Determination of Radiation Exposure during the Production of Fertilizers by Measurements

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Introduction
For the production of fertilizers, among other raw phosphates and potassium are used; phosphoric acid is increasingly used. These utilized raw materials contain natural radionuclides in increased concentrations, therefore it must be assumed that the radiation exposure to manufacturing workers is significant and must be taken into account accordingly. For this reason, in a large fertilizer factory radiological examinations have been carried out to determine the radiation exposure of employees in the production of phosphate-containing fertilizers.

Results

Effective dose due to internal and external radiation exposure as well as effective total dose to workers in the manufacture of phosphate-based fertilizers when considering realistic and conservative scenarios

Conclusions

The limit of 1 mSv per year is with high probability not exceeded even in unfavorable circumstances, especially as with, a dose reduction by wearing dust masks was not taken into account in the dose calculation.

Even taking into account new dose coefficients according to ICRP 137, the total dose remains below 1 mSv per year under realistic assumptions (maximum dose for the workplace “Cleaner” is 0.92 mSv/a).

Based on the conservative scenarios, the workplace “Cleaner” is likely to exceed the 1 mSv / a limit using the ICRP 137 dose coefficients. In particular, therefore, after publication of all dose coefficients required for the dose calculation in accordance with the new “Human Respiratory Tract Model”, we recommend an arithmetical reassessment of the available measurement data.

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