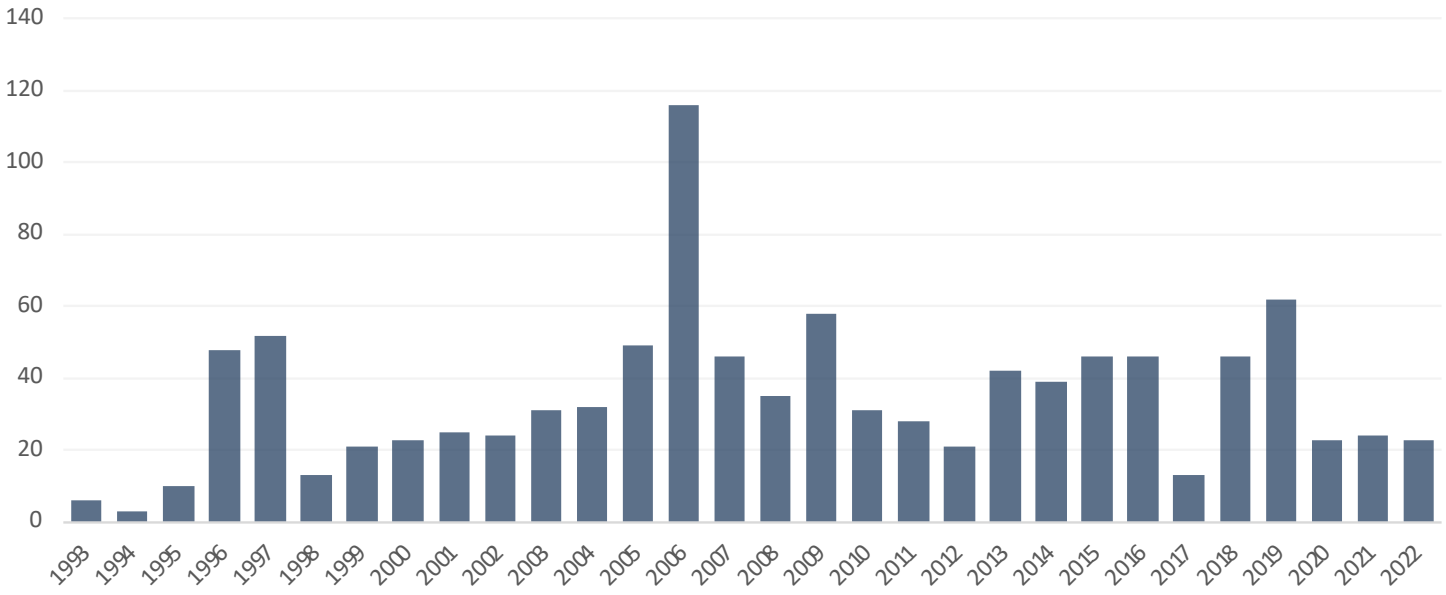

Figure 3. Incidents reported to the ITDB where there is insufficient information to determine that the incident is, or is likely to be, either connected or unconnected with trafficking or malicious use[10], 1993–2022.

[10] It should be noted that the spike of incidents in 2006 is related to a change in reporting practice by one country, rather than any change in the long-term trend of such incidents.

[11] The number of Group II incidents involving high enriched uranium decreased from 3 to 2,due to the reclassification of one incident from Group II to Group I in 2022 (see footnote 7).

[12] Incidents involving plutonium-based smoke detectors and other small plutonium sources are counted separately and totaled 13 in Group II.

Group III: Incidents not connected with trafficking or malicious use, 1993–2022

Incidents in this group are those for which there is sufficient information to determine that the incident is not connected with trafficking or malicious use. These incidents primarily involve various types of material recovery, such as discovery of uncontrolled sources, detection of materials disposed of in an unauthorized way and detection of inadvertent unauthorized possession or shipment of nuclear or other radioactive material, including radioactively contaminated material.

The majority of incidents in Group III fall into one of three categories: the unauthorized disposal (e.g. radioactive sources entering the scrap metal or waste recycling industries); unauthorized shipment (e.g. scrap metals contaminated with radioactive material being shipped across international borders); or the discovery of radioactive material (e.g. uncontrolled radioactive sources). The occurrence of such incidents indicates deficiencies in the systems to control, secure and properly dispose of radioactive material. The increase in reporting of these incidents between 2003 and 2005 coincides with the deployment of an increased number of radiation portal monitoring systems at national borders and scrap metal facilities. The annual number of reported incidents of this kind over the last decade has averaged at around 131 incidents per year.

In the 1993–2022 period, more than half (almost 53%) of incidents involved radioactive sources while only around 10% of all incidents in this group involved nuclear material. Incidents involving high enriched uranium (20), plutonium (3), and plutonium-beryllium neutron sources (10) were reported[13]. These included a number of reports of scrap metal shipments contaminated with high enriched uranium received by scrapyards, the most recent of which occurred in 2014. Radioactively contaminated and other materials, such as naturally occurring radioactive materials (NORM) and non-radioactive materials involved in scams, constitute the remaining incidents (37%).

In recent years, a growing number of incidents involved detections at metal recycling chains and the detection of manufactured goods contaminated with radioactive material. This indicates a persistent problem for some countries in securing and detecting the unauthorized disposal of radioactive sources. The most common source of such contamination is the feed material (in most cases, metal) from which the product had been manufactured. Much feed material is often obtained from the metal recycling industry and, in the process of being melted down, can become contaminated with material from an undetected radioactive source such as cobalt-60. The resulting contaminated metal, if used to manufacture household goods, could pose a potential health problem to unsuspecting consumers.

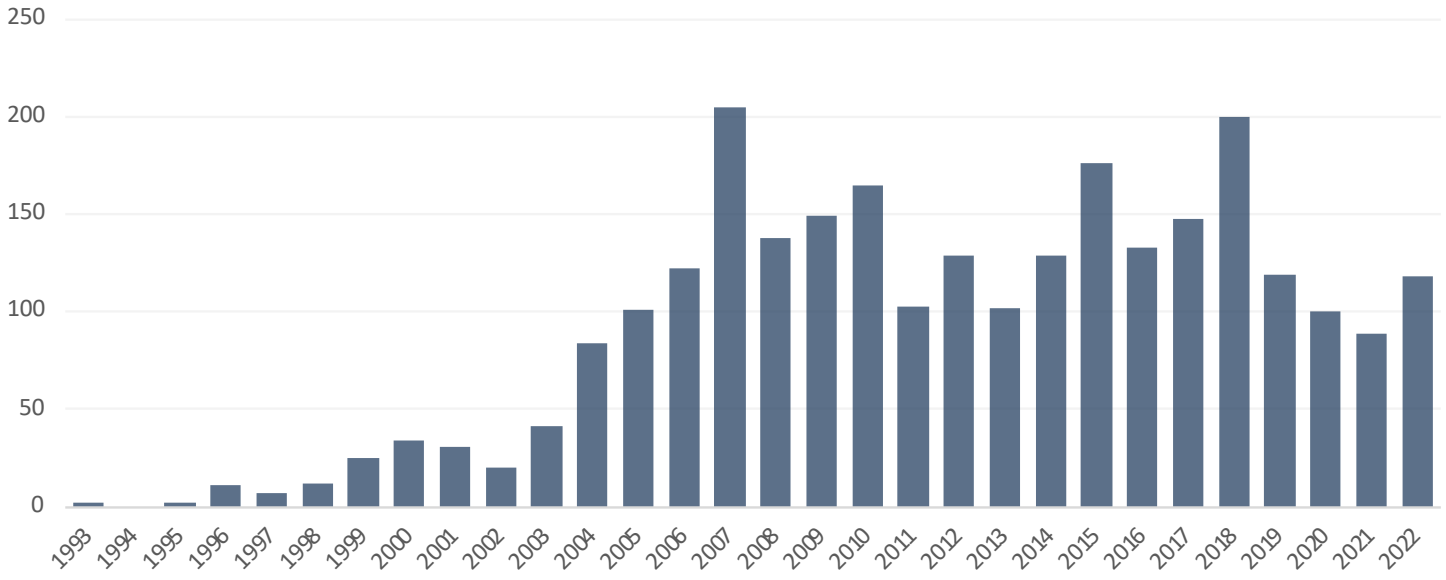

Figure 4. Incidents where there is sufficient information to determine that the incident is not, or is unlikely to be, connected, with trafficking or malicious use, 1993–2022.

[13] Incidents involving plutonium-based smoke detectors and other low activity plutonium sources are counted separately and totaled 49 in Group III.

Joining the ITDB

Non-participating States are encouraged to join the ITDB. States wishing to join the ITDB need to contact the IAEA Division of Nuclear Security. States will be asked to nominate a national PoC who will provide reports on incidents to the ITDB, receive ITDB information and reports produced by the IAEA and facilitate responses to the IAEA Secretariat's enquiries on specific incidents. Information on the ITDB, the procedures for reporting incidents and copies of the Incident Notification Form will be provided to the PoC.

Membership applications and nominations of PoC should be sent to:

Ms. Elena Buglova
Director, Division of Nuclear Security
International Atomic Energy Agency
Vienna International Centre
P.O. Box 100
A-1400, Vienna, AUSTRIA
Tel: +43-1-2600-22299

Annex: States participating in the ITDB as of 31 December 2022

1. Albania
2. Algeria
3. Antigua & Barbuda
4. Argentina
5. Armenia
6. Australia
7. Austria
8. Azerbaijan
9. Bahrain
10. Bangladesh
11. Belarus
12. Belgium
13. Benin
14. Bolivia, Plurinational State of
15. Bosnia and Herzegovina
16. Botswana
17. Brazil
18. Brunei Darussalam
19. Bulgaria
20. Burkina Faso
21. Cambodia
22. Cameroon
23. Canada
24. Central African Republic
25. Chad
26. Chile
27. China
28. Colombia
29. Comoros
30. Congo
31. Costa Rica
32. Côte d'Ivoire
33. Croatia
34. Cuba
35. Cyprus
36. Czech Republic
37. Democratic Republic of the Congo
38. Denmark
39. Dominican Republic
40. Ecuador
41. El Salvador
42. Estonia
43. Ethiopia
44. Finland
45. France
46. Gabon
47. Georgia
48. Germany
49. Ghana
50. Greece
51. Guatemala
52. Haiti
53. Honduras
54. Hungary
55. Iceland
56. India
57. Indonesia
58. Iran, Islamic Republic of
59. Iraq
60. Ireland
61. Israel
62. Italy
63. Jamaica
64. Japan
65. Jordan
66. Kazakhstan
67. Kenya
68. Korea, Republic of
69. Kuwait
70. Kyrgyzstan
71. Latvia
72. Lebanon
73. Lesotho
74. Libya
75. Liechtenstein
76. Lithuania
77. Luxembourg
78. Madagascar
79. Malawi
80. Malaysia
81. Mali
82. Malta
83. Mauritania
84. Mauritius
85. Mexico
86. Mongolia
87. Montenegro
88. Morocco
89. Mozambique
90. Myanmar
91. Namibia
92. Nepal
93. Netherlands
94. New Zealand
95. Niger
96. Nigeria
97. North Macedonia
98. Norway
99. Oman
100. Pakistan
101. Panama
102. Papua New Guinea
103. Paraguay
104. Peru
105. Philippines
106. Poland
107. Portugal
108. Qatar
109. Republic of Moldova
110. Romania
111. Russian Federation
112. Rwanda
113. Saudi Arabia
114. Senegal
115. Serbia
116. Sierra Leone
117. Singapore
118. Slovakia
119. Slovenia
120. South Africa
121. Spain
122. Sri Lanka
123. Sudan
124. Swaziland
125. Sweden
126. Switzerland
127. Tajikistan
128. Tanzania
129. Thailand
130. Tunisia
131. Türkiye
132. Uganda
133. Ukraine
134. United Arab Emirates
135. United Kingdom
136. United States of America
137. Uruguay
138. Uzbekistan
139. Venezuela, Bolivarian Republic of
140. Viet Nam
141. Yemen
142. Zambia
143. Zimbabwe

IAEA
International Atomic Energy Agency

23-00685E