

**Table 11**  
**Areas of high natural radiation background**

| Country                | Area   | Characteristics of area                                   | Approximate population | Absorbed dose rate in air <sup>a</sup> (nGy h <sup>-1</sup> ) | Ref.              |
|------------------------|--|---|------------------------|---|-------------------|
| Brazil                 | Guarapari  | Monazite sands; coastal areas                             | 73 000                 | 90–170 (streets)<br>90–90 000 (beaches)                       | [P4, V5]          |
|                        | Mineas Gerais and Goias<br>Pocos de Caldas Araxá | Volcanic intrusives                                       | 350                    | 110–1 300<br>340 average<br>2 800 average                     | [A17, P4]<br>[V5] |
| China                  | Yangjiang<br>Quangdong                           | Monazite particles  | 80 000                 | 370 average   | [W14]             |
| Egypt                  | Nile delta                                       | Monazite sands  |                        | 20–400  | [E3]              |
| France                 | Central region<br>Southwest                      | Granitic, schistous, sandstone area<br>Uranium minerals   | 7 000 000              | 20–400<br>10–10 000   | [J3]<br>[D10]     |
| India                  | Kerala and Madras                                | Monazite sands, coastal areas<br>200 km long, 0.5 km wide | 100 000                | 200–4 000<br>1 800 average                                    | [S19, S20]        |
|                        | Ganges delta                                     |   |                        | 260–440   | [M13]             |
| Iran (Islamic Rep. of) | Ramsar<br>Mahallat                               | Spring waters   | 2 000                  | 70–17 000<br>800–4 000  | [S21]<br>[S58]    |
| Italy                  | Lazio  | Volcanic soil   | 5 100 000              | 180 average   | [C12]             |
|                        | Campania   |   | 5 600 000              | 200 average   | [C12]             |
|                        | Orvieto town                                     |   | 21 000                 | 560 average   | [C20]             |
|                        | South Toscana                                    |   | ~100 000               | 150–200   | [B21]             |
| Niue Island            | Pacific  | Volcanic soil   | 4 500                  | 1 100 maximum   | [M14]             |
| Switzerland            | Tessin, Alps, Jura                               | Gneiss, verucano, <sup>226</sup> Ra in karst soils        | 300 000                | 100–200   | [S51]             |

<sup>a</sup> Includes cosmic and terrestrial radiation.