Übungen 3

1. Due to the atomic bomb test program between 1970 and 2016 the human radioactivity content has increased by 20% to about 2750 Bq. Compare that with the dose the human received from its natural content of ^{40}K (assume a body mass of 80 kg).

2. Take the total activity level of the body of 8 kBq and calculate the thermal energy release per hour (in Joule/h) assuming an average energy of 1.5 MeV per decay event deposited into the body of 70 kg mass.

3. For an average fertilized area of 20 acres ($\approx$ 80,000 m^2) (using a „light" spread of 2000 gal/acre ((1 gal $\approx$ 3.8 l))a total of 5.9 million Bq (MBq) is distributed annually. To what extend does this fertilizing effort enrich the soil in radioactive content if you assume a fertilization depth of 30 cm. Compare the radioactivity level with the natural soil activity (400 Bq/kg)!

4. A traditional sailing vessel carried a load of 2000 tons of Guano from Chile to its port of destination. Calculate the total activity of the load. Assuming a travel time of two months calculate the dose the sailors receive through external exposure assuming the deck area of the ship to be 500 m^2.

5. To kill germs in your strawberries, the 10 kg load of strawberries are exposed to 10 gray of 1.117 and 1.33 MeV radiation from a ^{60}Co source. Calculate the activity of the source.

6. A satellite is equipped with a atomic radium battery producing a power of 10 mW. Calculate the decay activity and the number of radium atoms in the battery. By what time will the power be only 10% of its initial value?