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Table 1

Radionuclide	Minimum Quantity of Concern[1] (TBq)	Minimum Quantity of Concern[2] (Ci)
Am-241	0.6	16
Cf-252	0.2	5.4
Cm-244	0.5	14
Co-60	0.3	8.1
Cs-137	1	27
Gd-153	10	270
Ir-192	0.8	22
Pm-147	400	11,000
Pu-238	0.6	16
Pu-239	0.6	16
Ra-226	0.4	10
Se-75	2	54
Sr-90 (Y-90)	10	270
Tm-170	200	5,400
Yb-169	3	81
Combinations	Unity [3]	

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[1] The aggregate activity of multiple, collocated sources of the same radionuclide should be included when the total activity exceeds the quantity of concern. Radioactive materials are considered aggregated or co-located if breaching a common physical barrier (e.g., a locked storage room door) would allow access to the material.

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[2] *The primary values used for compliance are TBq. The curie (Ci) values are rounded to two significant figures for informational purposes only.*

[3]Use the following method to determine which sources of radioactive material require *increased controls* (*IC*s):

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- Include any single source larger than the quantity of concern in Table 1.
- Include multiple co-located sources of the same radionuclide when the combined quantity exceeds the quantity of concern.

For combinations of radionuclides, include multiple co-located sources of different radionuclides when the aggregate quantities satisfy the following unity rule: [(amount of nuclide A) ÷ (quantity of concern of nuclide A)] + [(amount of nuclide B) ÷ (quantity of concern for nuclide B)] + etc ... ≥1

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Deleted: [2] The primary values used for compliance are TBq. The curie (Ci) values are rounded to one significant figure for informational purposes only. ¶

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Guidance for Aggregation of Sources

The NRC supports the use of the IAEA's source categorization methodology as defined in TECDOC-1344, "Categorization of Radioactive Sources," (July, 2003) (see http://www-pub.iaea.org/MTCD/publications/PDF/te_1344_web.pdf) and as endorsed by the agency's Code of Conduct for the Safety and Security of Radioactive Sources, January, 2004 (see http://www-pub.iaea.org/MTCD/publications/PDF/Code-2004.pdf). The Code defines a three-tiered source categorization scheme. Category 1 corresponds to the largest source strength (greater then 100 times the quantity of concern values listed in Table 1) and Category 3, the smallest (equal or exceeding one-tenth the quantity of concern values listed in Table 1). *ICs* apply to sources that are greater than the quantity of concern values listed in Table 1, plus aggregations of smaller sources that add up to greater than the quantities in Table 1. Aggregation only applies to sources that are co-located.

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Licensees who possess sources in total quantities that exceed the Table 1 quantities are required to implement *ICs*. Where there are many small (less than the quantity of concern values) co-located sources whose total aggregate activity exceeds the Table 1 values, licensees are to implement *ICs*.

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Some source handling or storage activities may cover several buildings, or several locations within specific buildings. The question then becomes: When are sources considered colocated for purposes of aggregation? For purposes of the *ICs*, sources are considered colocated if breaching a single barrier (e.g., a locked door at the entrance to a storage room) would allow access to the sources. Sources behind an outer barrier should be aggregated separately from those behind an inner barrier (e.g., a locked source safe inside the locked storage room). However, if both barriers are simultaneously open, then all sources within these two barriers are considered to be co-located. This logic should be continued for other barriers within or behind the inner barrier. The following example illustrates the point: A lockable room has sources stored in it. Inside the lockable room, there are two shielded safes with additional sources in them. Inventories are as follows:

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> The room has the following sources outside the safes: Cf-252, 0.12 Tbq (0.3 Ci); Po-210, 0.36 TBq (10 Ci), and Pu-238, 0.3 Tbq (8 Ci). Application of the unity rule yields: (0.012 ÷ 0.2) + (0.36 ÷ 0.6) + (0.3 ÷ 0.6) = 0.06 + 0.6 + 0.5 = 1.2. Therefore, the sources would require *ICs*. If the sources are distributed and shipped individually, *ICs* would not apply because they do not exceed the quantities in Table 1.
>
> Shielded safe #1 has a 1.9 Tbq (51 Ci) Cs-137 source and a 0.75 Tbq (20 Ci) Ra-226 source. In this case, both sources would require PMs, because they exceed the quantities in Table 1. The Ra-226 source, although not licensed by the NRC, was colocated with an NRC licensed source and, therefore, would need to be similarly protected.
>
> Shielded safe #2 has two Po-210 sources, each having an activity of 0.2 Tbq (5 Ci). In this case, neither source would require *ICs*. (Total activity = 0.4 Tbq (10 Ci)). They do not exceed the threshold quantity 0.6 Tbq (20 Ci).

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Because certain barriers may cease to exist during source handling operations (e.g., a storage location may be unlocked during periods of active source usage), licensees should, to the extent practicable, consider two modes of source usage — "operations" (active source usage) and "shutdown" (source storage mode). Whichever mode results in the greatest inventory (considering barrier status) would require *ICs* for each location.

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