



# Arsenic in soils and rock in the Karlsruhe administrative district

## ARSEN IN BÖDEN UND GESTEINEN IM REGIERUNGSBEZIRK KARLSRUHE

### BACKGROUND, OBJECTIVE

In Baden-Württemberg (BW) the average background value for arsenic is 17 mg/kg. In several areas this value – as in other federal states – is naturally exceeded, e.g. during construction projects in Bruchsal, natural arsenic levels of over 100 mg/kg were found in the subsoil. Increased contaminant levels in the soil affect several sensitive receptors and in general the competencies of different branches of the administration too – including, e.g. soil conservation, water, health, feedstuffs, waste and building planning authorities.

In this pilot project, Baden-Württemberg was quick to establish the basic principles for describing the facts and for uniform assessment of this soil contamination, as well as to describe the deducible consequences and possible actions for the administration and local authorities.

Though limited in the scope of investigation, the pilot project produced informative results. Transfer of the procedure used to other cases appears basically possible and advisable.

### IMPLEMENTATION AND RESULTS

Part 1 of the project involved a desk study with review of existing literature, the results of which were verified in part 2 of the project through exemplary sampling and chemical analyses.

Soils and rocks of the following strata, with thicknesses of < 1 m up to max. 10 m, can contain nat-

urally increased arsenic levels according to the knowledge available to date:

- Lower Lettenkeuper near faults = (average As level approx. 22 – 24 mg/kg)
- Upper Muschelkalk (Rhine rift valley fault, Bruchsal area) = (average As level approx. 26 – 45 mg/kg)
- Lower Muschelkalk, Wellenkalk 2 = (average As level approx. 44 – 49 mg/kg)
- Lower Muschelkalk, Galena Bank = (average As level approx. 46 – 47 mg/kg)
- Lower Muschelkalk, Horizontal Dolomite = (average As level approx. 51 – 76 mg/kg)

Whether and to what extent the levels in these rock strata and in the soils above them are increased, differs regionally. This is shown by way of the Lower Muschelkalk, which is present in the near-surface subsoil near Pforzheim as well as in the Neckar-Odenwald district. Significantly increased arsenic levels were only found in the Pforzheim area.

The data collected to date is random. Therefore, the pilot project has significantly improved knowledge of natural arsenic levels in the soil. The competent authorities can now, more easily than before, check whether investigation for arsenic is indicated in an individual case.

**SOIL CONSERVATION ASSESSMENT OF THE FINDINGS****TO DATE****RISK ASSESSMENT**

Due to the lack of substantial arsenic release, there is no identifiable risk to the soil – human, soil – crop plant and soil – groundwater exposure pathways, even though the test values were exceeded in some individual cases.

Exception: Potential risk in case of grassland use of soils above the Horizontal Dolomite of the Lower Muschelkalk (test for feedstuff safety).

**USE OF SOIL MATERIAL**

Use under the principle: like with like. Because arsenic is hardly released when disposed of on local soil tip sites, no harm to the well-being of the general public is to be assumed.

Consideration in urban development planning

Residential areas in the area above the Horizontal Dolomite of the Lower Muschelkalk. Children's play areas above Lower Muschelkalk in general.

Bruchsal area: Soil / subsoil above Upper Muschelkalk and Estheria strata.