

# Kansas Administrative Regulations

## Department of Health and Environment

### Article 35.—Radiation

#### 28-35-411. Table of quantities of radioactive material; need for contingency plan.

**Quantities of Radioactive Materials Requiring  
Consideration of the Need for a Contingency  
Plan for Responding to a Release**

|                                      | <b>Release</b> | <b>Quantity</b> | <b>Quantity</b> |
|--------------------------------------|----------------|-----------------|-----------------|
| Radioactive<br>Material <sup>1</sup> | Fraction       | (GBq)           | (Ci)            |
| Actinium-228                         | 0.001          | 148,000         | 4,000           |
| Americium-241                        | 0.001          | 74              | 2               |
| Americium-242                        | 0.001          | 74              | 2               |
| Americium-243                        | 0.001          | 74              | 2               |
| Antimony-124                         | 0.01           | 148,000         | 4,000           |
| Antimony-126                         | 0.01           | 222,000         | 6,000           |
| Barium-133                           | 0.01           | 370,000         | 10,000          |
| Barium-140                           | 0.01           | 1,110,000       | 30,000          |
| Bismuth-207                          | 0.01           | 185,000         | 5,000           |
| Bismuth-210                          | 0.01           | 22,200          | 600             |
| Cadmium-109                          | 0.01           | 37,000          | 1,000           |
| Cadmium-113                          | 0.01           | 2,960           | 80              |
| Calcium-45                           | 0.01           | 740,000         | 20,000          |
| Californium-252                      | 0.001          | 333             | 9 (20 mg)       |
| Carbon-14 (Non-<br>CO)               | 0.01           | 1,850,000       | 50,000          |
| Cerium-141                           | 0.01           | 370,000         | 10,000          |
| Cerium-144                           | 0.01           | 11,100          | 300             |
| Cesium-134                           | 0.01           | 74,000          | 2,000           |

|                |       |             |           |
|----------------|-------|-------------|-----------|
| Cesium-137     | 0.01  | 111,000     | 3,000     |
| Chlorine-36    | 0.5   | 3,700       | 100       |
| Chromium-51    | 0.01  | 11,100,000  | 300,000   |
| Cobalt-60      | 0.001 | 185,000     | 5,000     |
| Copper-64      | 0.01  | 7,400,000   | 200,000   |
| Curium-242     | 0.001 | 2,220       | 60        |
| Curium-243     | 0.001 | 110         | 3         |
| Curium-244     | 0.001 | 148         | 4         |
| Curium-245     | 0.001 | 74          | 2         |
| Europium-152   | 0.01  | 18,500      | 500       |
| Europium-154   | 0.01  | 14,800      | 400       |
| Europium-155   | 0.01  | 111,000     | 3,000     |
| Gadolinium-153 | 0.01  | 185,000     | 5,000     |
| Gold-198       | 0.01  | 1,110,000   | 30,000    |
| Hafnium-172    | 0.01  | 14,800      | 400       |
| Hafnium-181    | 0.01  | 259,000     | 7,000     |
| Holmium-166m   | 0.01  | 3,700       | 100       |
| Hydrogen-3     | 0.5   | 740,000     | 20,000    |
| Indium-114m    | 0.01  | 37,000      | 1,000     |
| Iodine-124     | 0.5   | 370         | 10        |
| Iodine-125     | 0.5   | 370         | 10        |
| Iodine-131     | 0.5   | 370         | 10        |
| Indium-114m    | 0.01  | 37,000      | 1,000     |
| Iridium-192    | 0.001 | 1,480,000   | 40,000    |
| Iron-55        | 0.01  | 1,480,000   | 40,000    |
| Iron-59        | 0.01  | 259,000     | 7,000     |
| Krypton-85     | 1.0   | 222,000,000 | 6,000,000 |
| Lead-210       | 0.01  | 296         | 8         |
| Manganese-56   | 0.01  | 2,220,000   | 60,000    |
| Mercury-203    | 0.01  | 370,000     | 10,000    |
| Molybdenum-99  | 0.01  | 1,110,000   | 30,000    |
| Neptunium-237  | 0.001 | 74          | 2         |

|                |       |            |         |
|----------------|-------|------------|---------|
| Nickel-63      | 0.01  | 740,000    | 20,000  |
| Niobium-94     | 0.01  | 11,100     | 300     |
| Phosphorus-32  | 0.5   | 3,700      | 100     |
| Phosphorus-33  | 0.5   | 37,000     | 1,000   |
| Polonium-210   | 0.01  | 370        | 10      |
| Potassium-42   | 0.01  | 333,000    | 9,000   |
| Promethium-145 | 0.01  | 148,000    | 4,000   |
| Promethium-147 | 0.01  | 148,000    | 4,000   |
| Radium-226     | 0.001 | 3,700      | 100     |
| Ruthenium-106  | 0.01  | 7,400      | 200     |
| Samarium-151   | 0.01  | 148,000    | 4,000   |
| Scandium-46    | 0.01  | 111,000    | 3,000   |
| Selenium-75    | 0.01  | 370,000    | 10,000  |
| Silver-110m    | 0.01  | 37,000     | 1,000   |
| Sodium-22      | 0.01  | 333,000    | 9,000   |
| Sodium-24      | 0.01  | 370,000    | 10,000  |
| Strontium-89   | 0.01  | 111,000    | 3,000   |
| Strontium-90   | 0.01  | 3,330      | 90      |
| Sulfur-35      | 0.5   | 3,330      | 900     |
| Technetium-99  | 0.01  | 370,000    | 10,000  |
| Technetium-99m | 0.01  | 14,800,000 | 400,000 |
| Tellurium-127m | 0.01  | 185,000    | 5,000   |
| Tellurium-129m | 0.01  | 185,000    | 5,000   |
| Terbium-160    | 0.01  | 148,000    | 4,000   |
| Thulium-170    | 0.01  | 148,000    | 4,000   |
| Tin-113        | 0.01  | 370,000    | 10,000  |
| Tin-123        | 0.01  | 111,000    | 3,000   |
| Tin-126        | 0.01  | 37,000     | 1,000   |
| Titanium-44    | 0.01  | 3,700      | 100     |
| Vanadium-48    | 0.01  | 259,000    | 7,000   |
| Xenon-133      | 1.0   | 33,300,000 | 900,000 |
| Yttrium-91     | 0.01  | 74,000     | 2,000   |

|                                                                           |        |         |        |
|---------------------------------------------------------------------------|--------|---------|--------|
| Zinc-65                                                                   | 0.01   | 185,000 | 5,000  |
| Zirconium-93                                                              | 0.01   | 14,800  | 400    |
| Zirconium-95                                                              | 0.01   | 185,000 | 5,000  |
| Any other<br>betagamma emitter                                            | 0.01   | 370,000 | 10,000 |
| Mixed fission<br>products                                                 | 0.01   | 37,000  | 1,000  |
| Contaminated<br>equipment: beta-<br>gamma emitters                        | 0.001  | 370,000 | 10,000 |
| Irradiated material,<br>in any form other<br>than solid<br>noncombustible | 0.01   | 370,000 | 10,000 |
| Irradiated material<br>that is solid and<br>noncombustible                | 0.001  | 370,000 | 10,000 |
| Mixed radioactive<br>waste: beta-gamma<br>emitters                        | 0.01   | 37,000  | 1,000  |
| Packaged mixed<br>waste <sup>2</sup> : beta-<br>gamma emitters            | 0.001  | 370,000 | 10,000 |
| Any other alpha<br>emitter                                                | 0.001  | 74      | 2      |
| Contaminated<br>equipment: alpha<br>emitters                              | 0.0001 | 740     | 20     |
| Packaged waste <sup>2</sup> :<br>alpha emitters                           | 0.0001 | 740     | 20     |

<sup>1</sup> For combinations of radioactive materials, the licensee shall be required to consider whether a contingency plan is needed if the sum of the ratios of the quantity of each radioactive material authorized to the quantity listed in this table for that

material exceeds one.

<sup>2</sup> Waste packaged in type B containers shall not require a contingency plan.

(Authorized by K.S.A. 48-1607; implementing K.S.A. 48-1602; effective Dec. 30, 2005; amended March 18, 2011.)

\*\*\*\*\* Authenticated Kansas Administrative Regulation \*\*\*\*\*