**Supplementary Table 1** Radium equivalent activity (Bq kg-1), air absorbed gamma radiation dose rate (nGy h-1), annual effective dose (mSvy-1) andexternal radiation hazard index (H*ex*)for surface sand

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sample code | 226Ra | 232Th | 40K | Raeq | D | E | Hex |
| S1 | 12.1 ± 1.3 | 10.1± 1.3 | 261 ± 10 | 46.6 | 22.9 | 0.02 | 0.13 |
| S2 | 21.3 ± 2.3 | 9.73 ± 0.9 | 454 ± 17 | 70.2 | 34.7 | 0.04 | 0.19 |
| S3 | 36.3 ± 3.3 | 26.9 ± 5.6 | 416 ± 12 | 107 | 51.0 | 0.06 | 0.29 |
| S4 | 21.5 ± 1.3 | 9.80 ± 0.9 | 454 ± 17 | 70.5 | 34.8 | 0.04 | 0.19 |
| S5 | 29.3 ± 3.2 | 12.1 ± 1.3 | 377 ± 15 | 75.5 | 36.5 | 0.04 | 0.20 |
| S6 | 15.0 ± 2.3 | 9.30 ± 1.0 | 408 ± 12 | 59.7 | 29.8 | 0.04 | 0.16 |
| S7 | 18.1 ± 2.2 | 11.1± 1.7 | 369 ± 11 | 62.4 | 43.6 | 0.05 | 0.17 |
| S8 | 21.6 ± 3.0 | 16.5 ± 3.1 | 335 ± 12 | 71.0 | 34.3 | 0.04 | 0.19 |
| S9 | 27.9 ± 5.8 | 16.7 ± 2.8 | 416 ± 12 | 83.8 | 40.6 | 0.05 | 0.23 |
| S10 | 30.6 ± 3.4 | 22.7± 3.6 | 435 ± 13 | 96.6 | 46.5 | 0.06 | 0.26 |
| S11 | 22.5 ± 2.4 | 20.7 ± 3.1 | 352 ± 12 | 79.2 | 38.2 | 0.05 | 0.21 |
| S12 | 16.1± 1.8 | 12.1 ± 1.9 | 426 ± 13 | 66.2 | 32.9 | 0.04 | 0.18 |
| min | 12.1± 1.3 | 9.30 ± 0.9 | 261 ± 10 | 46.6 | 22.9 | 0.02 | 0.13 |
| max | 36.3 ± 3.3 | 26.9 ± 5.6 | 454 ± 17 | 107 | 51.0 | 0.06 | 0.29 |
| mean | 22.7 ± 2.8 | 14.8 ± 2.3 | 392 ± 13 | 74.1 | 37.2 | 0.044 | 0.02 |