



**Brenk
Systemplanung**

Consulting Engineers & Scientists

Expert Solutions

for Safe NORM Management



INDEPENDENT - RELIABLE - INNOVATIVE

Made in Germany

Worldwide Expertise

Our Clients:

- National Regulators and International Organisations
- Mining Companies
- NORM Industries
- Oil & Gas Companies
- Geothermal Facilities
- Radioactive Waste Management Organisations

Selected References:

- NORM regulations for German Radiation Protection Ordinance
- Management and cleaning of NORM contaminated pipes and equipment from Oil & Gas production
- Radiological assessments and remediation of NORM contaminated sites and former uranium mining sites
- Assessment of radiological impacts of waste water discharges
- Radiological aspects in geothermal facilities
- Disposal of NORM waste





Objectives

Analyses and assessment of NORM releases into environmental media from industrial and mining processes aimed at:

- prevention and/or minimisation of potential radiation exposures of the public
- occupational radiation protection
- safe disposal of NORM residues
- long term environmental protection

concerning:

- solid NORM (soil, sediments, ashes, slags, filter material, etc.)
- NORM contaminated water (groundwater, surface water bodies, industrial water discharges, etc.)
- NORM pollution of ambient air (by dust, radon and its short-lived progeny)

A close-up photograph of a metal flange, likely part of a pipe or valve. The flange is made of a light-colored metal, possibly aluminum or stainless steel, and shows signs of wear and rust. A black probe is inserted into a hole in the center of the flange. An orange rectangular block is positioned around the probe, possibly for protection or measurement. The background is a solid blue color.

Services

Regulations and Recommendations

- Elaboration of scientific fundamentals and technical standards
- Specification of legal requirements
- Preparation of ordinances, guidelines and procedures for analysis and management of NORM

Analyses

Execution of site-specific radiological surveys:

- field measurements (γ -dose rate, in-situ spectrometry, surface contamination, radon in ambient and soil air, exhalation rates, etc.)
- sampling (soil, water, sludge, scratch samples from contaminated surfaces)

Realisation of laboratory sample analyses:

- spectrometric measurements (α , β , γ) of specific activities
- chemical and mineralogical analyses

Evaluation of measurement results:

- statistical data examination
- data based modelling (physical and chemical)

Taking care of radiation protection issues is our first priority.

Assessments

Estimation of realistic and potential exposures:

- occupational radiation exposure
- present and/or future public exposure

Compliance with radiation protection limits and/or reference values:

- effective doses
- activity concentration, contamination level

Justification, motivation and objectives for radiation protection measures:

- specific NORM management procedures
- decontamination, disposal and remediation

Preparation and Management of Project Execution

- Preparation of service specification for tenders
- Comparative evaluation of biddings resulting in comprehensible suggestions for commissioning
- Project scheduling including the determination of essential project phases
- Matching of responsibilities and requirements for reporting on project performance
- Specifically taking over the responsibility for radiation protection issues
- Management of the technical project execution in co-operation with the client
- Project performance documentation

Concept Development and Project Optimisation

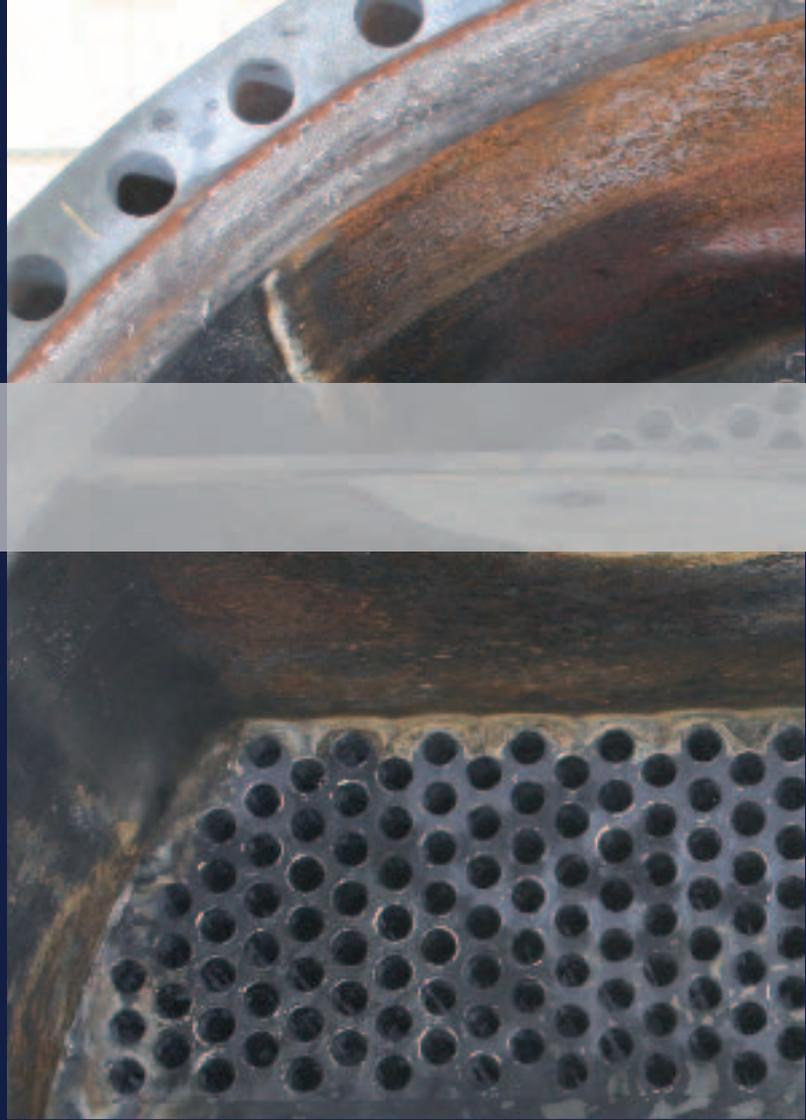
- Compilation and adaption of feasible disposal, decontamination or remediation measures
- Cost-Benefit-Risk analysis and assessment of the various technically feasible options
- Selection of the preferable option and matching with regulatory requirements and client abilities
- Technical project optimization

Services

The accumulation of NORM due to technical processes is a particular issue of facilities handling substances containing radionuclides of the uranium and thorium decay chain.

By means of process analyses and modelling of activity balances on a high scientific basis we develop the best solutions for our clients to deal with residues from industrial or mining processes.

We provide our clients with concepts for the reduction of radiation exposure, taking into account all aspects of process engineering and identify possible optimisation of the material flow for the most appropriate disposal pathways as a case-by-case review.



Radon Measurements

Measurement of Radon is executed by Brenk Systemplanung via

- short-term measurement of Rn-222 concentration in ambient air near the surface and
- long-term measurement of Rn-222 concentration in soil using Radon exposimeter.

The measurement device used for these tasks is AlphaGUARD.

Measuring Techniques

Brenk Systemplanung utilizes advanced measuring devices for radiological surveys such as

- γ -dose rate (e.g. FH 40 G-L10 probe FHZ 672 E-10),
- γ -energy spectrum (InSpector 1000),
- surface contamination (e.g. MicroCont II probe NORM 1) and
- high resolution in-situ γ -spectrometry (e.g. ISOCS)

Using up-to-date technology provides cost-benefit optimised planning of the sampling strategy.



Measuring Techniques

Solid NORM, water and sediments samples are taken on-site.

Laboratory analyses are performed by

- high resolution γ -Spectrometry,
- alpha spectrometry and
- β -LSC.

Choosing the measurement technique is adapted to the issue and optimised in terms of a cost minimisation for our clients.

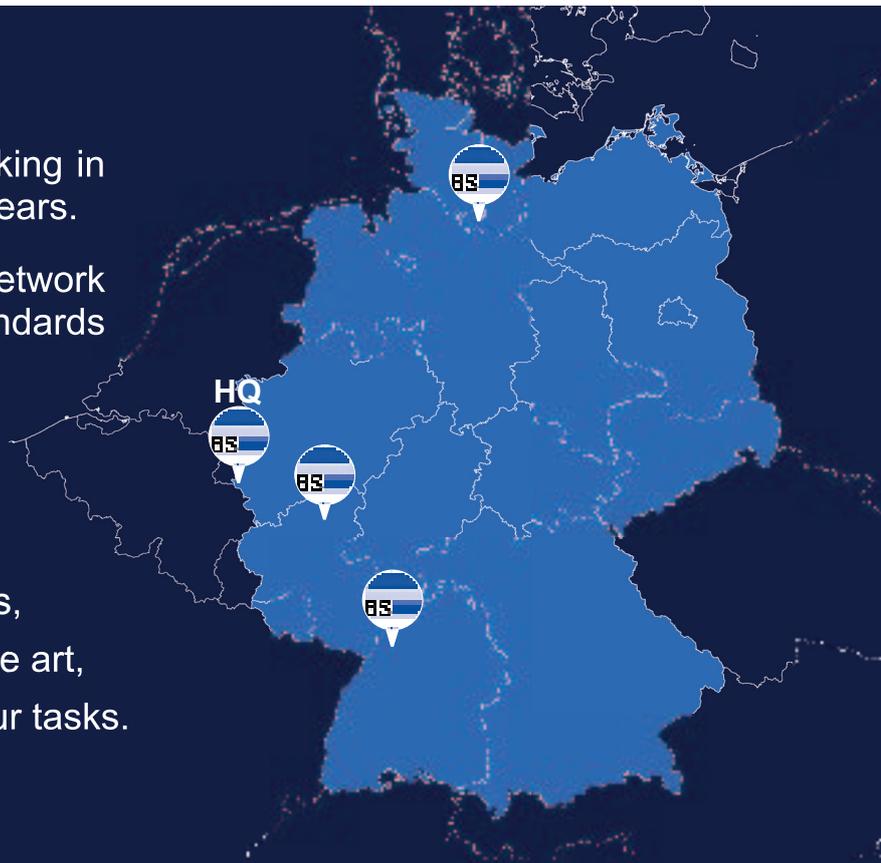


Brenk Systemplanung has been working in the field of NORM for more than 30 years.

Our broad national and international network enables us to keep highest quality standards always up to date.

Our experienced team offers

- interdisciplinary assessments,
- tailor-made solutions for our clients,
- qualified work based on state of the art,
- cost-effective implementation of our tasks.



**Brenk Systemplanung is your
reliable partner for safe NORM management.**

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