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 Papua New Guinea and Rwanda, the number of ITDB participating States increased to 141 in 2020.

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.
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 1993–2020

In 2020, 125 incidents were reported to the ITDB by 25 States. These indicate that unauthorized activities and events involving nuclear and other radioactive material, including incidents of trafficking and malicious use, continue to occur.

The groups' 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.

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1018</td>
</tr>
<tr>
<td>II</td>
<td>1018</td>
</tr>
<tr>
<td>III</td>
<td>2481</td>
</tr>
<tr>
<td>Total</td>
<td>3808</td>
</tr>
</tbody>
</table>

Figure 1. The number of the incidents recorded in ITDB during the period 1993-2020 per incident type group

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 Fact Sheet cannot be directly compared to Fact Sheets produced prior to the change in groupings.

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.
As of 31 December 2020, the ITDB contained a total of 3808 confirmed incidents reported by participating States since 1993. Of the 3808 confirmed incidents there are 309 within the Group I, 1018 incidents within the Group II and 2481 incidents within the 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, which ranks them from Category 1 to Category 5 in terms of their potential to cause harmful health effects. Those incidents reported to the ITDB in 2020 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.

The recovery rate for Category 1–3 radioactive sources is high and can be attributed to the concerted effort made by the authorities to recover them. However, these dangerous sources comprise only around 13% of the total 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 87% of the total.

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

** Trafficking or malicious use intent in reported thefts**
- 2% of the reported thefts have been confirmed to be related to trafficking;
- Less than 7% have been confirmed to be not related to trafficking or malicious use;
- The trafficking or malicious use intent of over 90% 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 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 34% of all thefts reported to the ITDB since 1993 have occurred during the authorized transport of such materials. This figure has risen to almost 60% in the last decade, which highlights the importance of strengthening transport security measures.

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2 In 2020, the ongoing data quality review and standardization work that followed the implementation of the Conceptual Framework identified three incidents that were out of scope or represent duplicates of previously reported incidents. These three incidents were subsequently removed from the database.

3 The absolute frequency of Group II incidents as of 30 December 2020 is lower than the frequency in the previous year, despite the reporting of 25 Group II incidents in 2020. The reason for this is the reclassification of some older Group II incidents as a result of the ongoing data quality review and standardization work that followed the implementation of the Conceptual Framework in 2017 and the reclassification by States of some incidents, when newly available information allowed them to update the incident and confirm the actual trafficking or malicious use intent. As a result, the incidents were subsequently reclassified under either Group I or Group III.


5 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.

6 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.

7 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.
The frequency of Group I incidents involving plutonium has increased from 2 to 3 in 2020. However, this increase is not due to the occurrence of a new incident but to the reclassification of one incident from Group II to Group I in 2020. This reclassification was the result of the ongoing data quality review and standardization process that is explained in the section ‘ITDB highlights 1993–2020’ and in footnote 1.

9 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.

A small number of the above incidents involved seizures of kilogram quantities of potentially weaponsusable nuclear material, but the majority involved gram quantities.10 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 few 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.
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, 1993–2020**

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 2020, confirmed incidents in this group included high enriched uranium (3), and plutonium-beryllium neutron sources (3). None such materials have been reported in 2020. Overall, in the 1993–2020 period the majority of incidents in this group comprise radioactive sources (81%). This figure rose to 88% in 2020 and included one Category 2 source.

![Figure 3](image-url)

**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, 1993–2020.

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11 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.

12 Incidents involving plutonium-based smoke detectors and other small plutonium sources are counted separately and totaled 11 in Group II.

13 See footnote 2.
**Group III: Incidents not connected with trafficking or malicious use, 1993–2020**

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 134 incidents per year.

In the 1993–2020 period, more than half (52%) of incidents involved radioactive sources while only 9% of all incidents in this group involved nuclear material. Incidents involving high enriched uranium (19), plutonium (3), and plutonium-beryllium neutron sources (9) were reported. 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 (39%).

In recent years, a growing number of incidents involved 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.

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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, 1993–2020.

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14 Incidents involving plutonium-based smoke detectors and other low activity plutonium sources are counted separately and totaled 47 in Group 3.
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 2020

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