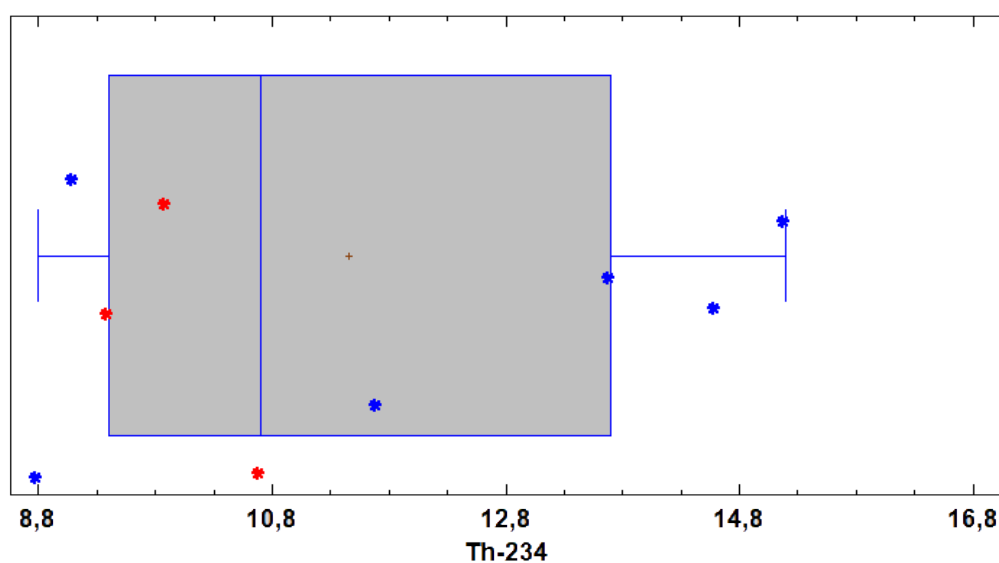
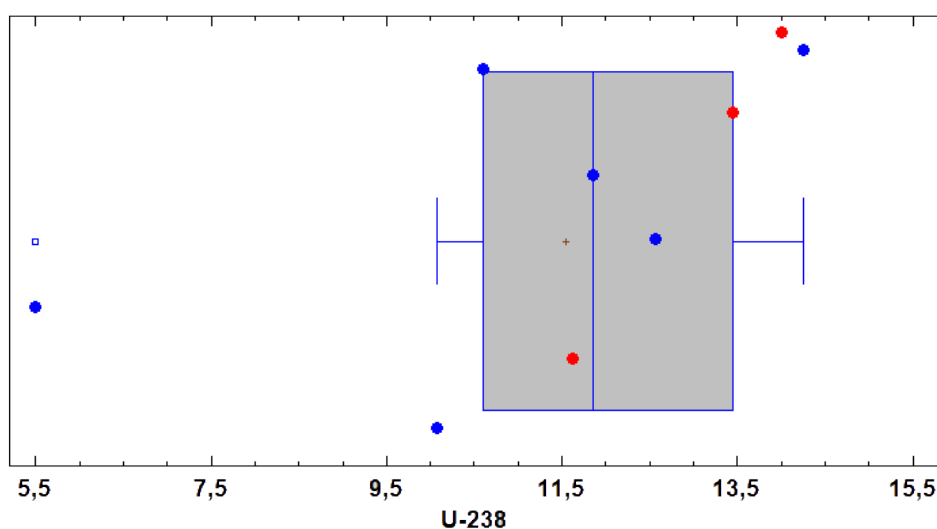


## Supplementary Information

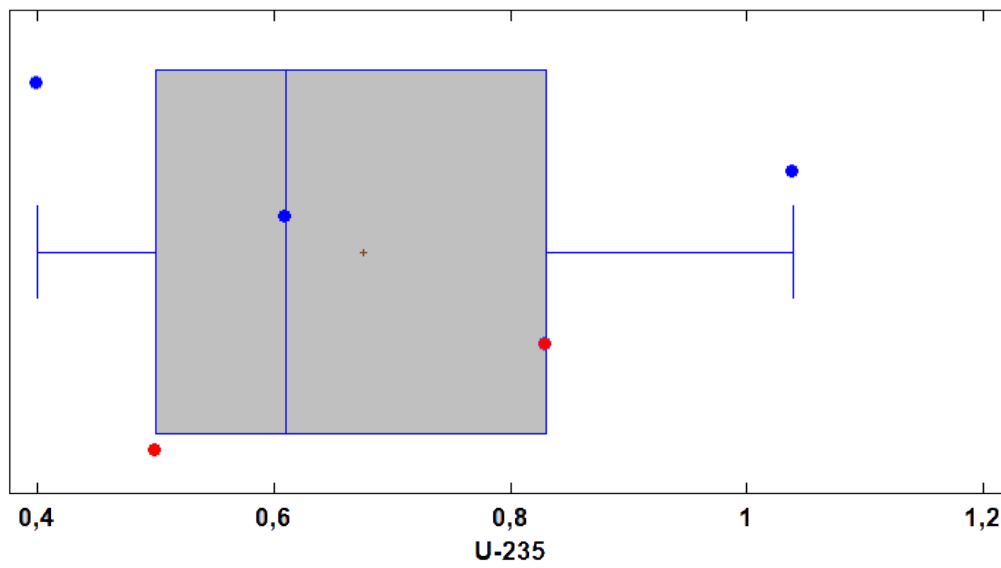
**Supplementary S1.** Box-and-whisker and scatter plots for the radionuclides of mortars made with CEM I 52.5 R-SR 3 cement.



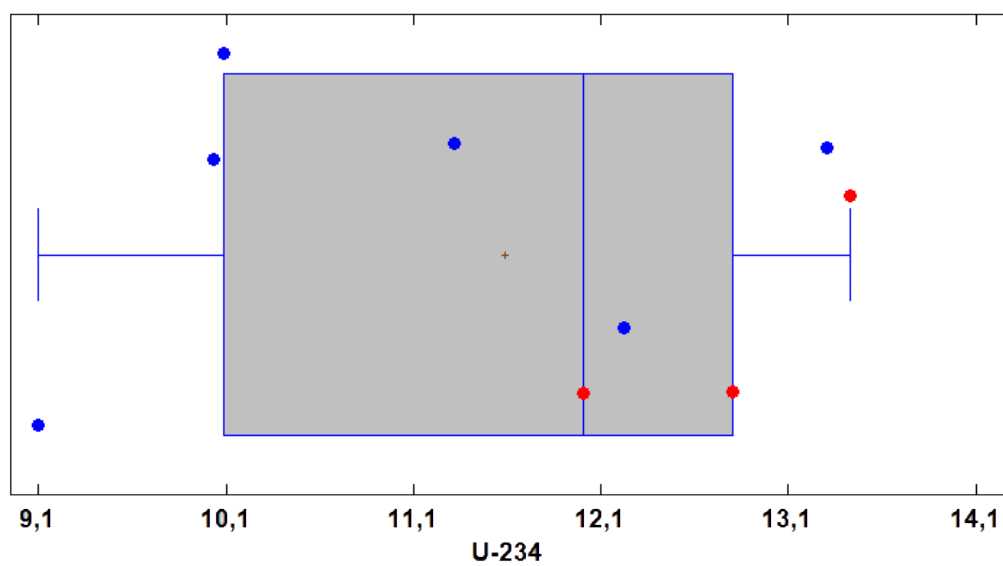
**Figure S1.1.**  $^{234}\text{Th}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



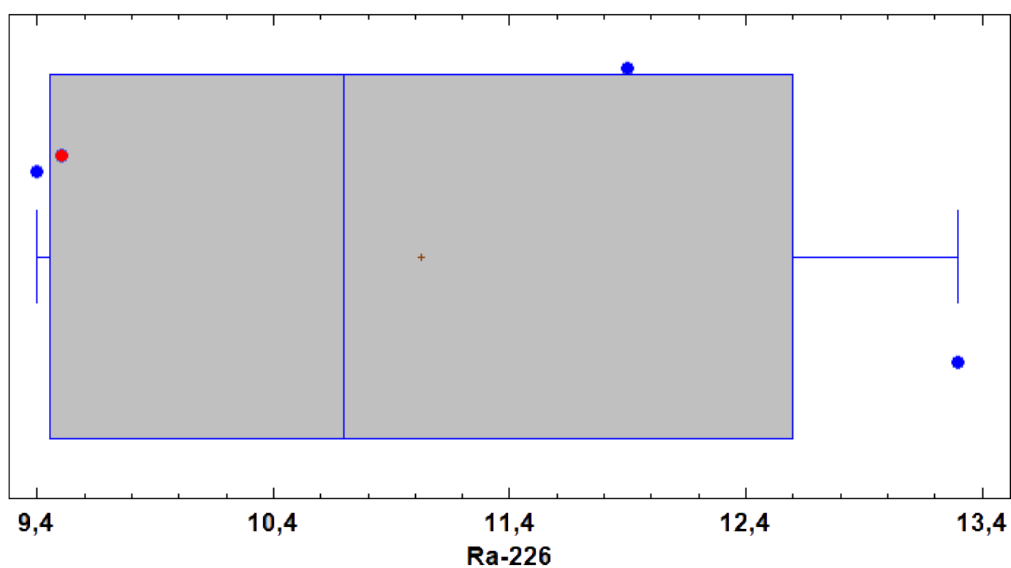
**Figure S1.2.**  $^{238}\text{U}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



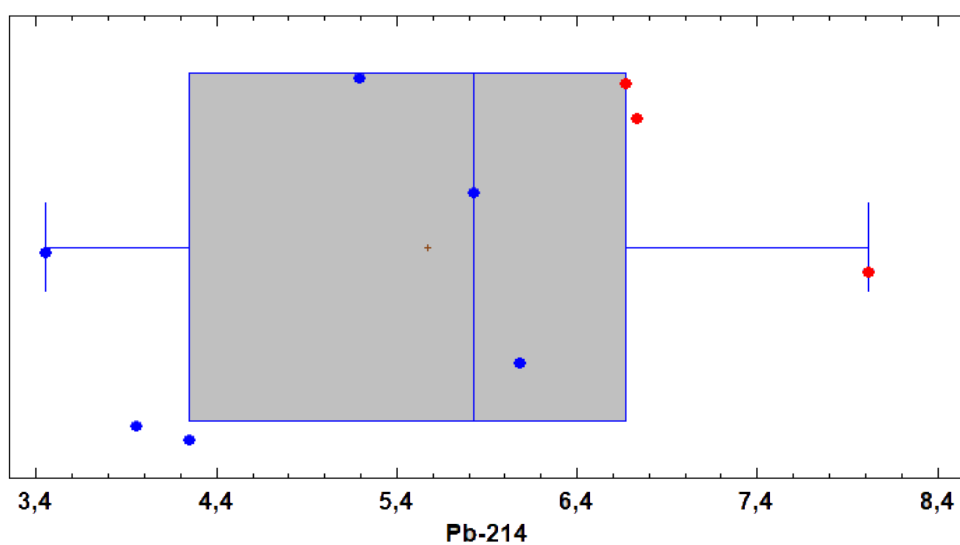
**Figure S1.3.**  $^{235}\text{U}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



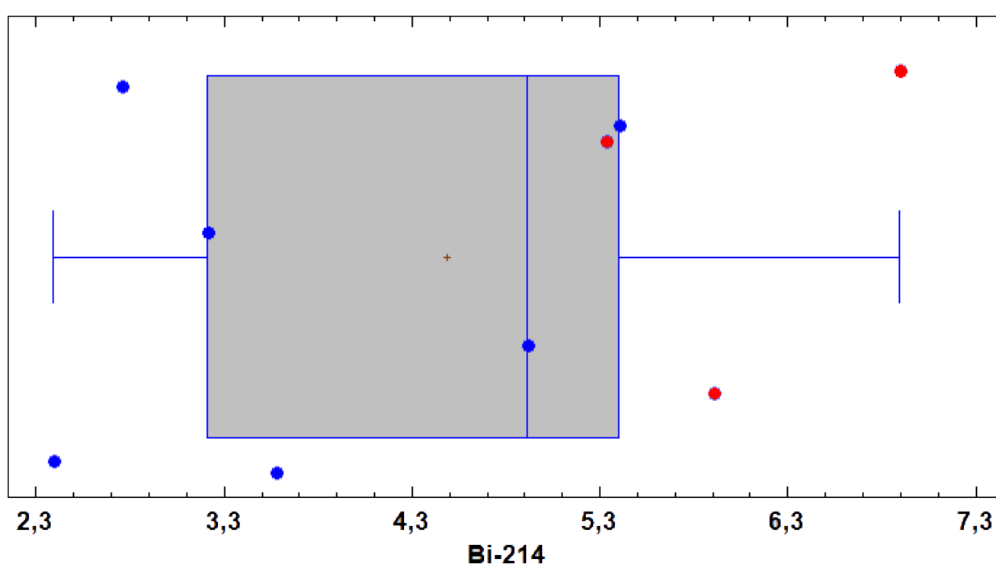
**Figure S1.4.**  $^{234}\text{U}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



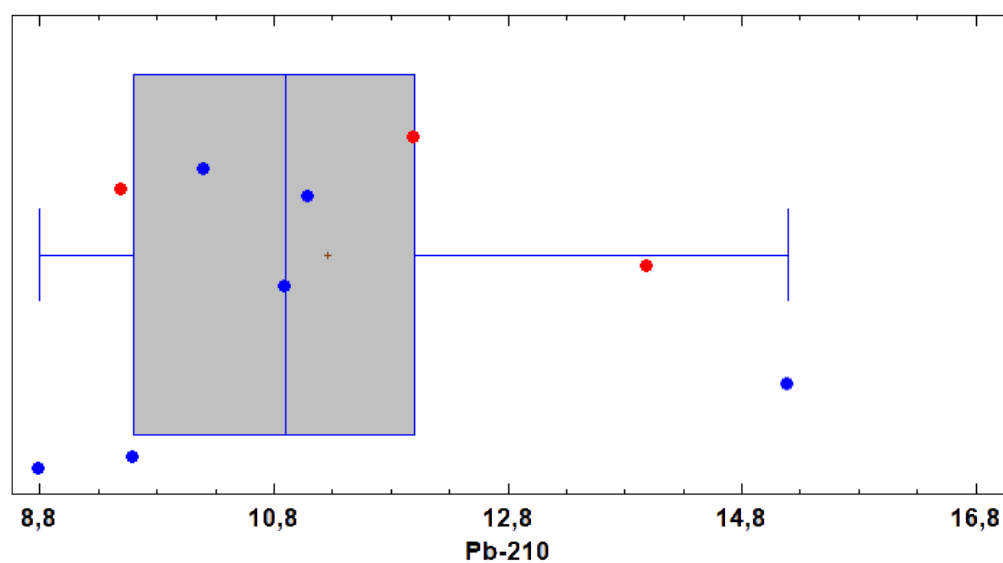
**Figure S1.5.**  $^{226}\text{Ra}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



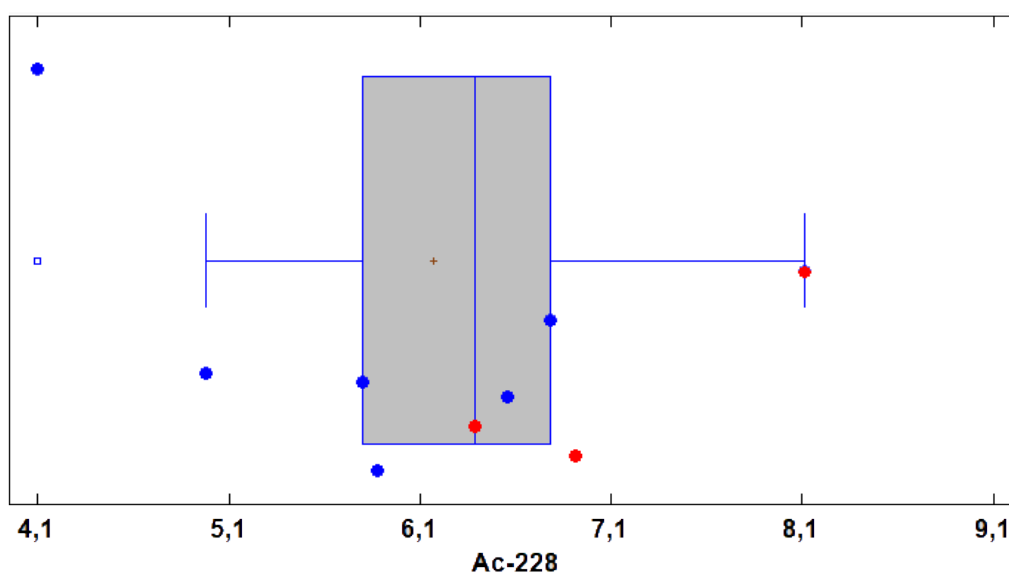
**Figure S1.6.**  $^{214}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



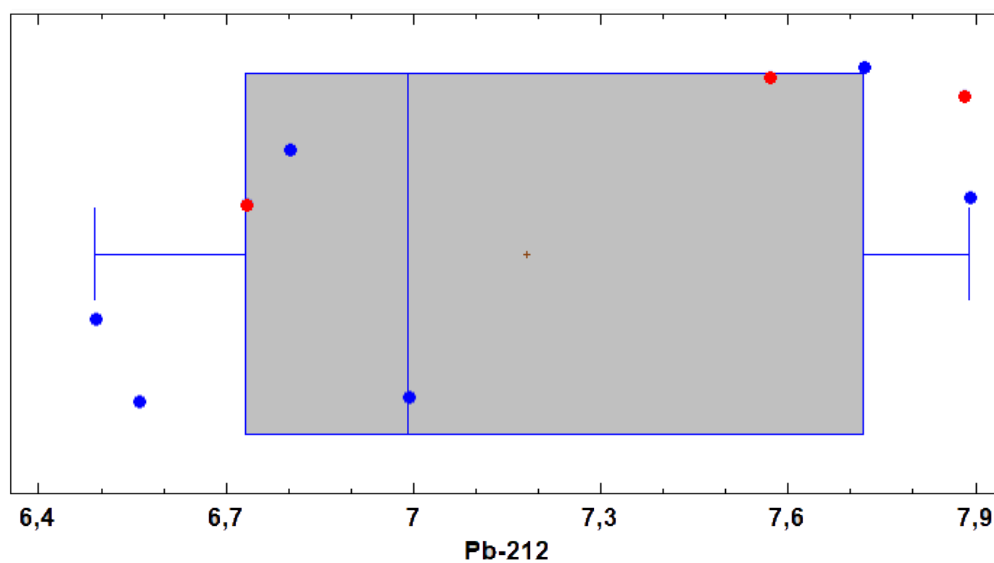
**Figure S1.7.**  $^{214}\text{Bi}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



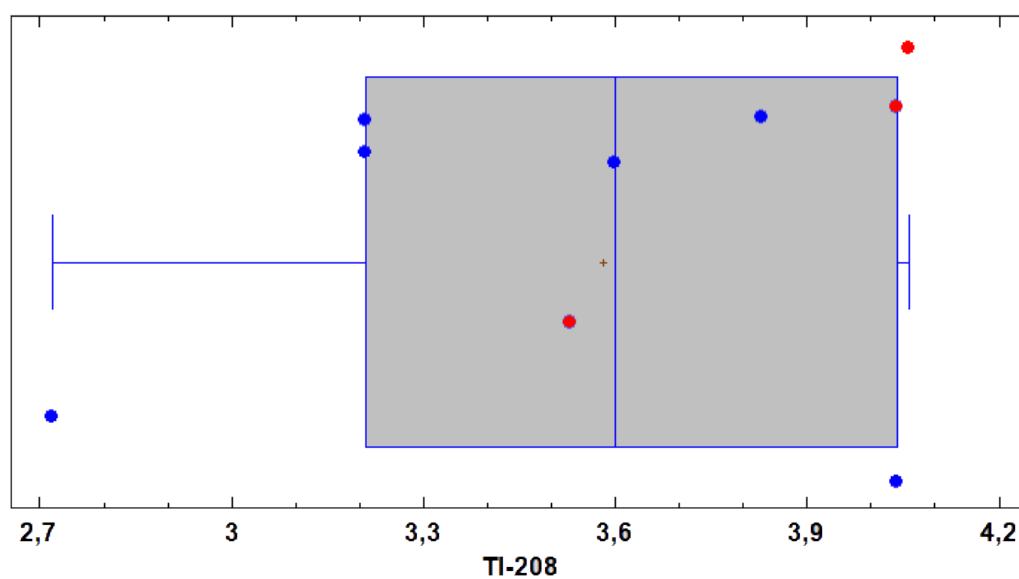
**Figure S1.8.**  $^{210}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



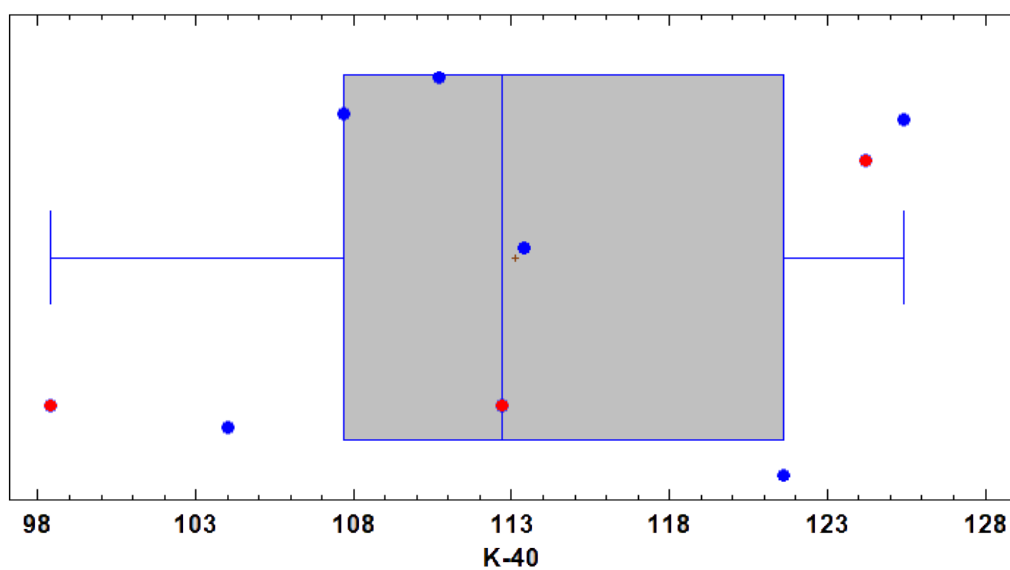
**Figure S1.9.**  $^{228}\text{Ac}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



**Figure S1.10.**  $^{212}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

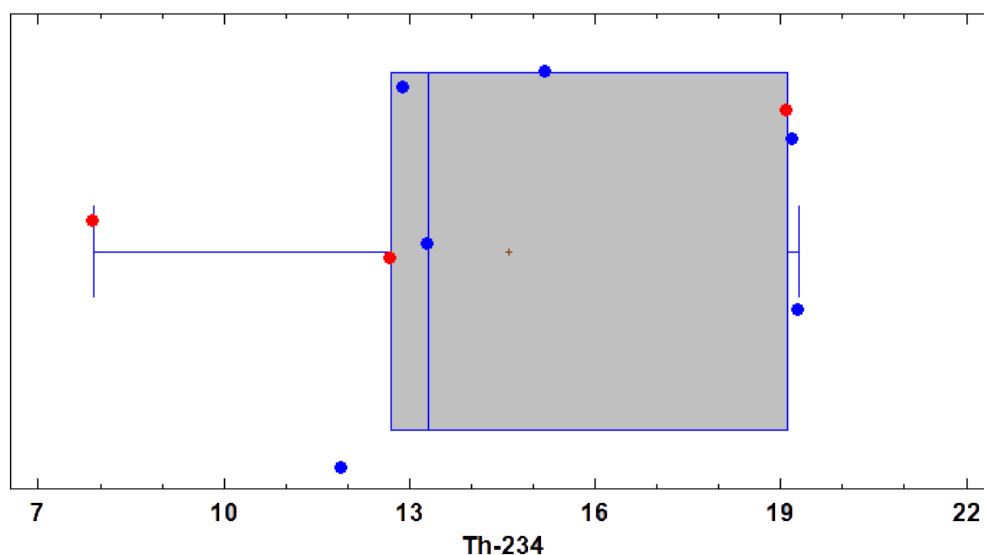


**Figure S1.11.**  $^{212}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

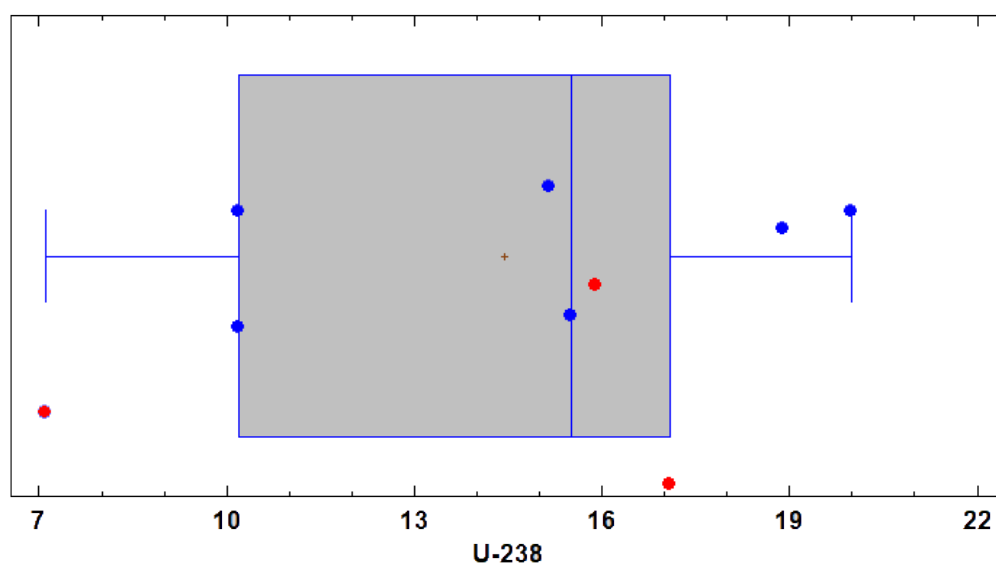


**Figure S1.12.**  $^{40}\text{K}$  activity concentrations box-and-whisker plot for ground mortar made with CEM I 52.5 R-SR 3 cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

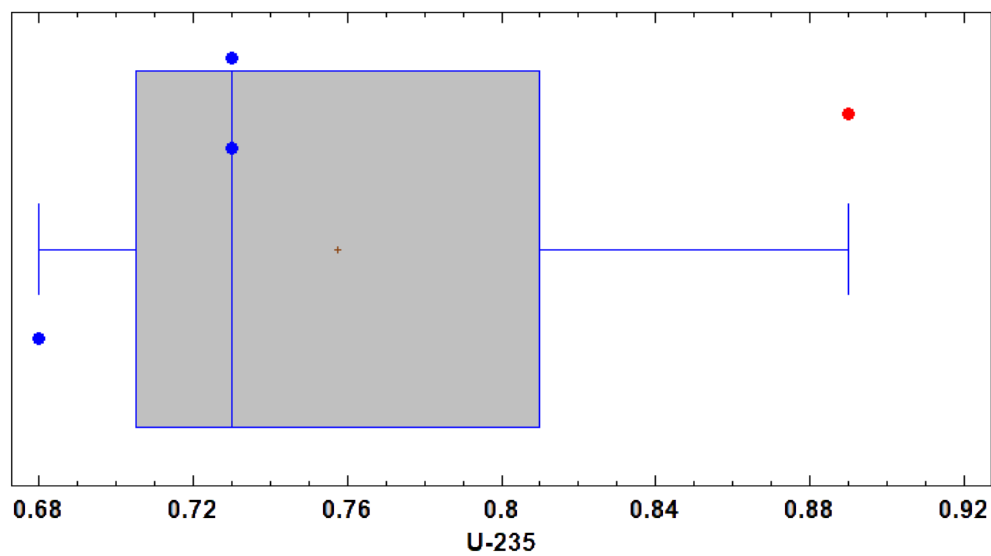
**Supplementary S2. Box-and-whisker and scatter plots for the radionuclides of mortars made with CEM II/A-S 42.5N cement.**



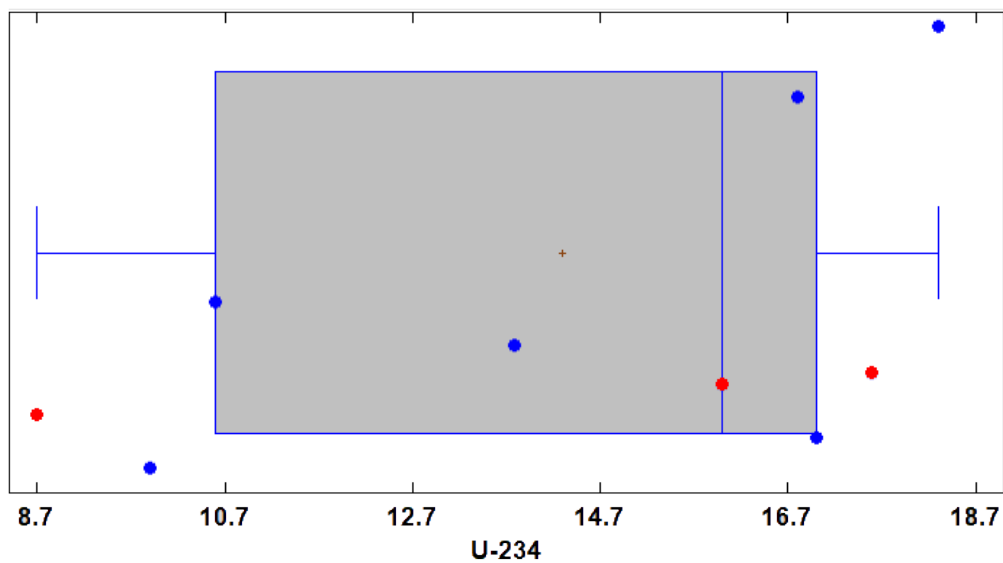
**Figure S2.1.**  $^{234}\text{Th}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



**Figure S2.2.**  $^{238}\text{U}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

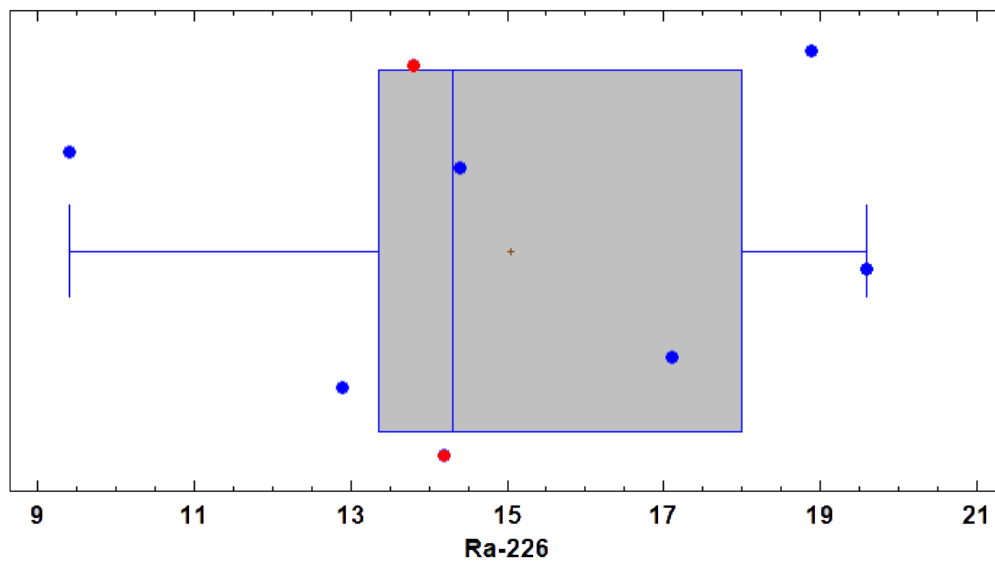


**Figure S2.3.**  $^{235}\text{U}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

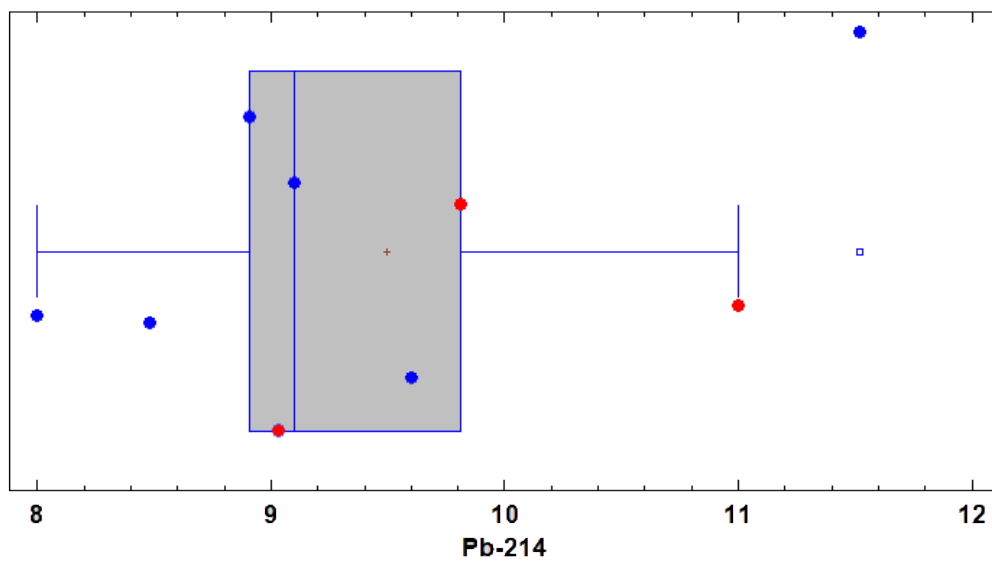


**Figure S2.4.**  $^{234}\text{U}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

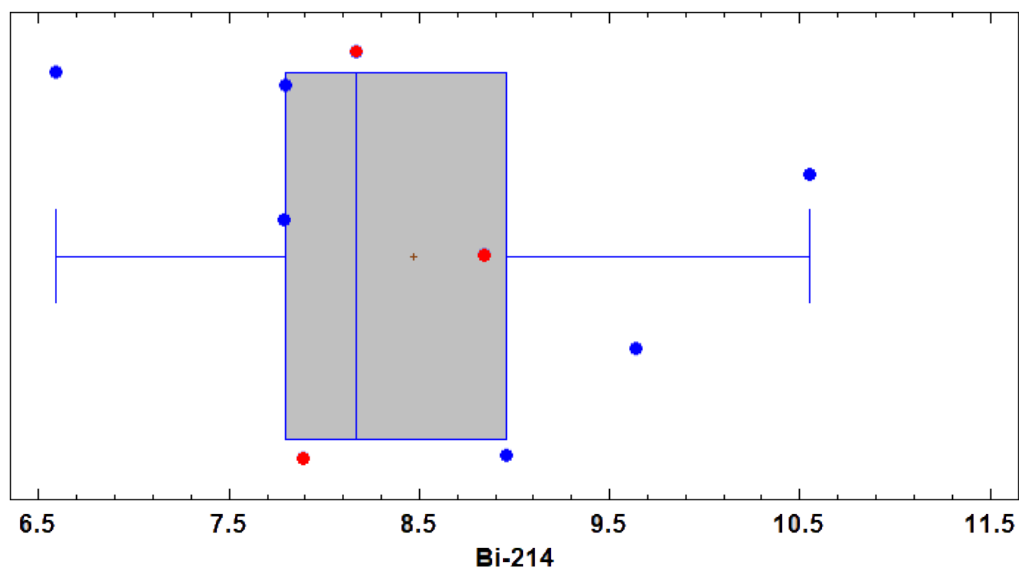




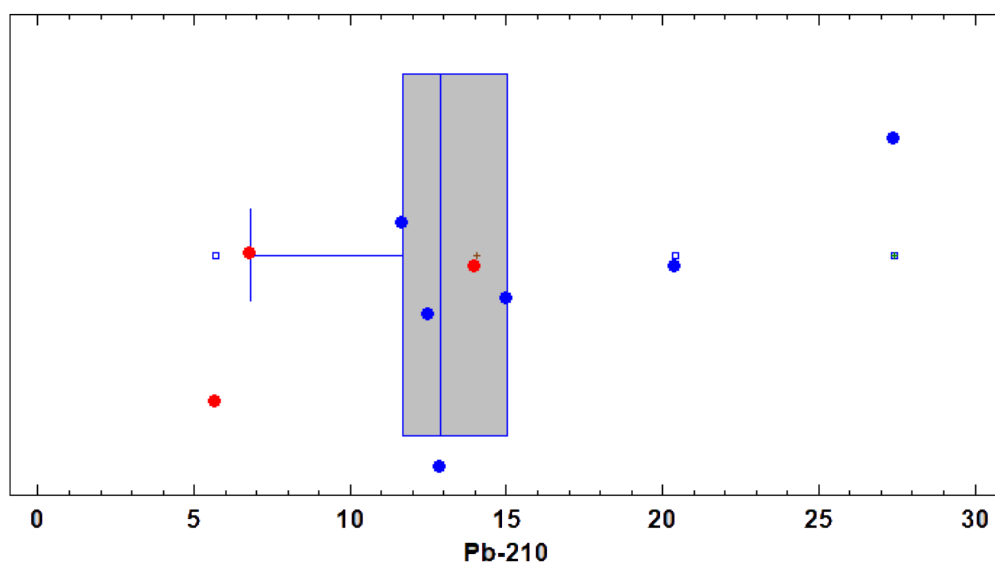
**Figure S2.5.**  $^{226}\text{Ra}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



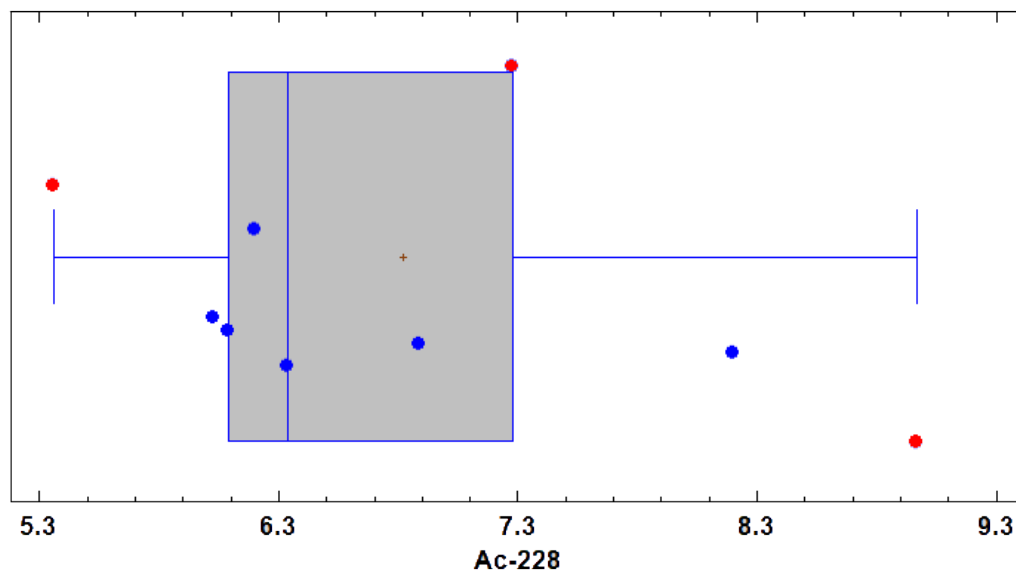
**Figure S2.6.**  $^{214}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



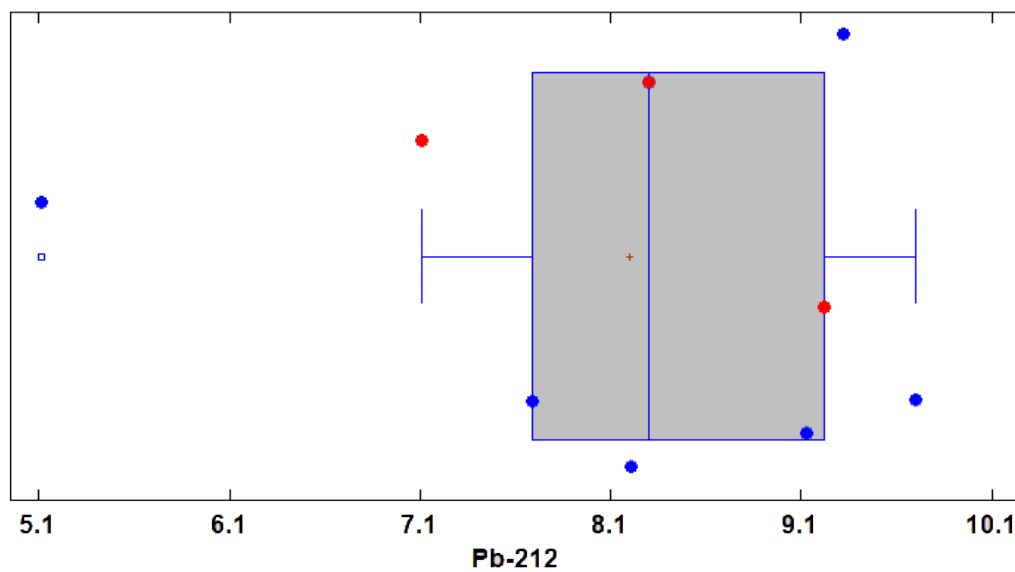
**Figure S2.7.**  $^{214}\text{Bi}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



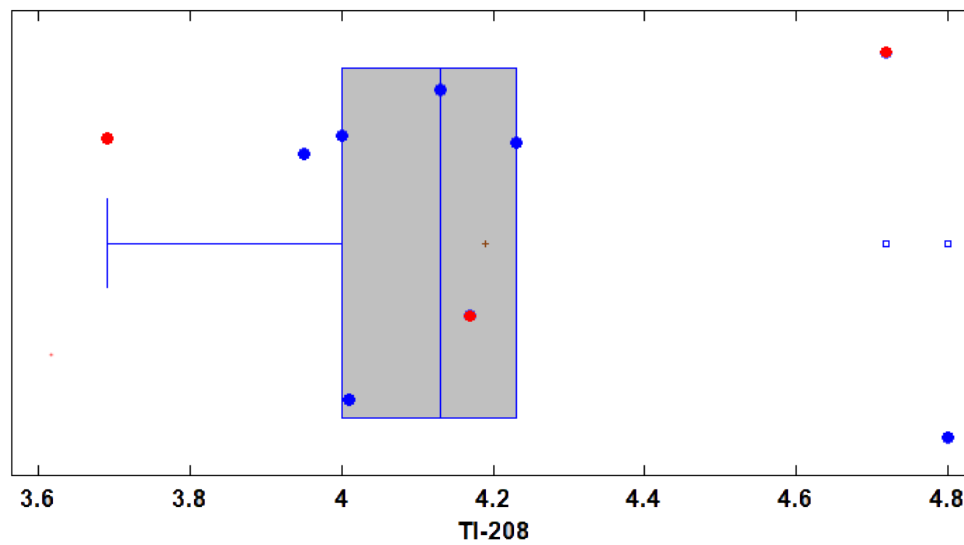
**Figure S2.8.**  $^{210}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



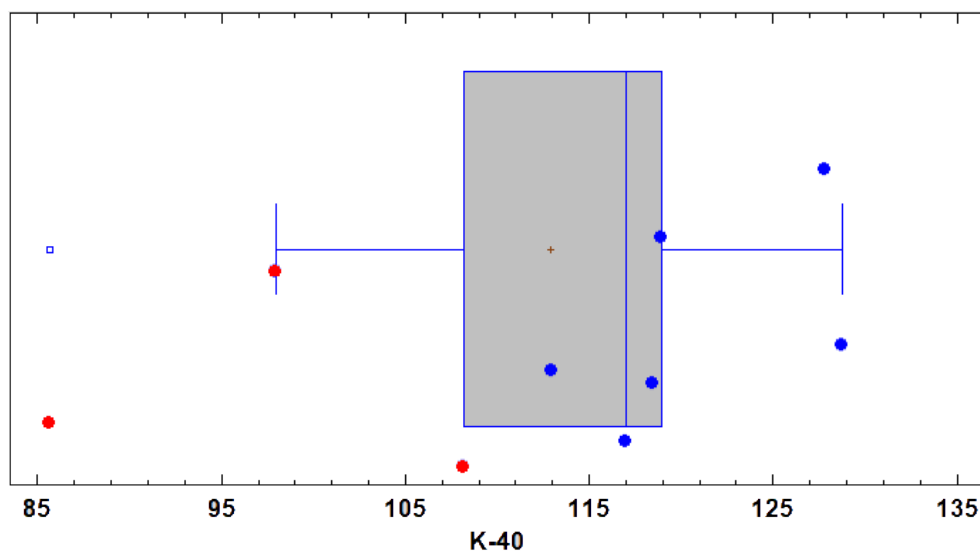
**Figure S2.9.**  $^{228}\text{Ac}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



**Figure S2.10.**  $^{212}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

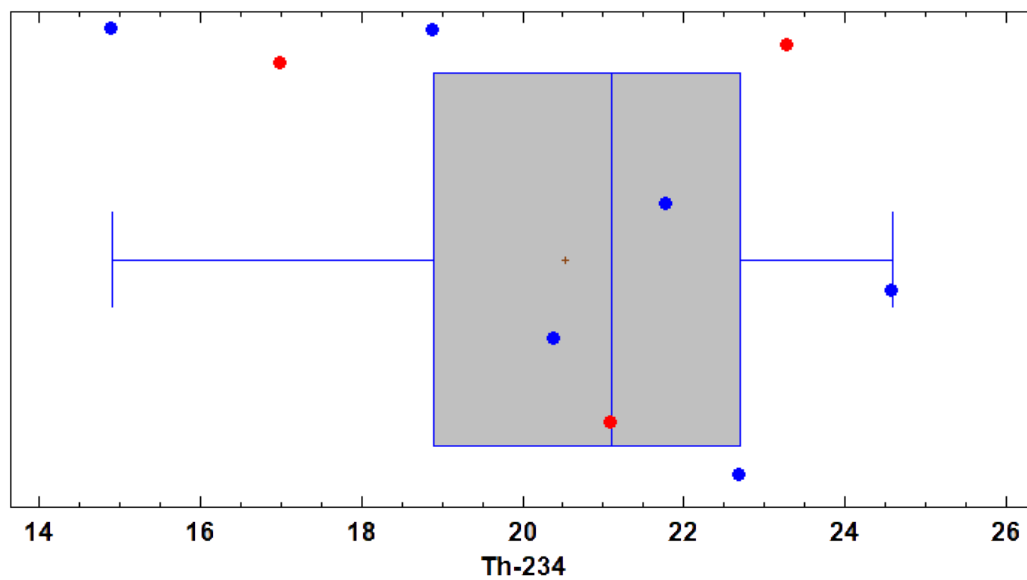


**Figure S2.11.**  $^{208}\text{Tl}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

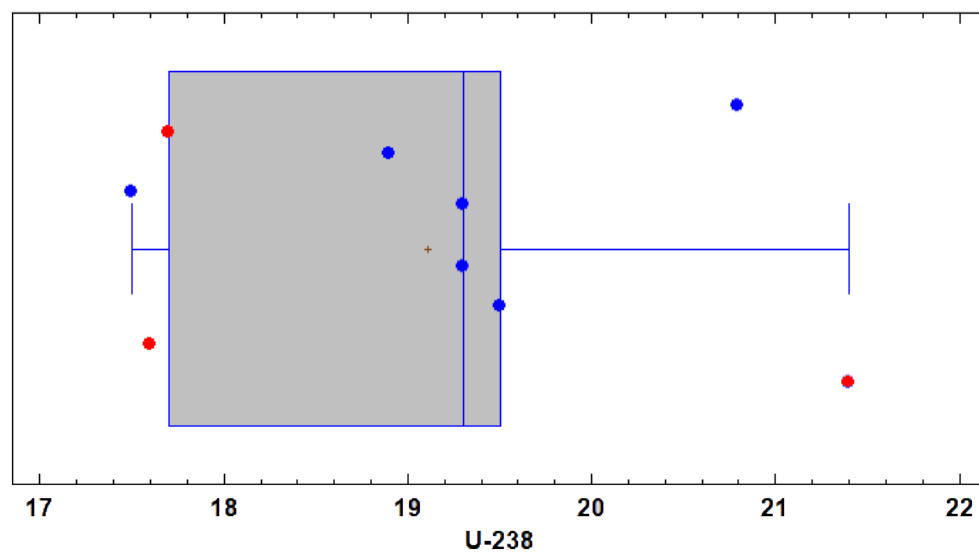


**Figure S2.12.**  $^{40}\text{K}$  activity concentrations box-and-whisker plot for ground mortar made with CEM II/A-S 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

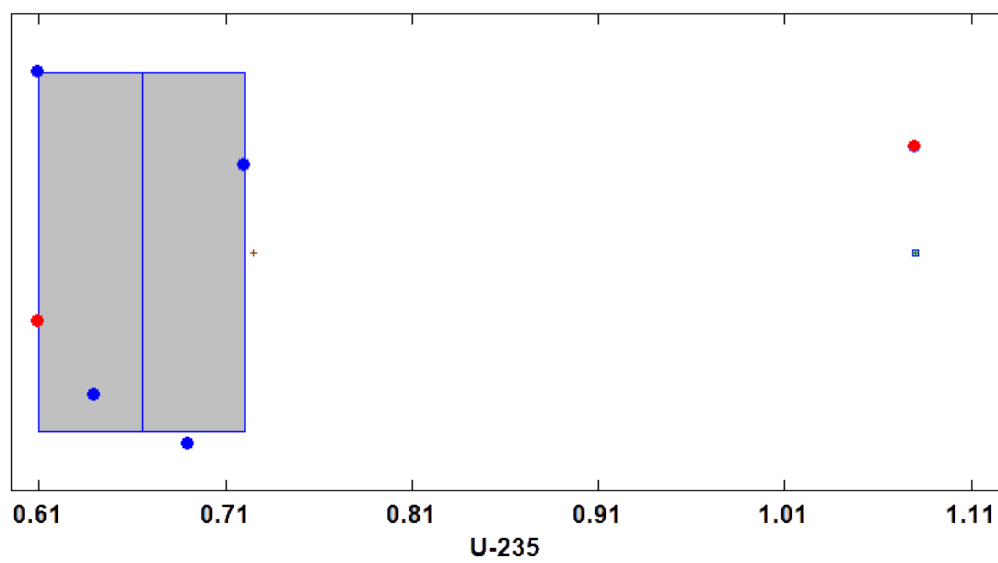
**Supplementary S3. Box-and-whisker and scatter plots for the radionuclides of mortars made with CEM III/A 42.5N cement.**



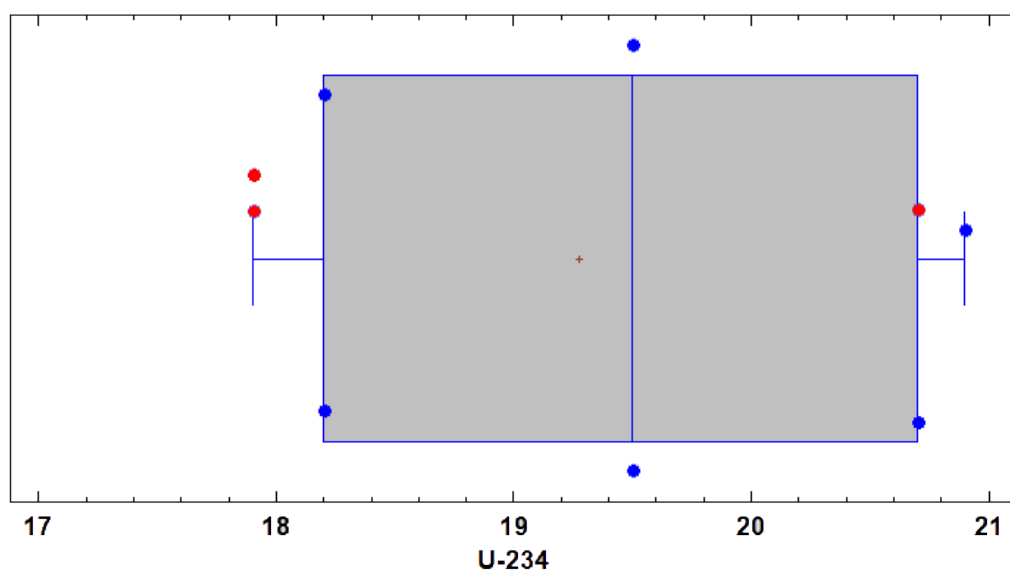
**Figure S3.1.**  $^{234}\text{Th}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



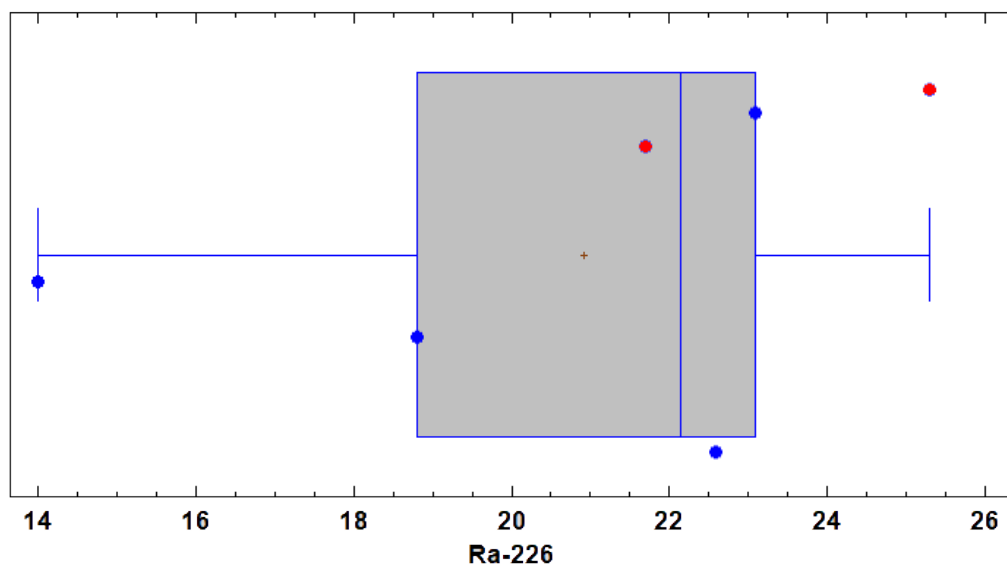
**Figure S3.2.**  $^{238}\text{U}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



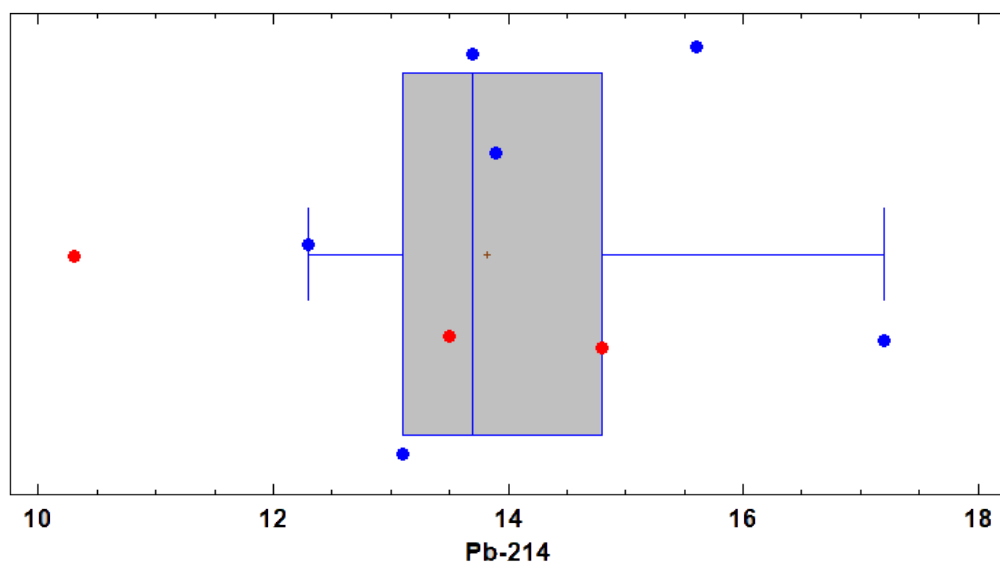
**Figure S3.3.**  $^{235}\text{U}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



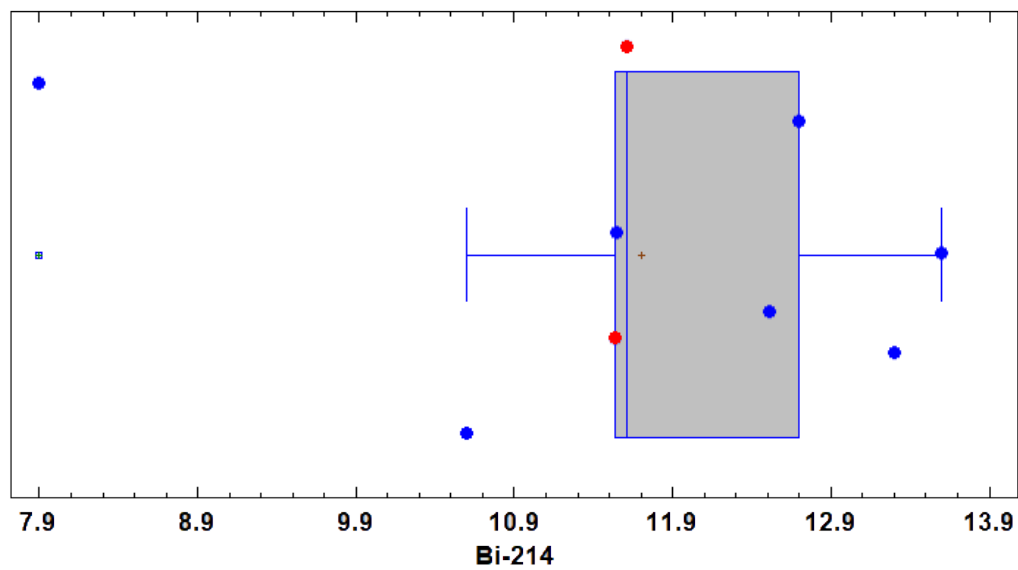
**Figure S3.4.**  $^{234}\text{U}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



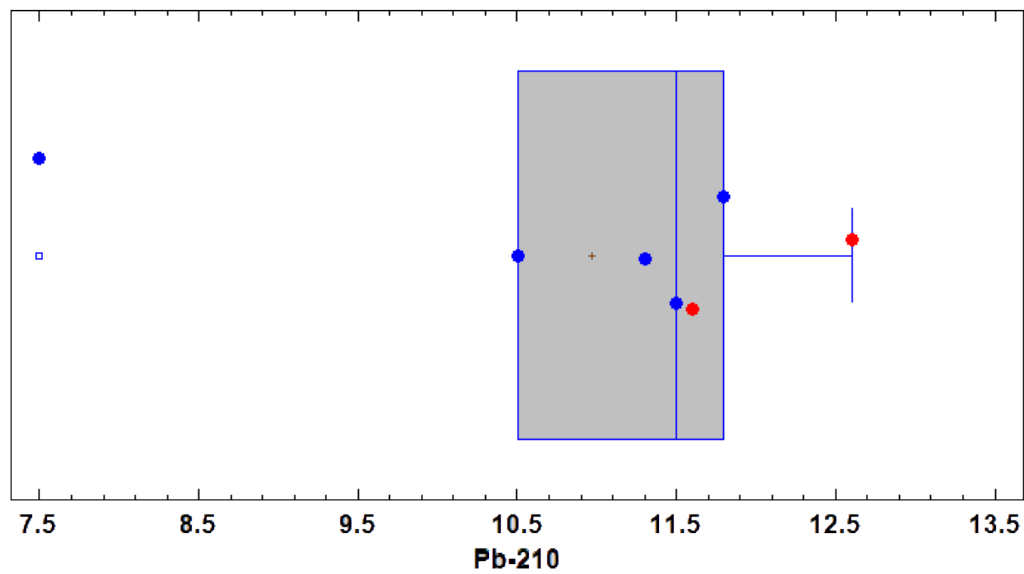
**Figure S3.5.**  $^{226}\text{Ra}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



**Figure S3.6.**  $^{214}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

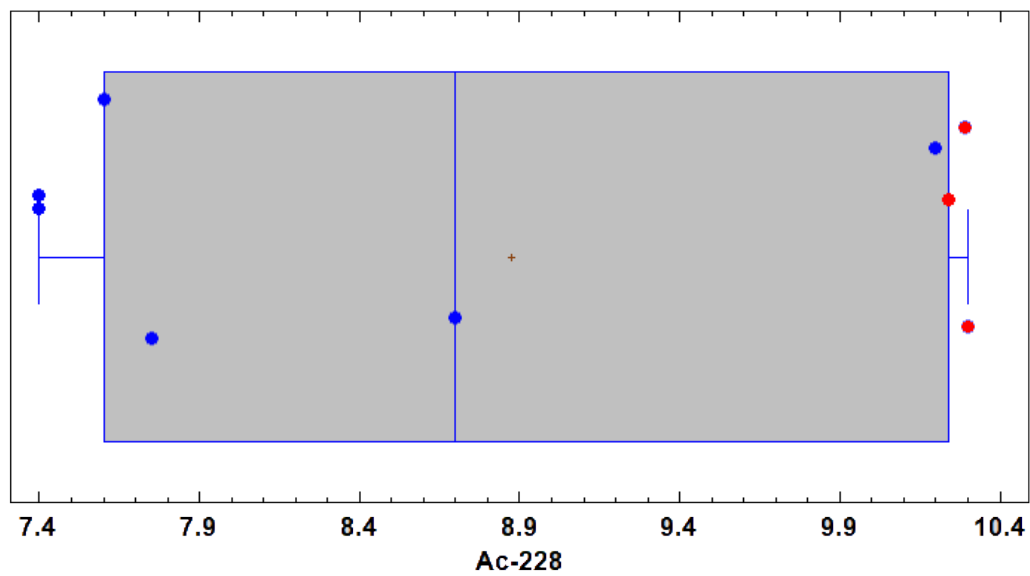


**Figure S3.7.**  $^{214}\text{Bi}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

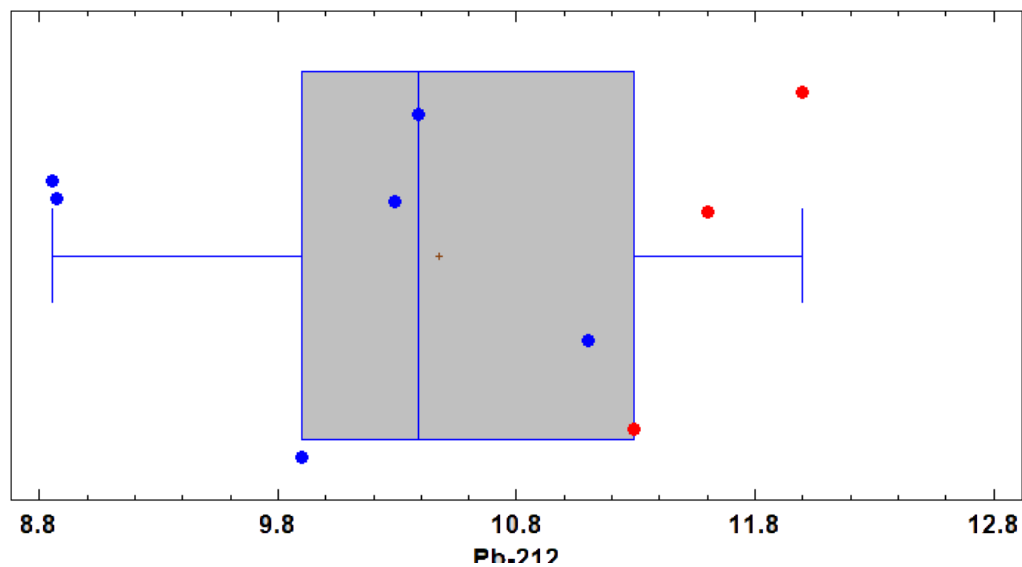


**Figure S3.8.**  $^{210}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

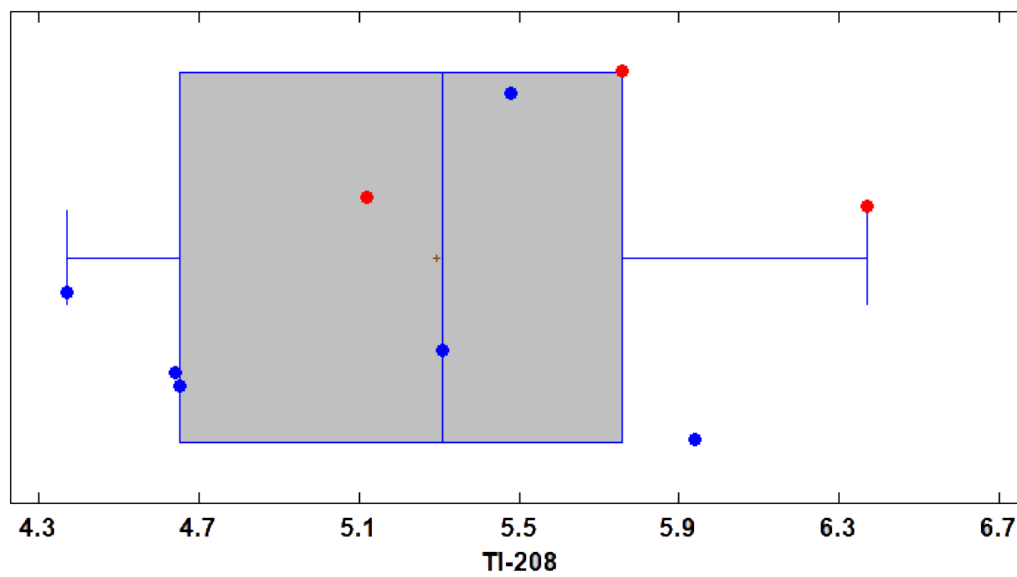




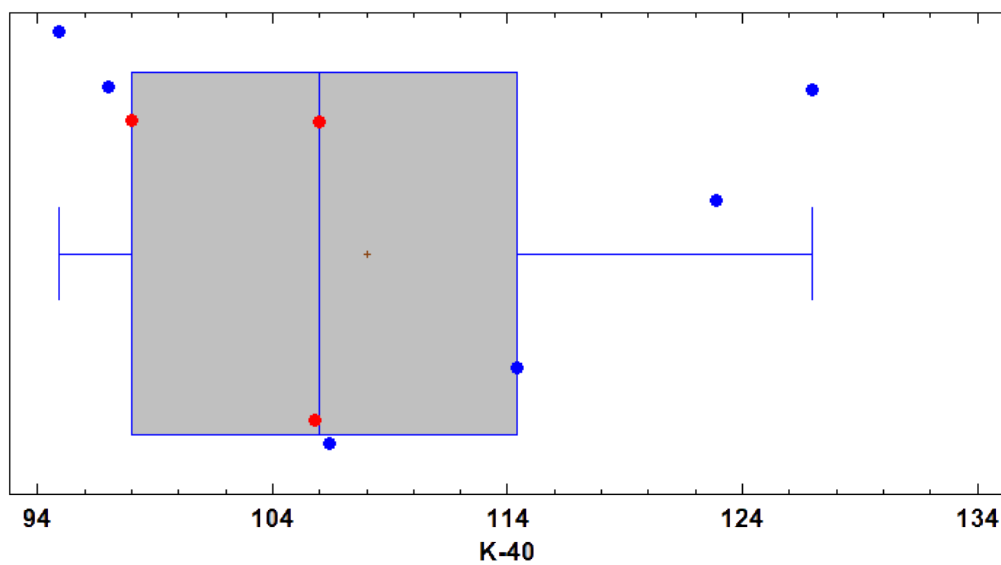
**Figure S3.9.**  $^{228}\text{Ac}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.



**Figure S3.10.**  $^{212}\text{Pb}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

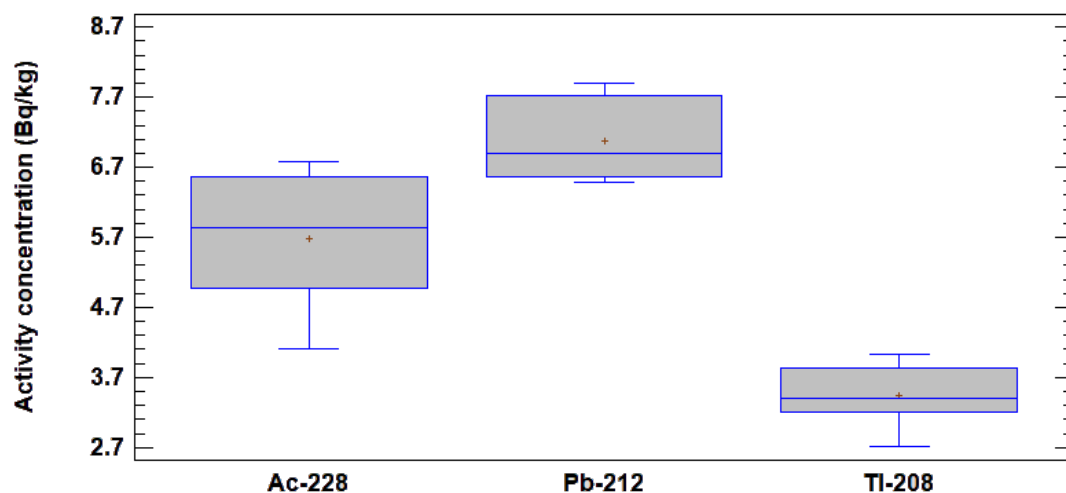


**Figure S3.11.**  $^{208}\text{Tl}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

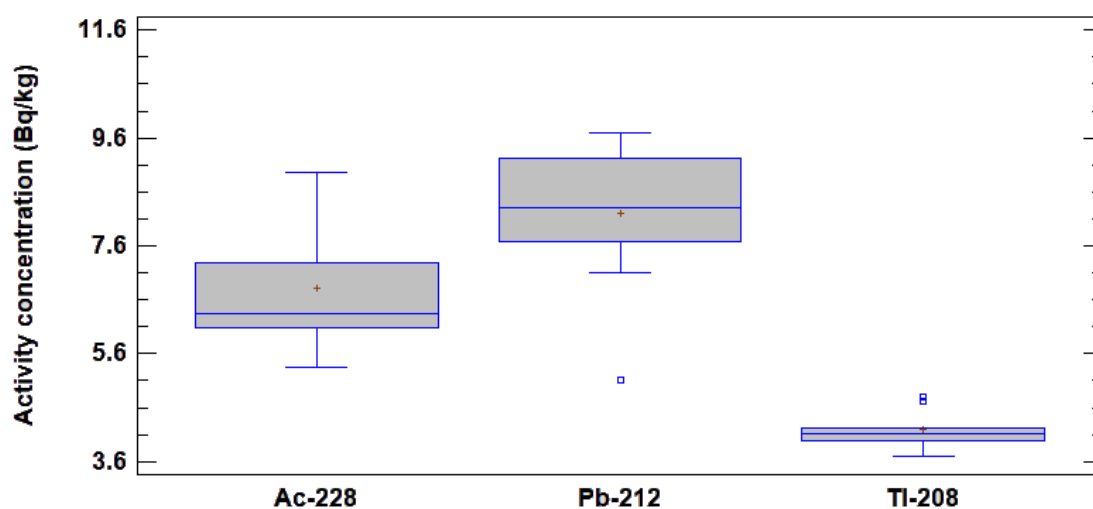


**Figure S3.12.**  $^{40}\text{K}$  activity concentrations box-and-whisker plot for ground mortar made with CEM III/A 42.5 N cement. The red dot shows the value for non-carbonated mortar and the blue dot shows the activity concentrations at different curing ages.

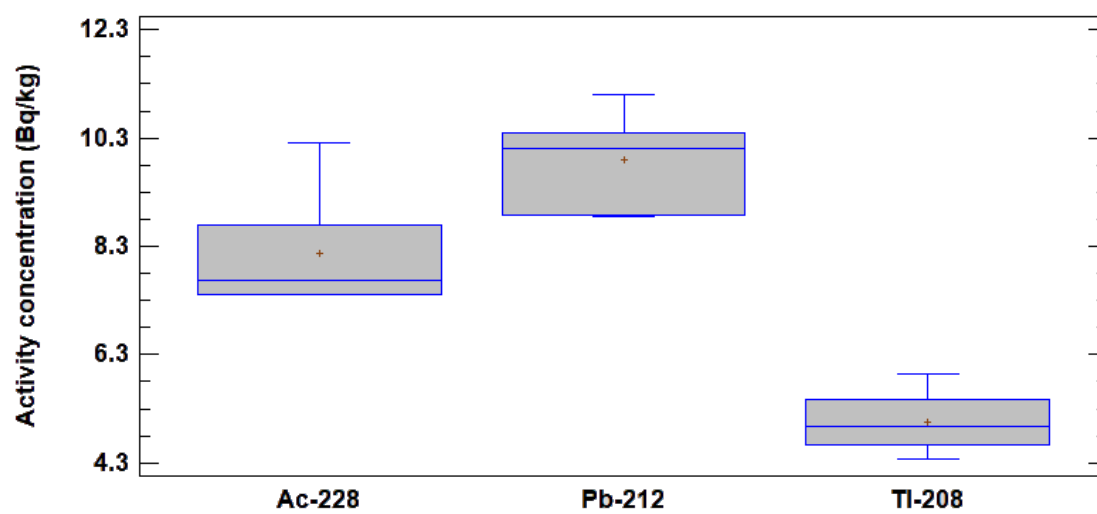
**Supplementary S4. Comparison of the activity concentrations of the radioactive thorium series for the three tested mortars.**



**Figure S4.1.** Activity concentration distributions of the radioactive thorium series for the mortar made with CEM I 52.5 R-SR 3 cement.



**Figure S4.2.** Activity concentration distributions of the radioactive thorium series for the mortar made with CEM II/A-S 42.5 N cement.



**Figure S4.3.** Activity concentration distributions of the radioactive thorium series for the mortar made with CEM III/A 42.5 N cement.