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Technical rules for Hazardous substances	Protective measures for activities in contaminated areas	TRGS 524

The Technical Rules for Hazardous Substances (TRGS) reflect the state of the art, occupational medicine and occupational hygiene as well as other established findings for activities involving hazardous substances, including their classification and labelling. They are published by the

Committee on Hazardous Substances (AGS)

determined or adjusted with the participation of the Committee for Occupational Medicine (AfAMed).

The TRGS are published by the Federal Ministry of Labour and Social Affairs (BMAS) in the Ge- meinsamen Ministerialblatt (GMBl).

Within the scope of its application, this TRGS specifies the requirements of the Ordinance on Hazardous Substances and the Ordinance on Occupational Health Precautions. If the TRGS is complied with, the employer can assume that the corresponding requirements of the ordinances are fulfilled. If the employer chooses a different solution, he must achieve at least the same level of safety and health protection for the employees.

The present TRGS is an update of the TRGS 524 and is based on the professional association's rule "Contaminated areas" (BGR 128). The Technical Committee for Construction is responsible for updating TRGS 524 in consultation with the AGS. If the AGS considers changes to be necessary, it will ask the Technical Committee for Construction to examine the possibility of adaptation.

Content

1 Scope of application

(1) This TRGS applies to work in contaminated areas including preparatory and finishing work. It specifies the determination of information required in § 7 of the Ordinance on Hazardous Substances (GefStoffV), describes the methodology for risk assessment for activities in contaminated areas and sets out basic requirements for the selection of protective measures. Sector- or activity-specific solutions, such as those contained in the rules and instructions of the accident insurance institutions, guidelines of the damage insurers, LASI guides and other series of publications by state authorities and professional associations, are to be regarded as concrete assistance, insofar as they refer to this TRGS as a basis.

(2) When working in contaminated areas, hazards from biological agents may occur in addition to the hazards from hazardous substances dealt with in this TRGS. In this case, reference is made to the BiostoffV and the corresponding Technical Rules for Biological Agents (TRBA) as well as to the information and instructions of the statutory accident insurance institutions.

(3) This TRGS does not apply to

1. Immediate, securing and salvage measures to avert acute hazards immediately after the occurrence of damage,
2. the cleaning and maintenance of facilities within the scope of the intended operation,
3. the deposit of waste for disposal within the meaning of the Closed Substance Cycle and Waste Management Act and the operation of the necessary facilities, machinery and equipment,
4. Activities for the recycling of waste in companies that are subject to the Federal Mining Act,
5. the operation of stationary plants and facilities for the treatment of contaminated materials and substances,
6. Work in radioactively contaminated structural facilities and areas, insofar as they are subject to the Atomic Energy Act,
7. Activities in geogenically contaminated areas,
8. Activities involving materials containing asbestos as defined in Annex III No. 2.4 of the Ordinance on Hazardous Substances (see TRGS 517 "Activities involving potentially asbestos-containing mineral rust materials and preparations and products made therefrom" and TRGS 519 "Asbestos: demolition, renovation or maintenance work"),
9. Activities involving biopersistent fibres as defined in Annex IV No. 22 of the Ordinance on Hazardous Substances (see TRGS 521 "Demolition, renovation and maintenance work with old mineral wool"),
10. Activities involving materials containing PAHs in road construction (see TRGS 551 "Tar and other pyrolysis products from organic material"),
11. Activities in connection with PAH or lead-containing coating materials (see TRGS 551 or TRGS 505 "Lead".) as well as
12. Activities in which a material hazard arises exclusively from silica dust or from dusts within the meaning of the general dust limit value according to TRGS 900 "Occupational exposure limits".

2 Definitions

Terms which are not defined below are used in this TRGS as they are defined in the "Glossary of Terms for the Regulations of the Ordinance on Industrial Safety and Health (BetrSichV), the Ordinance on Biological Substances (BiostoffV) and the Ordinance on Hazardous Substances (GefStoffV)" of the ABS, ABAS or AGS)[1].

[1] *See http://www.baua.de/cln_104/Themen-von-A-Z/Gefahrstoffe/Glossar/Glossar.html*

2.1 Contaminated areas

(1) Contaminated areas within the meaning of this TRGS are sites (properties, land), structural facilities, production facilities, deposits, objects, soil, water, air, which are contaminated with hazardous substances beyond a basic level that is harmless to health.

(2) In accordance with number 4.2, paragraph 6 of TRGS 400 "Risk assessment for activities involving hazardous substances", hazardous substances also include chemical substances which, although not classified as hazardous, can nevertheless lead to hazards for the safety and health of employees during activities in contaminated areas.

2.2 Structural assets

Structural installations are installations connected to the ground and made of building materials and components. A connection with the ground also exists if the installation rests on the ground by its own weight or is movable along fixed tracks or if the installation is intended by its purpose to be used predominantly in a fixed location. Fillings and excavations as well as artificial cavities below the earth's surface are considered as structural installations (see also § 2 of the accident prevention regulation "Construction Work" - BGV/GUV-V C 22).

2.3 Working in contaminated areas

(1) For the purposes of this TRGS, work in contaminated areas includes all activities in contaminated areas which are to be carried out during the construction, maintenance, alteration and removal of structural installations, including the preparatory, accompanying and final work. For Paragraph 2 Nos. 1-12 and 13, see also Annex 2A and 2B in conjunction with No. 3.1 (5).

(2) Work in contaminated areas can be, for example:

1. Construction work on a site where contaminated areas are expected or present,
2. Remediation of soils, waters and groundwater, as well as structural facilities contaminated by hazardous substances,
3. Operation of mobile facilities for the treatment of contaminated materials and substances,
4. Construction work on, at and in landfills, e.g.
    a) the repair or subsequent installation of leachate collection systems and pipes, gas collection systems and other structural installations at landfill sites,

b) the subsequent sealing or encapsulation of landfills, and

c) the relocation and processing of landfill material and other interventions in the landfill body,

5. Conversion and dismantling of contaminated buildings and technical facilities,
6. Clearing and cleaning contaminated rooms and facilities,
7. Track construction work where contamination of the track body with hazardous substances is suspected,
8. Activities on cold fire sites (fire damage restoration),
9. Activities involving hazardous substances derived from explosive ordnance,
10. Internal transport, interim storage and the preparation of contaminated materials for disposal,
11. Maintenance of work equipment that has been contaminated by use in the contaminated area,
12. Investigation work where the presence of hazardous substances is suspected, e.g.

    a) Walk-throughs,

    b) the creation of prospecting, the execution of drilling, probing, sampling, and

    c) Investigations within the framework of regulatory activities.

13. Demolition, refurbishment, maintenance and conversion work in connection with

    a) Activities involving building products containing PCBs (e.g. joint compounds, paints) incl. elimination of secondary sources,

    b) Activities involving tar-containing (carbon-based) materials in building construction (e . g. tar-containing glue, tar cork),

    c) Activities involving wooden structures treated with wood preservatives that are now covered by the provisions of Annex IV of the Ordinance on Hazardous Substances (e.g. DDT, pentachlorophenol, hexachlorocyclohexane ("lindane") including the removal or cleaning of correspondingly contaminated materials or surfaces,

    d) Activities with fills containing hazardous substances (e.g. in walls, ceilings and floors) and

    e) Activities involving surfaces treated with coatings containing DDT,

    (hereinafter referred to as "activities involving hazardous substances in buildings") including all exploratory, preparatory and ancillary work, insofar as these activities are not otherwise regulated.

2.4 Intended operation/working method

(1) The intended operation is the working procedure specified for the remediation or work in the contaminated area.

(2) The work process comprises the totality of all technical and organisational processes including the activities of the employees.

2.5 Client

The client is any natural or legal person who places an order for work in contaminated areas within the meaning of this TRGS (e.g. building owner) and is at the same time the employer concerned or a person equivalent to him in accordance with the Ordinance on Hazardous Substances.

2.6 Contractor

Contractor within the meaning of this TRGS is the natural or legal person who carries out the work in contaminated areas on behalf of the client or on behalf of another contractor as a subcontractor.

3 General principles, responsibilities, competences

3.1 General principles

(1) According to § 7 para. 1 sentence 2 of the Ordinance on Hazardous Substances (GefStoffV), work may not be started in contaminated areas before the risk assessment has been carried out. In the risk assessment, all influencing factors that may lead to a risk to employees must be determined and evaluated and, on this basis and taking into account the principles of § 9 para. 2 of the Hazardous Substances Ordinance, appropriate protective measures must be defined and complied with (see Annex 1).

(2) If it is only recognised after the start of work, e.g. during construction work, that the work is taking place in a contaminated area and that the application criteria of this TRGS are therefore fulfilled, it follows from § 7 para. 1 sentence 3 GefStoffV that the work must be stopped immediately and may only be resumed when the risk assessment has been carried out and the protective measures have been taken.

(3) In order to carry out the risk assessment, the information and documents of the client mentioned in section 3.2 are required. For the obligation of the Client to support the Contractor in the risk assessment, reference is made to § 17 Para. 3 GefStoffV.

(4) If the hazards cannot be assessed unambiguously, the highest possible hazard for the employees must be assumed, in particular taking into account § 10 and § 11 of the Ordinance on Hazardous Substances. Decisions must be made on a case-by-case basis in each phase of the work.

(5) According to § 7 para. 7 of the Ordinance on Hazardous Substances, the risk assessment may only be carried out by competent persons, i.e. persons who, due to their professional training or experience, have sufficient knowledge of activities involving hazardous substances and are familiar with the regulations to such an extent that they can assess the working conditions before starting the activity and evaluate or check the specified protective measures during the performance of the activities (TRGS 400, No. 3.1 para. 6)[2].

(6) Special knowledge is required to carry out the risk assessment for work in contaminated areas. For this reason, persons who can demonstrate special knowledge of safety and health protection during activities in contaminated areas are considered to be competent. The special knowledge can be acquired within the framework of vocational training or through further training and can be considered to exist if it is proven by certificates and, in the case of expertise according to Annex 2 A, regularly updated by participation in a qualified further training measure in the field of safety and health protection during activities in contaminated areas. With regard to the technical knowledge according to Annex 2B, participation in corresponding training measures is recommended. Annexes 2 A and 2 B contain the minimum requirements for the competent person according to this TRGS and their special knowledge.

(7) With regard to the general principles for carrying out risk assessment in the case of hazards due to hazardous substances, reference is made to TRGS 400, in particular to its number 3.1 "Organisation and responsibility".

3.2 Advance measures by the client in the planning phase

3.2.1 Preliminary exploration

(1) On the basis of its obligations under Section 17 (1) sentence 2 of the Ordinance on Hazardous Substances (GefStoffV), Section 2 (1) and (3) in conjunction with Section 4 of the Construction Site Ordinance (Baustellenverordnung) and, if applicable, other legal provisions, the Client shall determine whether hazardous substances may be contained in the materials handed over to the Contractor for processing.

2 The expert knowledge for safety and health protection at work in contaminated areas acquired according to the BG rule "Contaminated areas - BGR 128, Annex 6A or 6B" fulfils the expert knowledge requirements according to Annex 2A or 2B of TRGS 524.

(2) If this investigation leads to the justified suspicion that the materials handed over to the contractor for processing may contain hazardous substances, the client must describe the possible hazard potential. For this purpose, an investigation and assessment of the materials to be processed (subsoil, groundwater, building materials, installations) must be carried out in advance of the work in contaminated areas with regard to the hazardous substances to be suspected or already determined to be present according to the history of construction and use. The properties of the hazardous substances relevant for the risk assessment shall be described.

(3) If investigations according to para. 1 are not available, the employer must, according to § 7
in conjunction with. § In the course of determining the information to be provided, the employer shall, in particular, obtain information from the client as to whether hazardous substances may be released during the work to be carried out.

(4) If hazardous substances are to be expected on the basis of the investigations carried out under 3.2.1, the hazards arising from them shall be determined. Based on this determination, a safety and health protection concept, hereinafter referred to as the work and safety plan, shall be drawn up in the planning phase.

(5) Additional information, protection and monitoring obligations arise for the Client from other legal bases, e.g. the German Civil Code (BGB) § 645, the Construction Site Ordinance (Baustellenverordnung), the State Building Regulations (Landesbauordnungen) and contract law pursuant to VOB and VOL. Other legal provisions remain unaffected.

(6) The work and safety plan must be drawn up by a competent person (for the competent person see Number 3.1 Para. 5) and summarises the data and assessments required by the employer (contractor) to carry out the risk assessment with regard to hazards caused by hazardous substances. (For more details on the contents of the work and safety plan, see Number 6 and Annex 3).

3.2.2 Measures in the tender and in the execution (coordination)

(1) The measures to be taken in accordance with the specifications of the work and safety plan shall either be described in detail in the contracting authority's invitation to tender or the work and safety plan shall be part of the invitation to tender. Within the scope of his risk assessment, the contractor shall check whether the measures described in the client's work and safety plan are sufficient.

(2) If work in contaminated areas is carried out by several contractors - if necessary also by their subcontractors - all employers, clients and contractors must cooperate in the coordination of the various activities according to § 17 para. 3 GefStoffV. In view of the special hazards involved in work in contaminated areas, the client must appoint in writing a suitable person as coordinator to coordinate the work and continuously monitor compliance with the measures specified in the work and safety plan and to expertly determine measures in situations not covered b y the work and safety plan. Suitable persons are in particular competent persons in accordance with Number 3.1 Paragraph 5 of this TRGS.

(3) The contracting authority shall ensure that this person has authority over all contractors and their employees with regard to safety and health protection due to material hazards.

(4) Contractors must ensure that work in contaminated areas is supervised by technically qualified supervisors and persons authorised to give instructions (supervisors). These persons must supervise the safe execution of the construction work and have sufficient knowledge to do so.

(5) The person responsible for carrying out the tasks in accordance with paragraph 2 shall ensure that anyone who has to enter work areas subject to this TRGS is made aware of the corresponding hazard and the necessary protective measures.

(6) Further coordination obligations result from the Construction Site Ordinance. The planning and monitoring tasks arising from this TRGS and the Construction Site Ordinance may be carried out by one person if this person has the necessary qualification (see RAB 30).

3.2.3 Duties of the employer when engaging external companies

(1) If an employer as client assigns work in contaminated areas to external companies (also subcontractors), the provisions of § 17 GefStoffV must be observed.

(2) If external companies as defined in § 17 of the Ordinance on Hazardous Substances are commissioned to carry out work in contaminated areas, the client is responsible for ensuring that only specialist companies with the necessary personnel and safety equipment as well as the appropriate experience are used for the work. This also applies to the commissioning of subcontractors.

(3) The client of the subcontractors must also ensure that they are informed of the other company-specific sources of danger and rules of conduct before the work begins.

(4) Contractors who work under subcontract are fully subject to the requirements of this TRGS as employers. This also applies to contractors without employees.

4 Risk assessment for work in contaminated areas

In the following, the basic steps of risk assessment described in the GefStoffV and TRGS 400 are supplemented for the area of application of work in contaminated areas. In addition, information is given on special situations that may occur in experience when working in contaminated areas. For the risk assessment, experience from activities in situations with comparable conditions can be used. Some of this experience is available in the form of industry-specific or activity-specific guidance (see 4.9).

4.1 General

(1) The basic steps for hazard assessment according to GefStoffV and TRGS 400 are as follows:

1. Information gathering on
   a) Type and concentration of hazardous substances,
   b) the properties of the hazardous substances,
   c) the work areas in which activities according to point 2.1 are to be carried out,
   d) the available work procedures and the resulting work processes, work steps and individual activities as well as
   e) the work area and activity-related factors of the hazard.
2. Estimation of the expected exposure and hazard due to
   a) inhalation, oral or dermal ingestion of hazardous substances; and
   b) Fire and explosion hazards

   for the available work processes and taking into account the relevant work area and activity-related factors,
3. Selection of the working method with the least risk,
4. Selection and definition of measures,
5. Documentation of the risk assessment and the measures as well as
6. Monitoring and evaluation of the effectiveness of the measures.

(2) According to TRGS 400 number 4.2 paragraph 7, substances are to be treated as hazardous substances in the context of risk assessment if basic tests or assessments of hazardous properties are not or only partially available:

1. Test for acute toxicity,
2. Test for skin irritation, mucous membrane irritation,
3. Testing for mutagenic potential,
4. Testing for skin sensitisation and
5. Repeated dose toxicity assessment (test or qualified assessment).

(3) The following are indispensable prerequisites for carrying out the tests and assessments described in paragraph 2 and the risk assessment based thereon

1. knowledge of the composition of the preparations and articles with which the activities are to be carried out, and
2. the fact that the composition of the respective preparation or product does not change.

(4) However, since the composition of the materials encountered during work in contaminated areas does not follow a recipe, but very different situations are encountered solely due to the usually changing composition of the contaminated material, tests that presuppose homogeneous and constant conditions are not applicable to work in contaminated areas. This applies both to the tests according to TRGS 400, number 4.2 paragraph 7 and to those that would have to be carried out according to § 5 GefStoffV with regard to classification and labelling.

(5) This makes it necessary to specify the general requirements for risk assessment in TRGS 400 with the help of this TRGS 524 by adding the special requirements for work in contaminated areas.

4.2 Determination of information on the type and concentration of hazardous substances

(1) The first step in determining information on the type and concentration of hazardous substances is to identify the hazardous substances to be assumed in the contaminated area. Initial indications of the possible presence of hazardous substances can be derived from the history of use of a site or from the construction history of a building. This "historical investigation" is usually carried out by reviewing documents, interviewing contemporary witnesses or visiting the site, with special consideration of the former and current use of the site or building.

(2) For the treatment of contaminated sites, inspection and evaluation of files, aerial photographs, business registrations and the like provide insights into the history of use of the site and its surroundings. Observations, e.g. of the current use of the surrounding area, of the vegetation, detection of gaps in vegetation or reduced growth can also provide indications of possible contamination. Information on suspected contaminated sites can be obtained from the contaminated site registers of the relevant environmental authorities.

(3) To identify the hazardous substances that may be encountered at industrial sites, the following sources of information are available with regard to the hazardous substances used in different industrial sectors, for example:

1. Industry catalogue to historical Survey of Old sites *(www.fachdokumente.lubw.baden-württemberg.de)*
2. Typical for the industry Inventory from Soil Contamination (UBA- Research Report 86-016, Federal Environment Agency, Dessau (lending library))
3. WINGIS (Information on CD-ROM about GISBAU, Frankfurt or *www.gisbau.de* or via the Internet at *www.wingis-online.de)*

(4) As part of the information gathering process, a detailed hazardous substance profile must be compiled. For this purpose, it is usually necessary to obtain an initial overview by means of overview analyses (e.g. GC-MS screening) of which of the substances to be assumed according to the historical investigation (see above) are actually present at the site.

(5) Further information on the type, concentration and distribution of the hazardous substances present in the contaminated area must be obtained by means of suitable investigation methods and a sufficient number of sampling locations and individual samples. Sampling locations and investigation parameters can be derived from the results of the historical investigation (see above) or the overview analyses according to paragraph 4. If sufficient information on the hazardous substances present is available from the historical investigation, investigations may be dispensed with in justified individual cases.

(6) The chemical analyses of granular or lumpy materials (e.g. soil, masonry, landfill material, backfill materials) to be carried out with a view to assessing the risk from hazardous substances shall consider the grain fraction < 2 mm and > 2 mm separately. The mass fraction of the fine grain in the total sample shall be taken into account in the exposure assessment or hazard assessment, in particular with regard to the inhalation hazard (see also 4.3 para. 3).

(7) If, based on historical exploration or experience from comparably contaminated sites, hazardous substances are to be expected within a soil matrix that cannot be adequately detected by means of material analyses due to their mobility properties (volatility), additional soil gas analyses must be carried out. These analyses serve solely to validate the material analyses with regard to the qualitative substance composition and do not allow any conclusions to be drawn about the substance concentration actually to be expected in the breathing air, even if the substance composition is recorded quantitatively.

(8) When determining hazardous substances, it must be taken into account that hazardous substances can be transformed under the physico-chemical conditions of the surrounding matrix (e.g. the soil), by air ingress or by microbiological activity, or other hazardous substances can be formed, e.g.:

1. Trichloroethene or tetrachloroethene is degraded, among others via cis- or trans-1,2- dichloroethene and vinyl chloride,
2. spontaneous ignition of white phosphorus when exposed to air produces phosphorus pentoxide and
3. Inorganic mercury salts can be reduced to metallic mercury in an anerobic soil environment.

(9) It should also be noted that other substances may be produced, mobilised or released during or as a result of the activities, e.g.:

1. in the case of dusts deposited by means of water, which contain water-soluble substances,
2. Phosgene can be formed during the thermal decomposition of chlorinated hydrocarbons, e.g. as a result of flame cutting.
3. when using units with combustion engines (e.g. in enclosures, in trenches and shafts, when gutting buildings), the risk from exhaust gases must be taken into account (see also TRGS 554 "Exhaust gases from diesel engines").

(10) With regard to the plausibility check of the analytical results, which must be carried out as a matter of principle, all substances and parameters investigated must be listed in the documentation of the hazardous substance determination, preferably in tabular form. This can also be used to document that substances that would have been suspected from the history of use of the site/suspected site were not analytically detected. Subject to certain restrictions and observance of the necessary caution, this can lead to facilitation of the protective measures.

4.2.1 Special features of ASI work or the conversion of buildings, systems and containers

(1) All buildings that are to be converted or demolished must be investigated for the presence of building pollutants within the meaning of No. 2.3 (2). Building files, plans or accounting documents may contain information on building pollutants to be suspected and supplement the necessary inspection and, if necessary, the technical examination of the building. In addition, the following general sources of information are available:

1. Landesamt für Umweltschutz Bayern: "Kontaminierte Bausubstanz - Erkundung, Bewertung, Entsorgung; Arbeitshilfe: Kontrollierter Rückbau", available at *www.lfu.bayern.de/boden/fachinformationen/schadstoffratgeber/index/htm,*
2. Investigation strategy and scope for deconstruction measures/substance catalogue of environmentally relevant building materials - Parts 1 and 2 available at *www.fachdokumente.lubw.baden-württemberg.de* and
3. Working aids for recycling - Working aids for handling construction and demolition waste and for the use of recycled building materials on federal properties http://www.arbeitshilfen-recycling.de.

(2) In the case of commercially or industrially used buildings, installations and containers, the substances used and produced, including intermediate products and impurities, must be determined; the locally applied process technology must be observed (see 4.3).

4.2.2 Special features of activities on and in landfills

(1) For all types of landfills, the deposition history must be taken into account. Different substances may be contained in the various deposition areas of a landfill. Corresponding indications can be taken e.g. from operating diaries or emplacement plans.

(2) In the case of landfills for municipal waste, investigations must be made with regard to the deposition of commercial and industrial waste, especially for periods of operation before the TA-Abfall (1991) and TA-Siedlungsabfall (1993) came into force.

(3) The basis for the risk assessment for activities on and in landfills are in particular:

1. quantitative screening analyses (e.g. GC-MS) in the landfill gas with regard to the main components (methane and carbon dioxide) and with regard to the trace substances to be expected according to the discharged substances and
2. in the case of activities with contact to leachate, appropriate analyses of the leachate with regard to the trace substances to be expected according to the deposited substances.

4.2.3 Special features at Activities on cold Fire sites (fire damage restoration)

(1) The material composition of the burnt material and the burning conditions are decisive factors for the type and quantity of the resulting fire products (e.g. smoke condensates, pyrolysis products, ashes). Therefore, it must be determined what burned and how it burned (full fire, oxygen-rich or smouldering fire, low oxygen?).

(2) When determining the information, all substances (e.g. raw materials, auxiliary materials, operating materials or building materials such as asbestos, artificial mineral fibres) must be taken into account which were already present before the fire, were involved in the fire event and which give rise to the suspicion of the formation and release of dangerous fire after-products. Special attention should be paid to materials containing plastics such as PVC, polyurethane (PU), polystyrene (PS) or melamine and phenolic resins.

(3) Investigations to be carried out by means of laboratory analyses are only necessary for reasons of occupational safety if the involvement of hazardous substances is to be expected that were already present as operating, raw or auxiliary materials before the fire event and were involved in the fire event or were released as a result of the fire.

(4) Further notes on the subject of fire damage restoration include
e.g. BGI 858 and VdS 2357.

4.2.4 Special features of track construction

(1) In the case of track construction activities, particular attention must be paid to the fact that the track may be contaminated by hazardous substances. These can be, for example:

1. PAHs from tar-oil-soaked railway sleepers,
2. Mineral oil hydrocarbons from fuels, heating and lubricants,
3. Residues of herbicides that have been applied in the trackbed area as well as
4. a wide variety of hazardous substances from accidents and incidents.

(2) In case of danger due to emission of asbestos-containing dusts from the track ballast, reference is made to TRGS 517.

4.3 Determination of information on the properties of the hazardous substances

(1) Pursuant to § 7 para. 1 GefStoffV, it must be determined whether the substances identified are hazardous substances. In particular, the following can be used to determine the information:

1. the TRGS 900,
2. TRGS 905 "List of substances that are carcinogenic, mutagenic or toxic to reproduction",
3. TRGS 906 "List of activities or processes that are carcinogenic, mutagenic or toxic to reproduction" according to § 3 para. 2 no. 3 GefStoffV,
4. List of carcinogenic, mutagenic and teratogenic substances, activities and processes (according to Annex VI of Regulation (EC) No. 1272/2008, TRGS 905 and TRGS 906,
5. the TRGS 907 "List of sensitising substances",
6. substance-related TRGS,
7. BGIA substance list or BGIA reports and
8. Hazardous substance information systems such as GESTIS, GISCHEM, Hazardous Substance Database of the Länder, CHEMSAFE, NIOSH Pocket Guide to Chemical Hazards, WINGIS, STARS (UBA).

(2) The identified substances shall be characterised according to:

1. Fire and explosion hazards, e.g. explosive, oxidising, extremely flammable, highly flammable, flammable, explosion limits, flash point,
2. toxic properties, e.g. very toxic, toxic, harmful, corrosive, irritant, sensitising,
3. special health hazards, e.g. carcinogenic, mutagenic, toxic to reproduction,

4. physico-chemical properties that allow the assessment of the mobility or the appearance or aggregate state to be expected during the activities, e.g. boiling point, vapour pressure, solubility, relative gas density, saturation concentration in the gaseous state in the air, sublimation, water vapour volatility, as well as
5. possible chemical reactions among each other.

(3) With regard to the risk assessment, further criteria must be taken into account, e.g.:

1. Concentration of the substances in the material examined,
2. Occurrence of mixtures of substances,
3. Possible release of hazardous substances,
4. Form of occurrence (see paragraph 4),
5. the influence of the contaminated material on the release (retention capacity, presence of solubilisers) and the form of occurrence (e.g. difference in release behaviour between cohesive (silts, clays) and loose soils [sands, gravels]),
6. Recording paths
   a) Gastrointestinal tract - oral,
   b) Skin - dermal, (uninjured and injured skin), see TRGS 401 "Risk through skin contact - Determination, assessment, measures" and
   c) Respiratory tract - inhalation, see TRGS 402 "Determination and assessment of hazards arising from activities involving hazardous substances: Inhalation exposure".
7. Occupational exposure limit values (OELs) and
8. Biological limit values (BGW).

(4) Depending on their chemical-physical properties and the environmental conditions, hazardous substances can occur simultaneously in different forms, which must be taken into account in the risk assessment, e.g.

1. Depending on the quantity present, highly volatile substances (e.g. "petrol", certain aromatics, LHKW) may be present simultaneously both as a phase on or in the groundwater and in the gaseous aggregate state in the soil air and bound to the soil matrix and
2. Depending on the product, different hazards can emanate from a hazardous substance, e.g. products containing PAHs: Tar oils have different properties than solidly bound products such as tar cork.

(5) The hazards shall be determined on the basis of the properties of the substance and the conditions existing in the contaminated area (see section 4.6). The assessment shall in particular take into account the hazard characteristics[3] and assessment criteria specified in Appendix 4.

(6) The results of the determination of the substance-related data shall preferably be presented in tabular form. An example of the presentation is given in Annex 5.

4.4 Determining information on the areas of work

(1) The definition of work areas is a local or organisational division of the site.

(2) The determination of the working areas where hazardous substances may be released is carried out in 2 steps (see also Annex 6):

1. according to site-specific criteria:
   a) the local layout of the site, and
   b) Areas with different hazardous substance situations, e.g. industrial site,
2. according to location-independent criteria:

   Areas resulting from the work to be carried out and its boundary conditions, e.g. staging areas for the removal of contaminated materials, facilities for the treatment of contaminated groundwater from dewatering, areas for the decontamination or packaging of dismantled steel parts.

4.5 Determination of information on the available work procedures, work processes, work steps and individual activities

4.5.1 Requirements for the selection of the working method

(1) Check that work procedures are available which do not release hazardous gases, vapours or suspended solids and avoid skin contact with hazardous solids or liquids.

(2) If working methods which meet the requirements of paragraph 1 are not available, the hazards of the working methods available according to the state of the art shall be assessed and the working method shall be selected in such a way that the hazard to workers is as low as possible. The physical strain caused by the possible need to use personal protective equipment must also be taken into account.

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3 According to Regulation (EC) No. 1272/2008 (of 31.12.2008, CLP Regulation, also known as EU GHS Regulation), the previous classifications with R-phrases and hazard characteristics or identification letters are replaced by classifications with H-phrases and hazard classes or categories (see e.g. Annex 7 of this Regulation).

4.5.2 Determination of information on work steps work processes, and individual activities

(1) For each individual work area, the activities in which employees may be exposed to hazardous substances must be identified in relation to the work steps to be carried out and the corresponding work processes.

(2) Here, it is necessary to determine,

1. what is to be done in the respective work area ("work steps"),
2. the sequence in which the work steps are carried out or which work steps are carried out in parallel ("work processes"),
3. which working methods are suitable for carrying out the work (see above) and
4. which different activities result from these working procedures.

In addition to the activities of preparing and making available for disposal of the materials, loading and transport activities must also be taken into account (see also e.g. BGI 5010). For further explanation see also Annex 6

4.6 Determination of information on the risk factors related to the work area and activity

(1) The exposure of workers depends on the properties of the hazardous substances in conjunction with the conditions resulting from the conditions in the work area, the work processes used and the activities to be carried out accordingly.

(2) As set out in section 4.5.1, the determination steps described below shall be carried out for each of the possible working procedures.

(3) When working with the same hazardous substance, different hazards may arise when different working procedures are used or when working under different environmental or work area conditions.

(4) The work area and activity-related factors to be identified with regard to the risk assessment are in particular the following:

1. the climatic conditions during the performance of the activity, e.g.: for volatile and dust-bound substances, a warm or dry climate is generally conducive to emissions, while a cold or damp climate tends to reduce emissions; note: exceptions are e.g. substances volatile to water vapour!
2. The spatial situation, e.g.: does the work take place outdoors or in a poorly ventilated room?
3. The working method, e.g.: is the chosen method low emission or e- mission friendly?

4. The shape of the emission source, e.g.: is the emission source point-shaped (e.g. borehole), two-dimensional (e.g. landfill surface) or all-round (e.g. polluted plaster indoors)?
5. The spatial relationship of the activity to the emission source, e.g.: does the employee's activity take place close to the emission source (e.g. at a point source) or directly on it (area source), or even in the middle of it ("all-round")?
6. Frequency and duration of activity at/on the emission source, and
7. the sequence in which activities are carried out, in particular the parallel performance of different activities in the same work area.

4.7 Estimation of the expected exposure and assessment of the hazard

(1) The inhalation, oral or dermal uptake of hazardous substances must be estimated for the intended work processes and the resulting individual activities, and the risk must be assessed with additional consideration of the fire and explosion hazards.

(2) In the case of work carried out in parallel, the mutual influences on the hazard must be taken into account

4.8 Selection of the working method with the least risk

In accordance with the requirements of the Ordinance on Hazardous Substances, the work procedure to be used is the one which is likely to present the least risk on the basis of the assessments described above. Selection and determination of protective measures must be related to this work process.

4.9 Determination of information on risk assessment for specific activities

(1) According to number 5.4 of TRGS 400, industry-specific or activity-specific guidelines can be used for the assessment of hazards during work with hazardous substances. They must be up-to-date, i.e. refer to the current version of the Occupational Health and Safety Act and the Hazardous Substances Ordinance.

(2) Sector- or activity-specific aids can be used like an accompanying risk assessment of the manufacturer or distributor according to § 7 para. 7 GefStoffV, if they comply with the specifications described under No. 5.2 and Annex 2 of TRGS 400.

(3) The guidelines mentioned in section 4.9 can be used as sector- or activity-specific assistance in the sense mentioned above.

4.9.1 Deconstruction of petrol stations (petrol station refurbishment)

(1) The instructions for the remediation of petrol stations were drawn up by the Technical Committee for Civil Engineering on the basis of workplace measurements and blood tests (bi- omonitoring). It is to be applied exclusively to construction work at petrol stations and relates solely to hazards from carburettor and diesel fuels which are
e.g. as a result of overfilling or accidents in the soil or groundwater.

(2) The instructions for remediation of petrol stations are not to be applied to construction work on refineries, tank farms and the like, as different (usually higher) concentrations of fuels and possibly other hazardous substances in the soil or groundwater are to be expected there.

4.9.2 Activities with tar-containing (coal-based) materials in building construction

(1) During reconstruction, demolition and modernisation of buildings, one often encounters sealing, insulating and adhesive products containing tar. Polycyclic aromatic hydrocarbons (PAHs) are an essential component of these products. In addition to PAHs, a large number of other substances occur, some of which have acute effects (e.g. respiratory tract irritation due to phenols, cresols). The following instructions for action were developed with the aim of safely carrying out activities with materials containing tar.

(2) The "PAH Manual" of the Berlin State Office for Occupational Safety, Health and Technical Safety - LAGetSi - is applicable to all activities involving tar-containing materials in building construction. Hazard assessments are carried out for essential work steps and minimum requirements for the necessary protective measures are described, which are to be adapted to the conditions of the respective construction project. An assessment of the need for remediation is not the subject of these instructions.

(3) The instruction manual "Remediation of PAH-containing adhesives" issued by the BG BAU (Berufsgenossenschaft der Bauwirtschaft) describes the minimum requirements for the necessary protective measures when removing wooden floors that have been laid with tar-containing adhesives, on tar board or tar-containing levelling layers. The protective measures described must be adapted to the conditions of the respective construction project.

4.9.3 Activities with components, objects and materials contaminated with wood preservatives

(1) The wood preservative handling instructions of the Berlin State Office for Occupational Safety, Health Protection and Technical Safety (LAGetSi) were developed with the aim of safely carrying out activities involving components contaminated with wood preservatives. Components of HSM preparations can be, for example, PCP, HCH (lindane) and DDT.

(2) These instructions are applicable to all activities involving materials contaminated with HSM during reconstruction, demolition and modernisation as well as all ancillary work. Hazard assessments are carried out for essential work steps and minimum requirements for the necessary protective measures are described, which are to be adapted to the conditions of the respective construction project.

(3) An assessment of the hazard situation for the users of the HSM contaminated areas as well as an assessment of the need for remediation is not made in this manual. For this purpose, reference is made to the "Guideline for the Assessment and Remediation of Pentachlorophenol (PCP)-contaminated Building Materials and Components in Buildings (PCP Guideline)".

4.9.4 Activities on cold fire sites (fire damage restoration)

(1) The guidelines for fire damage restoration (VdS 2357) were drawn up by the German Insurance Association (GDV) for these activities. Based on the criteria described there, the damage site is divided into the hazard areas GB 0 to GB 3. The division into hazard areas evaluates the substance content to be expected in the fire residues as well as the extent and spatial distribution of the contamination by fire after-products and is independent of the spatial division of the damage object.

(2) Depending on the hazard areas GB 0 to GB 3, an exemplary risk assessment was carried out for the procedures and working methods usually used in fire damage restoration and, based on this, specifications for material-related occupational safety measures were developed. These represent minimum requirements and must be complied with by all persons working in the affected areas. They can be replaced at any time by technically superior equipment with at least the same protective function (cf. TRGS 500
"Protective measures" or TRBA 500 "General hygiene measures: Minimum requirements"). Annex 8 of VdS 2357 contains a proposal for the selection of personal protective equipment, taking into account the hazardous areas and the activities involved in the usual work processes.

5 Protective measures

5.1 Determination of appropriate protective measures

(1) In principle, the provisions of TRGS 500 are to be used to determine the protective measures. (see also Annex 7).

(2) Technical protective measures always have priority over all other measures, whereby the design of the work process is to be regarded as the highest technical protective measure (see order of priority according to § 9 para. 2 GefStoffV and Appendix 1 Tab. 1).

(3) Work procedures, work equipment and materials for carrying out the work and the protective equipment shall be selected in accordance with the state of the art. Special work equipment, materials and protective equipment for activities in contaminated areas which correspond to the state of the art are in particular

1. Systems for breathing air supply on earth-moving machinery and vehicles according to BGI 581,
2. Use low dust systems (e.g. Plaster milling with extraction, see www.GISBAU.de),
3. Ventilation equipment for the detection of hazardous substances or the assessment of workplaces,
4. Facilities to prevent the carry-over of hazardous substances, e.g.
   a) "Black and white" facilities,
   b) Boot, tyre or vehicle washing facilities and
   c) Fencing, partitioning.

(4) To minimise the oral and dermal absorption of hazardous substances, at least the protective measures according to the provisions of TRGS 500, number 5.3.1 "Break areas and break rooms", number 5.3.3 "Work clothing, protective equipment", as well as number 4.5 "Personal principles" must be implemented and appropriate facilities provided:

1. "Black and white facilities" with the possibility of separate storage of street and protective clothing (= protective suits and foot protection), as well as for hand and body cleaning and
2. Establishment of recreation rooms and break rooms in which there is no risk from hazardous substances.

(5) After working in contaminated areas, employees may only eat food in the recreation and break rooms after adequate cleaning or changing of work clothes and thorough body hygiene.

(6) The facilities described in paragraph 4 must be dimensioned according to the number of employees working in the area and must be cleaned every working day. As a guideline for dimensioning, one washing facility, one toilet and one shower should be provided for every three employees. If the dimensions are smaller, the same protection goal can also be achieved by means of organisational regulations, e.g. by briefly postponing the start of work for different work teams.

(7) One of the most important organisational protective measures is the deployment of personnel who are familiar with the special hazards in contaminated areas. Site managers and supervisors must acquire this knowledge by means of appropriate further and advanced training measures (see also § 3 ArbSchG).

(8) If the risk assessment shows that the technical and organisational measures are not sufficient to eliminate the hazard or to reduce it to a minimum, further measures including personal protective equipment must be applied. Type and selection of the required basic equipment

The risk assessment is governed by the German regulations on respiratory protection. For selection, reference is also made to BGR/GUV-R 190 "Use of breathing apparatus", BGI/GUV-I 868 "Chemical protective gloves" and BGI/GUV-I 8685 "Chemical protective clothing".

(9) The following may be required as personal protective equipment, for example

1. Head protection (hard hats) with face shield for work where splashing of contaminated liquids is to be expected, e.g. drilling work.
2. Hand protection in the form of gauntlet gloves made of material resistant to the substances contained in the contaminated materials and impermeable at least for a limited period of time, with textile lining or with cotton gloves to be worn underneath, for all work where the hands may come into contact with contaminated liquids or materials.
3. Respiratory protection in the form of filtering devices (for criteria to exclude the use of filtering technology, see BGR/GUV-R 190).
4. Respiratory protection in the form of insulating equipment (location-dependent hose equipment or location-independent, freely portable equipment) for work where it is to be expected that the oxygen content in the breathing air is below 19 vol. % or the concentration or properties of the hazardous substances in the breathing air preclude the use of filtering equipment.
5. Breathing apparatus for self-rescue (self-rescuer).
6. Chemical protective suits type 3 to type 1, e.g. for work where direct contact with hazardous substances in large quantities or with a high hazard potential (e.g. surge of hazardous liquids, chemical warfare agents) cannot be ruled out or for work with hazardous substances which can also be absorbed through the skin in relevant quantities in the gaseous aggregate state.
7. Foot protection against chemical effects.

(10) From the circumstances described in Number 4.1 Paragraphs 3 and 4 of this TRGS, it follows with regard to the selection of personal protective equipment that, in the risk assessment for work in contaminated areas, at least the protective measures based on the property of

1. hazardous to health (R20, 21 or 22),
2. Irritant to skin (R38),
3. Suspicion of hereditary mutation (R68) and
4. skin sensitising (R43)

must be specified. This means that basic personal protective equipment must always be specified for the activities to be carried out in contaminated areas. The selection is made according to t h e criteria of TRGS 401 and TRGS 402.

(11) When selecting personal protective equipment, all hazard factors that may occur during the activity to be assessed must be taken into account. This also includes the hazards that arise from wearing the personal protective equipment. According to § 9 Para. 3 GefStoffV, the employer may not permit the wearing of burdensome PPE as a permanent measure instead of technical or organisational measures. For example, equipment for which wearing time limits are specified or for which relevant occupational health examinations must be carried out can be regarded as stressful personal protective equipment (for information on wearing time limits, see BGR/GUV-R 190, section 6.3).

(12) Additional hazards caused by wearing the Personal Protective Equipment can arise, for example, from

1. in case of heavy physical work under respiratory protection with filter technology (measure: use of fan-assisted devices (at outside air temperature > 10°C);
2. due to heat accumulation during physical work under protective clothing (measures: Break regulations, use of internally ventilated protective clothing or cooling waistcoats),
3. during flame cutting with simultaneous use of generally easily flammable "chemical disposable protective clothing" (measure: use of flame-retardant impregnated chemical disposable protective clothing) and
4. by the use of "rubber boots" in areas where special demands are to be made on slip resistance (measure: review of the risk assessment as to whether the use of "rubber boots" is mandatory with regard to the type of exposure).

(13) The personal protective equipment shall be clearly defined according to the selection criteria applicable to each item of equipment. A corresponding checklist is given in Annex 8.

(14) If fire and explosion hazards are present, the provisions of § 12 and Annex III No. 1 GefStoffV must be observed. If potentially explosive atmospheres cannot be excluded with certainty, zoning and special protective measures are required, particularly with regard to the choice of work equipment and work permit regulations. Reference is made to the relevant TRGS 720 "Hazardous explosive atmospheres - General", TRGS 721 "Hazardous explosive atmospheres - Assessment of the explosion hazard" and TRGS 722 "Prevention or limitation of hazardous explosive atmospheres". The employer is obliged to prepare an explosion protection document in accordance with § 6 of the Ordinance on Industrial Safety and Health.

(15) If there is insufficient knowledge to assess the hazards posed by the hazardous substances, maximum safety measures are required for the individual case ("worst case" consideration). If further knowledge is gained in the course of the work, the risk assessment including the specifications for the measures must be reviewed and, if necessary, adapted to the new state of knowledge.

5.2 Measures against air pollution in working areas

(1) If the preceding risk assessment or accompanying measurements show that the air in the working area is likely to be contaminated with substances in concentrations hazardous to health or that such substances are present, suitable technical ventilation measures must be taken. This is to ensure that

1. the oxygen content of the atmosphere is more than 19% by volume,
2. the concentration of flammable gases and vapours is below 20 % of the lower explosion limit (LEL), and
3. the hazardous concentration of toxic gases, vapours or dusts for which a workplace limit value exists is ≤ 10% of this value. If it is certain that the hazard emanates only from a single hazardous substance, compliance with the occupational exposure limit value is sufficient.

(2) If the oxygen concentration at the workplace is lower than the natural oxygen content of the breathing air of 20.9% by volume, the cause must be determined and an assessment made as to whether a hazard exists. The required oxygen concentration of at least 19% by volume is only sufficient if the reduction of the oxygen content in the breathing air is caused exclusively by inert gases, e.g. nitrogen.

(3) For the metrological monitoring of explosive atmospheres, the selection of the calibration gas must be adapted to the expected substance situation. This adjustment can usually only be made by the manufacturer of the measuring instrument.

(4) In the case of hazardous substances for which there are no AGW, exposure must be avoided or reduced with suitable technical, organisational and, if necessary, personal protective measures in accordance with the state of the art. In TRGS 402, a procedure is specified which allows the employer to decide whether the protective measures taken with regard to the inhalation hazard are sufficient (see TRGS 402, number 5.3.1 ff).

(5) Depending on the risk assessment, continuous monitoring measurements with directly indicating measuring instruments or, at the required frequency, repeated individual measurements must be carried out to determine whether ventilation measures or natural ventilation at the workplace are sufficient. Continuous measurements must be carried out to monitor the oxygen content and explosive atmospheres (continuous monitoring) (see also the notes on metrological monitoring in Annex 9).

(6) In contrast to the use of blowing ventilation, no rapid mixing, dilution and removal of harmful gases can be achieved with suction ventilation in the working and ambient conditions that generally prevail when working in contaminated areas. In addition, there is a risk that hazardous or explosive gases and vapours will escape to a greater extent and, in the worst case, may be carried to the workplace and to the fan as a possible source of ignition. If suction ventilation is provided for other reasons, e.g. immission control, its applicability must be justified in each individual case.

(7) The suction point for the blowing ventilation shall be located at a sufficient distance from the emission source, taking into account the wind direction, and at such a height that the suction of hazardous substances from the area near the surface is prevented.

(8) Measurements for monitoring explosion hazards and the oxygen content in the air, as well as measurements for triggering protective measures if threshold values are exceeded, shall be carried out exclusively by means of directly indicating measuring instruments with alarm function.

5.3 Measurement planning for work in contaminated areas

(1) If the risk assessment shows that there is or is likely to be a risk to workers from a lack of oxygen, explosive atmospheres or hazardous gases, vapours, mists or dusts, the hazardous substances in the air in the work areas must be monitored by measuring equipment. A measurement plan must be prepared for this purpose. The measurement plan shall also take into account the control of the effectiveness of measures taken, e.g. ventilation.

(2) If measurement results and experience are available from other projects concerning comparable activities, these can be used as a basis for the risk assessment without having to carry out measurements of one's own. This applies, for example, to work on the clean-up of PCBs, fire damage or PAHs, or the clean-up of petrol stations. Corresponding information can be obtained from the statutory accident insurance institutions or is already available there for certain activities in the form of exposure descriptions. The waiver of own measurements must be documented and justified.

(3) In contaminated areas, it must be assumed that the qualitative and quantitative composition of the hazardous substances in the material to be processed is usually not constant. Furthermore, hazardous substances may be added during the work that were not detected during the previous investigations. When working outdoors, the environmental conditions are also not constant. Therefore, the following must always be taken into account when planning and, in particular, evaluating measurements during work in contaminated areas:

1. The quantitative analysis of the original substance of the contaminated materials cannot be used to derive an exact numerical prediction of the concentrations of hazardous substances to be expected in the air, but only a qualitative estimate ("high - low") of the exposure to be expected is possible in connection with the factors related to the work area and activity (see 4.6).
2. The measurements of hazardous substances in the air only record the situation existing at the respective measurement site at the time they are carried out. A forecast of future conditions is only possible if all factors determining the emission of hazardous substances and the exposure of workers are the same.

(4) Therefore, for the application of TRGS 402 for work in contaminated areas, express reference is made to its Annex 5, No. 6. Annex 9 contains additional guidance on measurement planning for work in contaminated areas.

6 Work and safety plan

(1) The results of the investigations, assessments and specifications necessary for the risk assessment (see Sections 4.1. to 4.8 and 5) shall be recorded by the client in a work and safety plan (cf. Section 3.2).

(2) The work and safety plan serves as documentation for the client,

1. the basis on which the risk assessment decisions were made,
2. to prove in which form the cooperation between the client and the executing company required in § 17 GefStoffV took place and
3. for planning hazard-related protective measures.

(3) If the client is required to prepare a SIGE plan in accordance with the Construction Site Ordinance, the work and safety plan is a special component of the SIGE plan.

(4) According to the Construction Site Ordinance, the provisions of § 4 of the Occupational Health and Safety Act must be taken into account when drawing up the SIGE plan. This principle must also be taken into account when drawing up the work and safety plan in accordance with this TRGS.

(5) A model for the structure and contents of the work and safety plan as well as for a tabular presentation of the results of the risk assessment and the determination of the protective measures are contained in Annexes 3 and 10.

7 Informing and instructing employees

(1) With regard to the information and instruction of employees to be carried out by means of operating instructions, reference is made to the provisions of § 14 of the Ordinance on Hazardous Substances and TRGS 555 "Operating Instructions and Information for Employees". Since work in contaminated areas is generally not a stationary, recurring type of work, the period for repeated instruction must be adjusted in accordance with the risk assessment.

(2) The operating instructions are binding working and behavioural instructions issued by the supervisor to the employee carrying out the work. It must specifically describe or specify the measures to be taken.

(3) The operating instructions must be written in relation to the workplace and the activity. This means that either

1. a separate operating instruction shall be prepared for each of the activities determined in accordance with point 4.5, or
2. in addition to the circumstances and specifications that apply equally to all activities, the special hazards and specifications to be observed for certain activities are also listed in an operating instruction that applies to all activities.

8 Occupational health prevention

In addition to individual preventive occupational medicine, the purpose of preventive occupational medicine is to ensure that the employer receives detailed advice on activities involving hazardous substances. Therefore, in the case of activities in contaminated areas, the occupational physician should be involved in the examination of the employer's work and safety plan as well as in carrying out the risk assessment and determining the protective measures.

8.1 Involvement of the company doctor in the risk assessment

(1) The company doctor must always be involved in the risk assessment. This applies in particular if preventive medical examinations are to be offered or arranged in accordance with the Annex to the ArbMedVV. For details on the risk assessment of activities in contaminated areas, see section 4 of this TRGS.

(2) Essential components of the participation of the company doctor are

- Participate in the review of the contractor's work and safety plan.
- Participation in the inspections and meetings that serve to gather information on the risk assessment.

8.2 General occupational medical toxicological counselling

As part of the general occupational health advice, workers must be informed and advised about the health hazards associated with their work. In order to establish the current reference to the respective upcoming activities in contaminated areas, this advice can be integrated into the construction site-related instruction according to § 14 of the Ordinance on Hazardous Substances. See also number 7 of this TRGS.

8.3 Individual occupational health screening

(1) According to the appendix to the ArbMedVV, occupational medical check-ups are to be arranged or offered either as compulsory or as offered check-ups for certain activities. Preventive medical examinations serve the purpose of providing individual health care and detailed counselling. An occupational health screening may be limited to a consultation.

(2) In the event of exposure to carcinogenic hazardous substances of categories 1 and 2 (Annex to the ArbMedVV, Part 1, Para. 3), the employer must also offer examinations to the formerly exposed employees (follow-up examinations). After termination of the employment relationship, the employer may transfer this obligation to the competent accident insurance institution with the consent of the person concerned.

(3) For activities requiring the wearing of respiratory protective equipment, occupational health examinations must be arranged or offered in accordance with Part 4 of the Annex to the ArbMedVV.

(4) Biomonitoring (detection of hazardous substances in biological material) is a component of occupational health precautions, insofar as recognised procedures are available for this purpose and values for assessment, in particular biological limit values, are available (see TRGS 903 "Biological limit values").

8.4 Special instructions for first aid

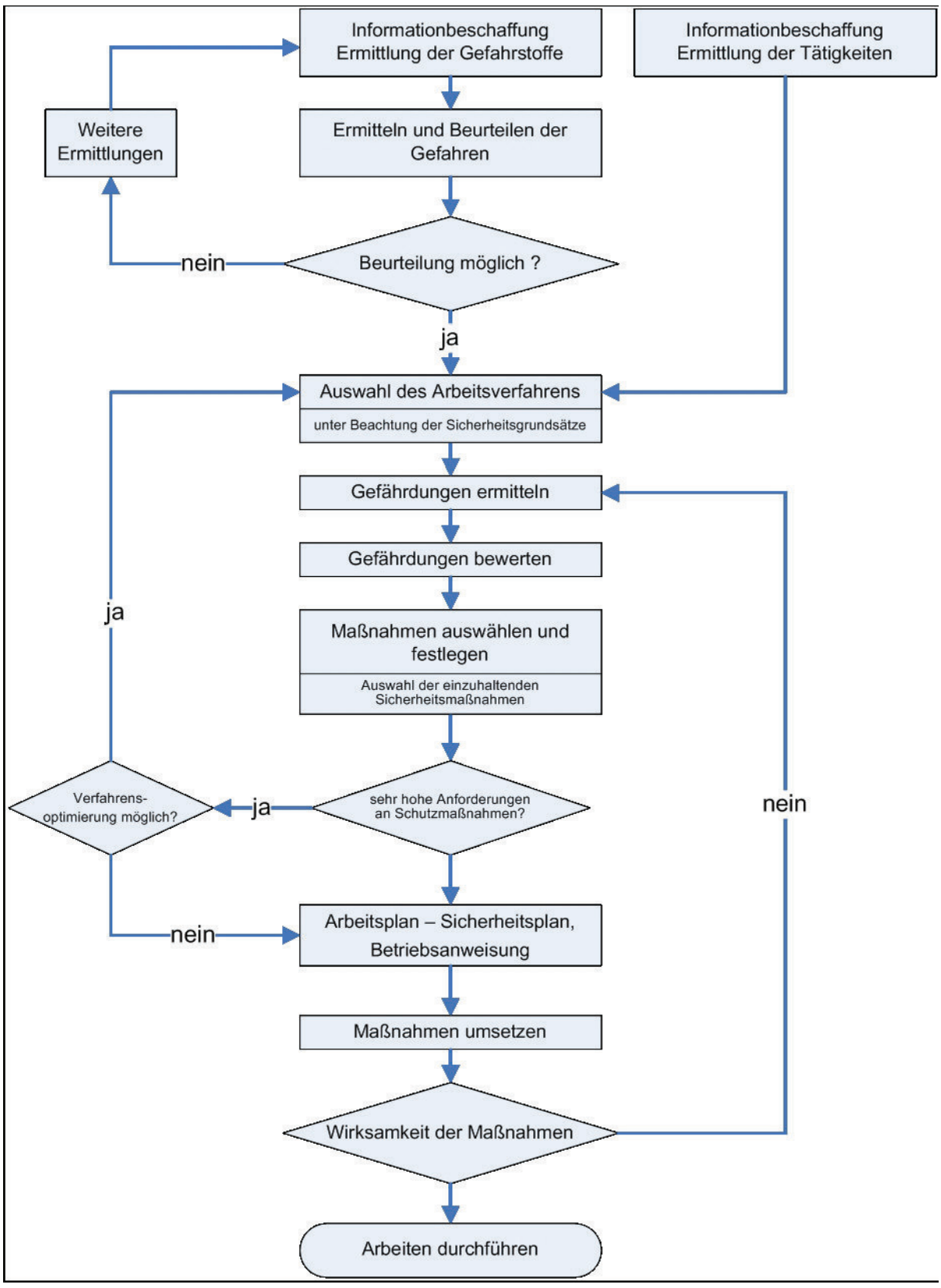
(1) Effective organisation of first aid must be ensured. This includes, among other things, suitable reporting systems, a number and training of first aiders adapted to the hazardous situation and decontamination facilities (e.g. body and eye showers).

(2) The local ambulance service will normally only be equipped to diagnose and treat injuries and illnesses that can be expected locally. In situations with a very high risk from chemical substances or possible biological contamination, it may be necessary to inform the rescue service and the nearest suitable clinical emergency room of the work plans with an indication of the expected hazardous substances or biological contamination, so that the appropriate diagnosis and treatment can be carried out there without delay. This also includes the provision of toxicological data and information on the measures to be taken in the event of an accident, if requested by the emergency service or the emergency room.

(3) The company doctor can advise whether it makes sense in individual cases to keep antidotes on hand to give to the emergency department.

Annex 1 to TRGS 524

Flow chart for the essential steps of risk assessment



Annex 2A to TRGS 524

General technical knowledge for safety and health at work in conta- minated areas

According to § 7 para. 7 of the Ordinance on Hazardous Substances, the risk assessment may only be carried out by competent persons, i.e. by persons who, due to their professional training or experience, have sufficient knowledge of activities involving hazardous substances and are familiar with the regulations to such an extent that they can assess the working conditions before starting the activity and evaluate or check the specified protective measures when carrying out the activities (TRGS 400, No. 3.1 para. 6). Special knowledge is required to carry out the risk assessment for work in contaminated areas. For this reason, those persons in particular who can demonstrate special knowledge of safety and health protection during activities in contaminated areas are regarded as competent.

Tasks of the qualified person:

The tasks of the qualified person according to TRGS 524 Annex 2 A include in particular:

1. Carry out and document the risk assessment,
2. Draw up a site-specific work and safety plan,
3. Instructing the employees in the respective hazards and the necessary protective measures of the work or construction site,
4. Monitoring t h e requirements laid down in the operating instructions for compliance with them,
5. Arrange for any additional investigations into hazardous substances that may be required,
6. Arrange for necessary measurements in the air of the working areas,
7. Evaluate the results in cooperation with the implementing companies,
8. Coordinate the timing of individual trades and assess their effects on each other with regard to possible hazards,
9. Updating the work and safety plan and
10. Monitoring the safety measures to be complied with.

Qualification of the competent person according to TRGS 524

(1) A qualified person within the meaning of this TRGS is a person who, in order to be able to carry out the above-mentioned tasks in a professional manner, has professional experience in the planning and/or execution of work in contaminated areas, as well as in the

has extensive and relevant knowledge of construction and occupational health and safety, in particular:

1. construction knowledge of the working procedures used when working in contaminated areas,
2. Basic knowledge of physics and chemistry,
3. Knowledge of the requirements for determining the hazardous substances to be expected in each individual case when working in contaminated areas,
4. in-depth knowledge of the methodology of risk assessment according to TRGS 400 in general and TRGS 524 in particular,
5. in-depth knowledge of the requirements of metrological monitoring of hazardous substances,
6. in-depth knowledge of technical and organisational protective measures, personal protective equipment and the corresponding special requirements of work in contaminated areas, including special site equipment, storage and disposal measures.
7. Basic knowledge of issues relating to occupational health care, in particular:
   a) Preventive medical check-ups, their contents and legal basis,
   b) Hazardous substances, toxicology and risk assessment,
   c) Exposure/stress due to hazardous substances and personal protective equipment, and
   d) Hygiene, skin protection.
8. Basic knowledge of organising emergency measures and first aid,
9. In-depth knowledge of state regulations and rules and those of the accident insurance institutions on the subject of hazardous substances, at least:
   a) Occupational Health and Safety Act,
   b) Ordinance on Occupational Health Precautions,
   c) Workplace Ordinance,
   d) Industrial Safety Ordinance,
   e) Hazardous Substances Ordinance,
   f) Construction Site Regulations,
   g) PPE Use Regulation,
   h) Technical Rules for Hazardous Substances (TRGS),
   i) Principles of prevention (BGV/GUV-V A 1),
   j) Construction work (BGV/GUV-V C 22),
   k) Occupational health screening (BGV/GUV-V A 4),
   l) rules and information on safety and health at work, at least those referred to in points (m) to (q),

m) Rule Landfills (BGR/GUV-R 127),

n) Rule Use of protective clothing (BGR/GUV-R 189),

0) Rule Use of breathing apparatus (BGR/GUV-R 190),

p) Rule Use of protective gloves (BGR/GUV-R 195) and

q) Code of practice for driver's cabs with breathing air supply systems on earth-moving and special civil engineering machinery (BGI 581),

10. Basic knowledge of responsibility structures (management and supervision) and the resulting liability in the field of occupational health and safety.

(2) The competent person must be willing and able to actively promote safety and health protection on construction sites. They must have the ability to think through work processes systematically, with foresight and across trades, to recognise emerging hazards and to take the necessary co- ordination measures. In addition to this knowledge and skills, the competent person must also have a sufficient degree of social competence to perform his or her tasks. In particular, he/she must have the ability to work in a team, to lead cooperative processes and to communicate appropriately. Their function and position must be designed in such a way that they experience the necessary acceptance of other planning and implementation participants and that they can devote sufficient and effective time to their task.

Annex 2 B to TRGS 524

Technical qualification for activities with hazardous substances in buildings according to Number 2.3 Para. 2 No. 13

Tasks of the qualified person:

The tasks of the qualified person according to TRGS 524 Annex 2 B include in particular:

1. Carry out and document the risk assessment,
2. Draw up a site-specific work and safety plan,
3. Instructing the employees in the respective hazards and the required protective measures of the work or construction site,
4. Monitoring the requirements laid down in the operating instructions for compliance with them,
5. Arrange for any additional investigations into hazardous substances that may be required,
6. Arrange for necessary measurements in the air of the working areas,
7. Evaluate the results in cooperation with the implementing companies,
8. Coordinate the timing of individual trades and assess their effects on each other with regard to possible hazards,
9. Updating the work and safety plan; and
10. Monitoring the safety measures to be complied with.

Qualification of the competent person according to TRGS 524 Annex 2 B

(1) A qualified person within the meaning of this TRGS is a person who, in order to be able to carry out the above-mentioned tasks in a professional manner, has professional experience in the planning and/or execution of work in contaminated areas and has sufficient and relevant knowledge of construction and occupational health and safety, in particular:

1. construction knowledge of the working methods used for activities according to 2.3 para. 2,
2. Knowledge of the occurrence and properties of the hazardous substances mentioned in 2.3 Para. 2,
3. Basic knowledge of the methodology of risk assessment according to TRGS 400 in general and TRGS 524 in particular,
4. Knowledge of the requirements of metrological monitoring,

5. Knowledge of technical, organisational protective measures and personal protective equipment and the corresponding special requirements of work in contaminated areas, including special construction site equipment, storage and disposal measures.
6. Basic knowledge of issues relating to occupational health care, in particular:
   a) Preventive medical check-ups, their contents and legal basis,
   b) Hazardous substances, toxicology and risk assessment,
   c) Exposure/stress due to hazardous substances and personal protective equipment, and
   d) Hygiene, skin protection.
7. Basic knowledge of the organisation of emergency measures and first aid
8. Basic knowledge of state regulations and rules and those of the accident insurance institutions on the subject of hazardous substances, at least:
   a) Occupational Health and Safety Act,
   b) Hazardous Substances Ordinance,
   c) Construction Site Regulations,
   d) Technical Rules for Hazardous Substances (TRGS) 524,
   e) Rule Use of protective clothing (BGR/GUV-R 189),
   f) Rule Use of respiratory protective equipment (BGR/GUV-R 190),
   g) Rule Use of protective gloves (BGR/GUV-R 195),
   h) relevant instructions for action and
   i) Building regulations guidelines/recommendations.
9. Basic knowledge of responsibility structures (management and supervision) and the resulting liability in the field of occupational health and safety

(2) The competent person must be willing and able to actively promote safety and health protection on construction sites. They must have the ability to think through work processes systematically, with foresight and across trades, to recognise emerging hazards and to take the necessary co- ordination measures. In addition to this knowledge and skills, the competent person must also have a sufficient degree of social competence to perform his or her tasks. In particular, he/she must have the ability to work in a team, to lead cooperative processes and to communicate appropriately. Their function and position must be designed in such a way that they experience the necessary acceptance of other planning and implementation participants and that they can devote sufficient and effective time to their task.

Annex 3 to TRGS 524

Sample structure and contents of the work and safety plan

This sample has the character of a checklist. Therefore, the contents are to be adapted on a case-by-case basis!

1 General data

1. Name of the contaminated area,
2. Name of the principal,
3. authorities involved, the occupational health and safety services, the experts,
4. Name of the expert coordinator in accordance with §17 GefStoffV or Number 3.2.2. para. 2 of TRGS 524 and his deputies, including definition of their authority,
5. Name of the contact person of each contractor,
6. Occasion for the work,
7. Designation of the group of persons affected by the work and safety plan,
8. Period of validity (time or trade related).

2 Site description

1. History of construction and use of the site,
2. Site plan showing the total extent of the construction site and the contaminated area,
3. Summary of the previous investigations and remediation studies including a site plan, e.g. of the sampling points for building materials, soil, groundwater and seepage water,
4. Location plan of the individual contamination sites or extensions, including information on safety-relevant concentrations of the contaminants in the soil, groundwater, building fabric or similar,
5. geological-hydrogeological situation of the contamination area (strata inventories, groundwater conditions),
6. Ordnance situation.

3 Determination of information on existing or suspected hazardous substances

1. Tabular summary of the results of the investigations on hazardous substances (section 4.2),
2. Tabular compilation of the hazardous substances to be considered with regard to health protection on the basis of their physico-chemical or toxicological properties and their encountered concentration in accordance with assessment criteria (see Number 4.3),
3. Compilation of possible hazard-relevant effects and symptoms of hazardous substance ingestion, e.g. headache, dizziness, mucous membrane irritation (see section 4.3).

4 Determining information on work areas, work procedures, work processes, work steps and individual activities

1. Division of the construction site into different work areas with potential exposure (see number 4.4),
2. Description of the process steps and working methods per work area or individual trade, including the time sequence of the processing, and identification of the individual activities in which a hazard due to hazardous substances is to be expected (see Number 4.4),
3. Information determination of the process- and environment-related criteria of emission/exposure (see Number 4.4),

5 Risk assessment

Activity-related combination of the results of the investigations and assessments according to Number 4 to form a semi-quantitative exposure assessment.

6 Occupational health and safety

6.1 General protective measures

1. Description of the special site equipment for work in contaminated areas incl. site plan,
2. Division of the construction site into protection zones, e.g. black and white areas, A-B-C zones, including site plan according to the different work areas,

3. General rules of conduct including instructions on the use of decontamination facilities and equipment,
4. Occupational health screening.

6.2 Work area or activity-related specifications on technical and organisational protective measures and on personal protective equipment.

1. Requirements for the working process, e.g. "low emission",
2. Requirements for measures for the collection of hazardous substances ("extraction"),
3. Requirements for blowing ventilation measures,
4. Requirements for machines, vehicles and equipment,
5. Requirements for any necessary sealing measures, e.g. foil doors, negative pressure maintenance,
6. Special rules of conduct in case of danger, description of possible danger cases, if applicable,
7. Fire and explosion protection requirements,
8. Determination of control parameters for metrological monitoring,
9. Determination of the substance-related threshold values for the use of additional protective measures in the event of the occurrence of hazardous substances in the respiratory air in dust, mist, vapour or gas form (10 % of the occupational exposure limit values),
10. Determining the intervals of instruction and, if necessary, exercises,
11. Determination of personal protective equipment,
12. Determination of responsibilities for the operational provision of personal protective equipment, in particular respiratory protective equipment (maintenance and care).

7 Measurement concept for monitoring workplace conditions

1. Determination of the measurement target at the location of the activity,
   a) Monitoring of acute hazards (O_2 , LEL, TOX),
   b) Triggering of protective measures when threshold values are exceeded,
   c) Checking the effectiveness of protective measures,
   d) Clearance of work areas before starting work,
   e) Documentation of compliance with or undercutting of limit values,
2. Determination of the measuring instruments and procedures,

3. Determination of the monitoring measurements to be carried out continuously by means of direct-reading measuring instruments with alarm function (LEL, O_2 , triggering of measures when threshold values are exceeded),
4. Determination of the intervals for routine control measurements, e.g. to check the validity of control parameters,
5. Definition of the responsibilities for keeping the measuring devices ready for operation (maintenance and care).

8 Disposal

1. Rules of conduct for handling and disposing of contaminated protective equipment and other contaminated items,
2. Rules of conduct, e.g. for handling and disposing of contaminated water from decontamination plants and other waste, such as used air filters, protective clothing.

9 Documentation, evidence

1. Determination of the documentation to be carried out by the various parties involved (site manager of the client, coordinator or executing companies).
2. Determination of the evidence to be submitted by the individual contractor, e.g. occupational health precaution, filter book.

Annex 4 to TRGS 524

Assignment of properties, hazard characteristics and typical evaluation criteria

Characteristic group Substance property	Properties or hazard characteristics according to classification ("R-sentences")[4]	Typical evaluation criteria
Combustible	explosive, extremely flammable, highly flammable, flammable, explosive	– Explosion limits – Boiling point/steam pressure – Ignition temperature – Flash point
explosive	explosive, explosive	- Chemical reactivity
oxidising	oxidising	- Available oxygen
toxic	very toxic, poisonous , Harmful to health	– Occupational exposure limit – Solubility – Boiling point/steam pressure – Skin resorptivity - Recording path - toxicological parameters (e.g. ADI, LOAEL, LD50,)
skin/mucous membrane damaging skin resorptive sensitising (skin,...) (cf. TRGS 907)	Corrosive, irritant, sensitising (see below)	– Occupational exposure limit – Boiling point/steam pressure – pH value – Skin contact – Note "H" according toTRGS 900 – Designation "Sh", "Sah", "SP" according toTRGS 907
Allergens (cf. TRGS 907)	sensitising	– Occupational exposure limit – Boiling point/steam pressure – Intake path / Contact – Designation "Sh", "Sah", "SP" according toTRGS 907
Substances with special hazard potential (CMR substances)	carcinogenic Carc. cat. (K)	– Boiling point/steam pressure – Limit values of the European Union – toxicological parameters (e.g. unit risk) Skin resorptivity
	mutagenic Courage. Cat. (M)	– Boiling point/steam pressure – Skin resorptivity
	fruit damaging Repr.Cat. $(R)_E$	– Boiling point/steam pressure – Skin resorptivity
	Impairment of the ability to reproduce Repr. Cat. $(R)_F$	– Boiling point/steam pressure – Skin resorptivity

4 According to Regulation (EC) No. 1272/2008 (of 31.12.2008, CLP Regulation, also known as EU GHS Regulation), the previous classifications with R-phrases and hazard characteristics or identification letters are replaced by classifications with H-phrases and hazard classes or categories (see e.g. Annex 7 of this Regulation).

Annex 5 to TRGS 524

Example of the presentation of the substance data determined for the assessment of mobility and hazards (section 4.3 Information a s s e s s m e n t on the properties of substances)

Note: The following table is only an **example of** the results of the collection of relevant substance data and does not represent a selection of all parameters to be considered! These must be **selected on a project-specific basis** according to the substance inventory!

Substance name	Boiling point [°C]	Steam pressure [mbar] (20°C)	Vapour saturation concentration [g/m³] (20°C)	soluble in H_2O	Aggre- gate condition or manifestation to be expected during the work	UEG [Vol%]/ [g/m³] / Flash point [°C]	Skin-gan-gig	Hazardous characteristics according to GefstoffV5	AGW [mg/m³] / AGW [ml/m³]	Peak limit	Classification acc. TRGS 9054	Remarks R Sentences S-phrases4
Phenol	181,7	0,2	0,77	++	bound to dust particles,	1,36 / 82	+	toxic corrosive	7,8 / 2	-	M3	volatile in water vapour, subli- mised, aqueous solution pH ~ 5, R23/24/25-34; S 24/25
Benzene	80	100	320	+/-	vapour	1,2 / - 11	+	highly flammable, toxic	-		K1 M2	R 45-11-48/23/24/25 S 53-45
Lead (II,IV) oxide	1472	1.3 at 943°C	-	-	dusty	-	-	harmful to health	-		R_F 2 R 2_E	R20/22-61/62, S53-45
Mercury (II) chloride	280,7	0,0001	0,0011	++	in stratum water	-	+	Very toxic	0,01 (E) / -	8		Aqueous solution pH 3.2
Benzo(a)-pyrene	495,5	0,0073 nano bar	0.08 nano-gram	3 mg/l	bound to dust particles	-	+		-		K2 M2 R_F 2 R 2_E	R 43 Sensitisation by skin contact R 45, 46, 60 61; S 53 Avoid contact
Naphthalene	218	0,04	0,21	32 mg/l	bound to dust particles, vaporous	0,9 / 48 / 80	+	harmful to health	-		K3	Odour: Moth powder/tar R 22 R 40

Classification according to TRGS 905: K1-3 = carcinogenic, M1-3 = mutagenic, R_f 1-3 or R_e 1-3 = toxic to reproduction or development;
E = Inhalable dust; A = Alveolar dust; GS = Odour threshold; water soluble: ++ = very good; + = good; +/- = moderate; - = not water soluble;

5 According to Regulation (EC) No. 1272/2008 (of 31.12.2008, CLP Regulation, also known as EU GHS Regulation), the previous classifications with R-phrases and

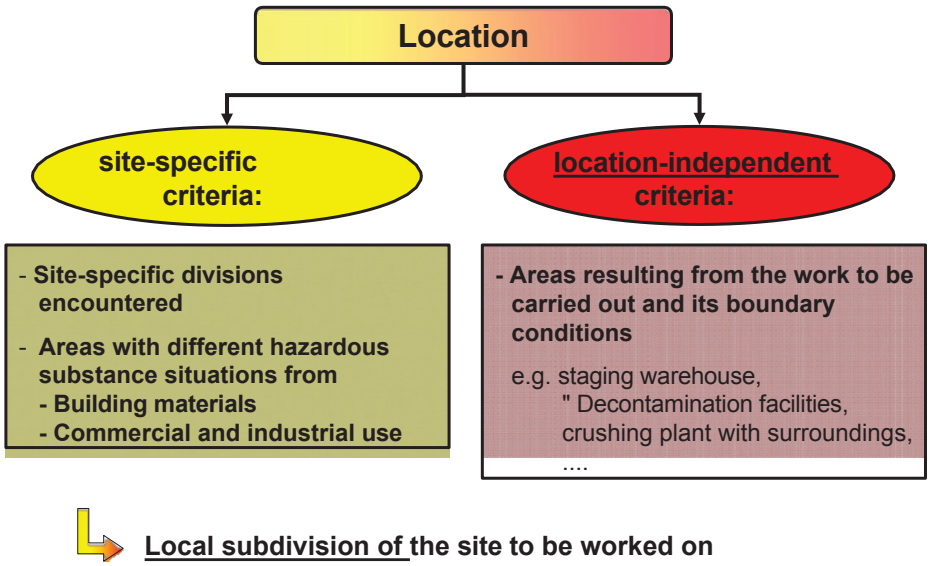
hazard characteristics or identification letters are replaced by classifications with H-phrases and hazard classes or categories (see e.g. Appendix 7 -diAeussr dVhausodinuGef)aRh-rustnodffeS--SAäGtzSe-dGuerscchhGäfetsfauehrerunn- gbz-wB-A. .disee- (seehaeAmexes3and4)

Annex 6 to TRGS 524

"Identification of work areas, work processes and activities with exposure in accordance with points 4.4 and 4.5".

Step 1:

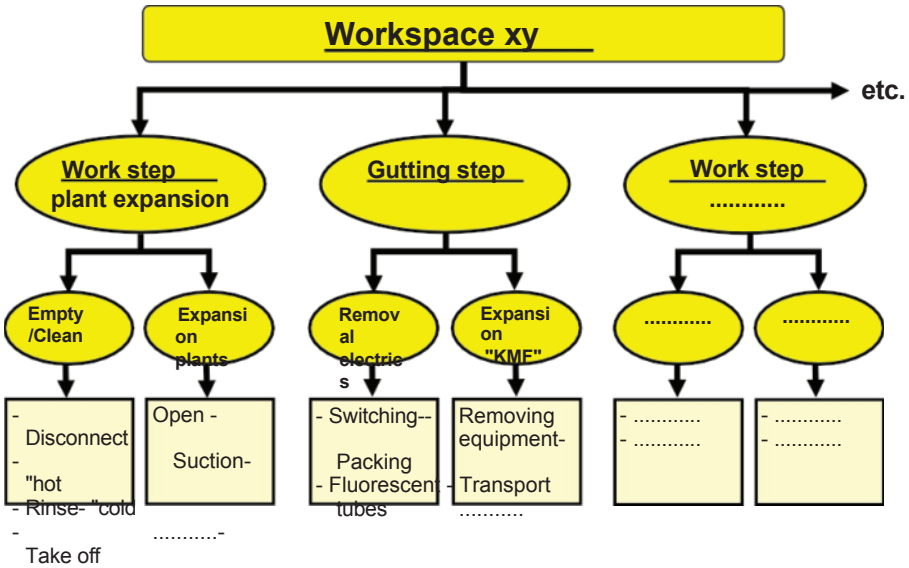
Identify the work areas where hazardous substances may be released.



Local subdivision of the site to be worked on

Step 2:

Determination of the work steps, work procedures, processes and activities for each work area identified in accordance with section 4.4, using the following example "Industrial deconstruction"



Annex 7 to TRGS 524

Technical, organisational and personal measures

Technical measures	
Avoidance and reduction of exposure	1. Use low-emission processes 2. Effectively capture released hazardous substances at the point of origin and discharge them safely. (e.g. suction) 3. Limit the spread of dust (e.g. cover, knock down dust, enclose). 4. Ventilation, weathering 5. Separate employees from the danger zone: a) Automation of activities (remote control) b) Equip drivers' cabs with breathing air supply systems. 6. Provide suitable work and auxiliary equipment for material handling
Site equipment	1. Set black and white areas, 2. Provision of special facilities, e.g. black and white facility, fencing 3. Attach safety marking 4. Avoid unauthorised access 5. Cordoning off the workplaces 6. Access control to the workplace 7. Provision of decontamination facilities, e.g. for vehicles (tyre washing facility), tools and equipment (washing area); boot cleaning or changing of boots.
Fire and explosion protection	1. Avoid explosive atmosphere in the working area 2. Limit the release of explosive and flammable substances 3. Ventilation and deaeration 4. Avoid ignition sources (e.g. open fire, mechanical and electrical sparks, electrostatic charges, frictional heat, hot surfaces). 5. Using explosion-protected work equipment in potentially explosive atmospheres 6. Use technical ventilation 7. Monitoring of the explosion limits and alarm in case of exceeding the alarm values for explosion protection 8. Maintain sufficient protective distances 9. Provide the necessary extinguishing agents and suitable fire-fighting equipment.

Organisational measures	
Process organisation	1. Draw up construction schedule or SiGe plan (adapt to health and safety requirements??) /Set up site regulations 2. Create work and safety plan 3. Create a risk assessment 4. Draw up operating instructions and keep them available at the workplace 5. Appoint a coordinator to avoid mutual hazards if several companies are involved in the work. 6. Avoid unnecessary activities in the contaminated area 7. Minimise the number of people working in the contaminated area. 8. Zoning the construction site into activities with different hazards 9. Avoid working alone 10. Limit working time in the hazardous area 11. Instruct employees regularly 12. Ensure qualified supervision 13. Employ a qualified workforce 14. Ensure monitoring of the intended operation and alarming by means of suitable devices. 15. Establish rules for the use of decontamination facilities. 16. Documentation (e.g. access logs, filter book)
Ensure technical safety	1. Ensure monitoring of the intended operation and alarming by means of suitable devices. 2. Ensure maintenance 3. Keep reserve units
Emergency organisation, first aid,	1. Establish general rules of conduct in case of danger, 2. Create alarm and hazard prevention plans 3. Create escape and rescue plan 4. Keep escape and rescue routes clear 5. Have effective communication facilities available (e.g. telephone, mobile phone facilities). 6. Announce emergency numbers 7. Secure the deployment of the fire brigade and rescue services 8. Ensure first aid and medical care 9. Have suitable rescue equipment available 10. Conduct rescue exercises in combination with fire drills 11. Have one first aider per work group with first aid equipment ready to hand.
Metrological monitoring	1. Arrange for metrological monitoring of the workplace, 2. Monitoring of hazardous substance concentrations and alerting when air limits are exceeded 3. Set up measuring programme 4. Ensure expertise
Ensure occupational health care	1. Consulting a) in the preparation of the risk assessment b) in the selection of personal protective equipment c) on hygiene measures 2. Occupational health examinations 3. Biomonitoring

Personal measures	
Qualification	1. Instruction (workplace and activity-related, regular) 2. Ensure occupational health care and preventive medical check-ups (offered and compulsory check-ups) 3. Observe employment restrictions (Youth Employment Protection Act, Maternity Protection Act). 4. Training, further education, specialised courses
Hygiene	1. Drinking, eating, snorting and smoking ban 2. Use black and white facilities 3. Hand washing/showering 4. Use personal protective equipment 5. Linen change
Proper use and handling of personal protective equipment	1. Check suitability of employees 2. Proper selection (wearing comfort, durability...) 3. Instruction 4. Adhere to break regulation and carrying time limit 5. Proper maintenance, care and storage

Annex 8 to TRGS 524

Necessary information when determining the personal protective equipment

Respiratory protection (see BGR/GUV-R **190)**	
Respiratory protection system:	☐ Insulating equipment ☐ Container devices ☐ Hose equipment ☐ Compressed air hose unit ☐ ..... ☐ Filter units
Breathing connection	☐ Filtering half mask ☐ Quarter, half, full mask (normal pressure, positive pressure system) ☐ with fan support ☐ without fan support ☐ Helmet, bonnet systems
when using filter systems:	☐ Filter type ☐ Filter class Standard change interval ..... x daily at breaks/end of shift Special change criteria ....

Protective clothing (see BGR/GUV-R **189)**
When working in contaminated areas, always wear protective clothing EC Cat. III must always be worn! Type: ..... Fabrication (e.g. type 3, with incorporated bonnet): ..... ☐ Tape off cuffs for hand and foot protection ☐ Connection of protective clothing/hand protection by means of roll ring system

Hand protection (see BGR/GUV-R **195 or** BGI/GUV-I **868)**	
Requirements at Protective effect with regard to	Mechanical hazards ..... Chemical hazards ..... biological hazards .....
Glove material:	.....
Packaging	☐ Cuff ☐ open back of the hand ☐ Closed back of the hand Arm length/cuffs: .....

Foot protection (see BGR/GUV-R **191)**	
Requirements at Protective efficacy with regard to	Mechanical hazards ..... chemical hazards ..... biological hazards .....

Annex 9 to TRGS 524

Notes on metrological monitoring when working in contaminated areas

When planning the metrological monitoring of hazardous substances in the air during work in contaminated areas, the following must be observed:

1. the hazardous substance-related basis of the measurement planning is data indicating the hazardous substance concentration in the investigated medium (soil, groundwater, plants, masonry, plaster, supporting structure, ...).
2. it is not possible to extrapolate the concentration to be expected in the air in the working area on the basis of the concentration found in the medium, but only to estimate the order of magnitude ("high/low") and an approximate percentage distribution of the individual contaminants.
3. Any estimation is only as good and reliable as the site is representative and the distribution of the pollutant components in the working area and the working conditions according to the process and environmental conditions are constant!

Basics:

Has the risk assessment been carried out for all activities?

1. Has the division of the site into "work areas" (see number 4.4) been carried out?
2. Have been verified or comprehensibly documented for all "site-typical" hazardous substances (see Number 4.2) by means of sampling and analytical methods,

   a) which hazardous substance in which future work area (local delimitation and allocation),

   b) where at or at examined Medium (soil, soil air, groundwater, building fabric),

   c) in which concentrations

   is to be expected? (see point 4.2)
3. Have all hazards posed by hazardous substances been identified? (see point 4.3).
4. Have the "activities with acute hazards" been identified which, due to the hazard, require mandatory metrological monitoring? (see section 4.3).
5. Have the activities that could be considered for the measurement objective "triggering of measures in case of non-acute hazards" been identified? (see 4.5.2).

Only if these questions are answered positively can measurements be planned and carried out in a targeted manner!

Measurement planning methodology

Note:	For each of the activities intended for metrological monitoring, the measurement planning must be set up according to the methodology presented below!

1 Set measurement target

Possible measurement targets are:

1. Monitoring and initiation of protective measures with regard to acute hazards (ex-hazard, O_2 deficiency, acutely irritating, corrosive, toxic substances),
2. Triggering of protective measures for chronically acting substances (carcinogenic, mutagenic, etc.),
3. Checking the effectiveness of technical, organisational and hygienic protective measures,
4. Proof of compliance with limit values,
5. Control in case of abnormalities,
6. Clearance measurement of shafts, pits, containers, rooms before they are entered.

→ Draw up a list of the activities to be monitored, separated according to measurement objectives!

→ **Feasibility check**:

Is the number of work areas or activities to be monitored still manageable and thus controllable?

2 Define measurement strategy for each activity to be monitored:

1. Determination of the substance/parameter to be monitored:
   – Individual substances, lead parameters/sum parameters calculated on distribution (PID) or reference substance for 10% rule
2. Setting the alarm values
   – for "toxic" substances, observe the 10% rule,
   – for explosive substances, alarm value 20% LEL (if necessary, pre-alarm at 10% LEL).
3. Determination of the calibration gases to be used for each project
4. Determination of the measurement frequency:
   – uninterrupted measurement with measurement target "triggering of measures", or
   – spot-checking the effectiveness of measures.
4. In the case of spot checks: Determination of number and times of measurement ("operating condition") and/or definition of triggering criteria.
5. Determination of trigger criteria for unscheduled measurements or examinations, if necessary outdoor measurements according to BGR 117-1.
6. Determination of the measuring person.

→ **easibility check**:

Are the properties of the hazardous substances so homogeneous that a representative lead parameter or sum parameter to be monitored can be determined?

3 Set the measuring device(s):

1. Directly indicating warning device ("monitor"), e . g.: Multiple gas monitor "EX-OX-TOX", PID (FID, test tubes), dust monitors,
2. Substance-specific measuring instruments with slightly longer measuring delay, e.g.: portable GC, infrared spectrometer, ion mobility spectrometer,
3. Sampling on sample carrier with quantitative analysis:
   – Personal sampling according to BIA methods
4. Determine the number of warning/measuring devices to be used/provided:
   → Number of activities (work areas) to be monitored with the respective unit type + one spare unit each

→ **easibility check:**

1. Are there any measurement methods at all for all or some of the hazardous substances that may occur in parallel that are sufficiently accurate in terms of quantity?
2. Are the properties of the hazardous substances so different that different monitoring methods or measuring devices would have to be used in parallel?
3. Does the person who has to carry out or assess the measurement have the necessary knowledge or expertise (instruction ↔ training), which varies depending on the measurement objective?

4 Determine documentation:

1. Which measurements are to be documented?
2. How is it to be documented, how often? (Data storage, form!!)

5 Determine the consequences of exceeding the alarm value

1. Work stoppage/interruption
2. Determine technical/organisational/personal protection measures to be taken.
3. Formulate conditions for continuing the work, e.g.
   – "Free measurement",
   – further investigations,
   – Carry out reassessment if necessary

Annex 10 to TRGS 524

Example of the tabular presentation of the risk assessment and determination of the protective measures

Working area Tar pit Work steps:	Activity/ Staff	Exposure estimation for direct and unprotected contact with				Hazard assessment			Technical protective measures, measuring devices	Personal protective equipment (EC category)			Special features Remarks
		Cont. Material	Cont. Liquids	Dust, aerosol	Gases/ Vapours	Health hazards: inhalative	Health hazards: dermal	Fire/explosion hazard		Clothes (3)	Hand shoes (1 to 3)	Breathing protection (3)	
Making the enclosure	**Excavate foundations:**												
	Excavator operator	0	0	0	0	**0**	**0**	**0**	PID on man, alarm at 5 ppm	(Type 5/6)	(BW Nitrile)	-	
	Removal	0	0	0	0	**0**	**0**			(Type 5/6)	(BW Nitrile)	-	
	Helpers	+	0	+	++	**++**	**+**			Type 5/6	BW Nitrile	(HM-AP2)	
	Control/ Measurement	+	0	0	0	**0**	**+**			(Type 5/6)	(BW Nitrile)	-	
	Insert prefabricated foundations:												
	Wheel loader driver	0	0	0	0	**0**	**0**	**0**	PID on man, alarm at 5 ppm	(Type 5/6)	(BW Nitrile)	-	
	Helpers	+++	0	0	++	**++**	**+++**			Type 5/6	BW Nitrile	(HM-AP2)	
	Tent erection, ventilation assembly:												
	Mobile crane driver	0	0	0	0	**0**	**0**	**0**	PID in Arb-range, 5 ppm alarm	(Type 5/6)	(BW Nitrile)	-	Ventilation: 2-fold air exchange, underpressure or leak test by means of a fogging system.
	Fitters	0	0	0	0	**0**	**0**			(Type 5/6)	(BW Nitrile)	-	
Suction of the absorbent phase	Suction tanker	0	+	0	+	**+**	**+**	**+**	PGD + GW in the Working range, alarm 5 ppm/ 20% LEL	Type 5/6	BW Nitrile	(HM-AP2)	
	Helpers	0	++	0	++	**++**	**++**			Type 4	Nitrile (3)	TVM/TH-AP3	
Removing the	Excavator operator	0	0	+++	+++	**+++**	**0**	+	ALV F-A/P3,	(Type 5/6)	(BW Nitrile)	-	Dust precipitation

Concrete cover	Transport	0	0	+	+	**+**	**0**		DME filter, PID + GW alarm 5 ppm/20% LEL Ventilation during alarm	-	-	-	by wetting, truck: windows closed, ventilation off
	Helpers	0	0	++	+++	**+++**	**+**			Type 5/6	BW Nitrile	HM-AP2	
	Control	0	0	+	+					(Type 5/6)	(BW Nitrile)	(HM-AP2)	
Excavation "tar	Excavator operator	0	0	0	+++	**+++**	**0**	+	ALVF-A/P3, DME filter, PID	(Type 5/6)	(BW Nitrile)	-	Transport: Setting down the
	Helpers	+	+	++	++	**++**	**++**		PID + GW, Alarm 5 ppm or 20% LEL Ventilation in case of alarm	Type 4	Nitrile *(3)*	TVM/TH-AP3	Troughs in over-ga- lock; Truck in airlock: windows closed, Ventilation off;
	Transport	0	0	0	+	**+**	**0**			-	-	-	
	Surveying	+	+	+	+	**+**	**+**			Type 5/6	BW Nitrile	(HM-AP2)-	
	Control	+	+	+	+	**+**	**+**			Type 5/6	BW Nitrile	(HM-AP2)-	
Cleaning "Pit"	**Pre-cleaning (pushing the remains together)**												
	Helpers	+++	0	+	0	**+**	**+++**	**0**	-	Type 4	Nitrile ***(3)***	TVM/TH-AP3	
	Main cleaning ("kärcher")												
	Helpers	0	+++	0	+++	**+++**	**+++**	**0**	-	Type 4	Nitrile ***(3)***	TVM/TH-AP3	
Deconstruction "Pit"	Excavator operator	0	0	+	+++	**+++**	**0**	**0**	ALVF-A/P3, PID, alarm at 5 ppm	Type 4	Nitrile ***(3)***	VM au	Transport: Troughs w.o. Truck in airlock: windows closed, Ventilation off;
	Transport	0	0	0	+	**+**	**0**			-	-	-	
Deconstruction "tent	**Interior cleaning by means of a steam jet unit**												
	Helpers	0	+++	++	0	**++**	**+++**	**0**	PID, alarm at 5 ppm	Type 4	Nitrile ***(3)***	TVM/TH-AP3	
	Tent dismantling												
	Mobile crane driver	0	0	0	0	**0**	**0**	**0**	PID, alarm at 5 ppm	(Type 5/6)	(BW Nitrile)	(HM-AP2)-	
	Helpers	0	0	0	0	**0**	**0**			(Type 5/6)	(BW Nitrile)	(HM-AP2)-	
Cleaning and maintenance	Cleaning - outside	++	+	++	0	**++**	**++**	**0**	-	Type 4	Nitrile ***(3)***	VM-P3 or TH-P3	EBM and KFZ before maintenance on

work on contaminated earth-moving machinery (EBM) and vehicles (KFZ)	Cleaning - inside, dry (acid - gen)	0	0	++	0	**++**	**+**			Type 5/6	BW Nitrile	HM-P3 or FFP3	Clean the inside and outside of the washing area.
	Cleaning - inside, damp	0	+	+	0	**0**	**+**			Type 5/6	BW Nitrile	-	
	Maintenance	+	0	+	0	**+**	**+**			Type 5/6	BW Nitrile	(HM-P3 or FFP3)	

Legend: **Exposure assessment or risk assessment: +++** = high**,** , **++** = medium, + = low, **0 =** no exposure/hazard **Technical protective measures: ALV** F-ABEK/P3= breathing air supply system filter ABEK/P3, **DME filter** = diesel soot filter system, **measurement technology: PID=** photoionisation detector; **GW** = gas warning device.
PPE: Specification in (brackets) = "Keep PPE on hand, use on instruction"; for trigger criteria see work and safety plan chap. ....
Gloves *"BW-Nitril"*: nitrile dipped cotton gloves, closed back, tested according to ***EC cat 2*** *(*mech. hazard),
Gloves *"Nitrile (3)*": Chemical protective gloves made of nitrile, tested according to *EC cat. 3* (chemical, biological hazard)
TVM-x = full-face mask, fan-assisted; **TH-x** = bonnet, fan-assisted; **HM-x** = half mask, **VM-x** = full-face mask + **filter type/class, FFP x** = particle-filtering half mask + **filter class; VM au** = full-face mask with outside air-independent respiratory protection (compressed air hose)

Annex 11 to TRGS 524

Sources of information, rules and regulations
(as amended from time to time)

Specific information on work in contaminated areas - including detailed safety measures - can be derived from specific documentation on the state of the art (e.g. TRGS, UVV, BG or industry-specific regulations or provisions). Other sources of information include the bulletins of the statutory accident insurance institutions.

1 Ordinances, technical rules, e.g.:

Ordinance on Hazardous Substances

TRGS 400Danger assessment for activities with hazardous substances,
TRGS 401 Hazards through skin contact - determination, assessment, measures
TRGS 402 Determination and assessment of hazards during activities involving hazardous substances
fen: Inhalation exposure
TRGS / TRBA 406 Respiratory sensitising substances
TRGS 500Protective measures
TRGS 505 Lead
TRGS 517 Activities involving potentially asbestos-containing mineral raw materials and preparations and products made therefrom
TRGS 519Asbestos : Demolition, renovation or maintenance work
TRGS 521 Demolition,renovation and maintenance work with oldmineral wool TRGS 554 Exhaust gases from diesel engines
TRGS 710 Biomonitoring
TRGS 720 /TRBS 2152Dangerous explosive atmospheres - General information
TRGS 721 /TRBS 2152 - Part 1 Dangerousexplosive atmosphere - Assessment of the explosion hazard
TRGS 722 /TRBS 2152 - Part 2 Prevention or restriction of hazardous explosive atmospheres capable atmosphere TRGS 900Workplace limit values

TRGS 903Biological limit values
TRGS 905 List of substances that are carcinogenic, mutagenic or toxic for reproduction in conjunction with
List of carcinogenic, mutagenic and reprotoxic substances, activities and processes according to Annex I of Directive 67/548/EEC, 6th number of the Ordinance on Hazardous Substances and TRGS 905
TRGS 906 List of carcinogenic activities or processes according to § 3 para. 2 no. 3 GefStoffV
TRGS 907List of sensitising substances

Construction Site Ordinance

RAB 10	Definitions
RAB	30Suitable coordinator
RAB	31Safety and Health Protection Plan - SiGe-Plan
RAB 33	Generalprinciples according to § 4 of the Occupational Health and Safety Act when applying the Construction Site Ordinance

2 Rules, Rules and information leaflets of the Statutory accident insurance institutions, e.g.:

[1] Principles of prevention (BGV/GUV-V A1 plus BGR/GUV-R A 1)

[2] Construction work (BGV GUV-V C 22)

[3] Safety and health protection labelling at the workplace (BGV/GUV-V A8)

[4] Explosion protection regulations - (EX-RL) (BGR/GUV-R 104),

[5] Work in containers, silos and confined spaces (BGR 117-1),

[6] Workplace ventilation - Ventilation measures (BGR 121),

[7] Work in enclosed spaces of waste water systems (BGR/GUV-R 126),

[8] Equipping workplaces with fire extinguishers (BGR/GUV-R 133),

[9] Work in special civil engineering (BGR 161),

[10] Use of protective clothing (BGR/GUV-R 189),

[11] Use of breathing apparatus (BGR/GUV-R 190),

[12] Use of foot and leg protection (BGR/GUV-R 191),

[13] Use of eye and face protection (BGR/GUV-R 192),

[14] Use of head protection (BGR/GUV-R 193),

[15] Use of protective gloves (BGR/GUV-R 195),

[16] Guidelines for occupational physicians on occupational health care for work in contaminated areas

[17] Driver's cabs with breathing air supply systems on earth-moving machinery and special civil engineering machinery (BGI 581),

[18] Instructions for risk assessment and determination of protective measures for explosive ordnance disposal (BGI 833)

[19] Chemical protective gloves (BGI/GUV-I 868)

[20] Chemical protective clothing (BGI/GUV-I 8685)

[21] Transport of contaminated materials (BGI 5010)

3 Sector-specific regulations, e.g.:

"Guideline for fire damage restoration" of the Gesamtverband der Deutschen Versicherungswirtschaft e.V. (GDV) (VdS-No.2357)

4 Information systems on the Internet:

Comprehensive information on occupational safety and health (especially legal bases, concepts)
www.baua.de

Hazardous substance information:

[1] "GESTIS"- Hazardous Substances Database of the industrial Employer's Liability Insurance Associations:
www.dguv.de/inhalt/medien/datenbank/index.html

[2] Hazardous Substance Information System for the Construction Industry "*GISBAU*" *www.gisbau.de* - WINGIS

[3] Hazardous substance databases of the German Institute for Medical Documentation and Information (DIMDI) *www.dimdi.de* - Database search - Free grips- WebSearch

Toxicological databases:

CCRISChemical Carcinogenesis Research Information System

CIVS Chemical Information System on Consumer Relevant

Substances GENE-TOXGenetic Toxicology Test Results

HSDBHazardous Substances Data Bank

ICSC International Chemical Safety Data Sheets

[4] STARS (UBA) Substance database for soil protection/environmentally relevant substances
www.stoffdaten-stars.de

Information on the Historical Exploration:

[1] Contaminated building material - investigation, assessment, disposal; working aid: Con- trolled

Deconstr

uction
www.lfu.bayern.de/boden/fachinformationenschdstoffratgeber/index.htm.de

[2] Substance catalogue of environmentally relevant building materials
www.fachinformation.lubw.de

[3] Economic sectors and hazardous substances *www.gisbau.de* - WINGIS - Construction areas - Con- taminated areas - Economic sectors

BG BAU
Berufsgenossenschaft der Bauwirtschaft

101-004

DGUV Regulation 101-004

Contaminated areas

April 1997 - updated version February 2006

Rehabilitation and Building Maintenance", DGUV
Construction Division.

Edition: April 1997 - updated version February 2006 DGUV

Regulation 101-004 (previously BGR 128)
Available from your competent accident insurance institution or
at www.dguv.de/publikationen.

Table of contents

Trade association rules for safety and health at work (BG rules) are compilations or concretisations of contents from

- State occupational health and safety regulations (laws, ordinances) and/or
- regulations of the employers' liability insurance association (accident prevention regulations) and/or
- technical specifications and/or
- the experience of the prevention work of the social accident insurance institutions.

BG rules are primarily aimed at employers and are intended to help them implement their obligations under state occupational health and safety regulations or accident prevention regulations, as well as to show them how to avoid occupational accidents, occupational diseases and work-related health hazards.

If the recommendations contained in the BG rules are observed, the employer can assume that he will achieve the protection goals required by accident prevention regulations. Other solutions are possible if safety and health protection are guaranteed in the same way. If technical rules have been established by the committees set up for this purpose in order to concretise state occupational health and safety regulations, these rules must be observed as a matter of priority.

If binding contents from state occupational health and safety regulations or accident prevention regulations are reproduced, they are indicated in bold type or summarised in the appendix. Explanations, in particular exemplary possible solutions, are given by corresponding notes in italics.

Preliminary remark

This BG regulation refers to the Technical Rules for Hazardous Substances (TRGS). The following must be observed:

Announcement of the BMWA of 31 December 2004 - IIIb3-35122 on the application of the TRGS against the background of the new Ordinance on Hazardous Substances.

The new Ordinance on Hazardous Substances came into force on 1 January 2005. It should be noted that the Ordinance does not contain any transitional provisions for the technical regulations (TRGS), since according to § 8 para. 1 of the Ordinance they will have a different legal significance in the future. The newly appointed Committee on Hazardous Substances has the task of determining which of the previous Technical Rules can continue to apply under the new Ordinance - if necessary after editorial adaptation - and which need to be revised in terms of content. However, the previous technical rules can also be used in future as interpretation and application aids for the new Ordinance. However, it must be noted that the Technical Rules that have not yet been revised must not contradict the new Ordinance. This is the case, for example, with the previous specifications on the trigger level or the TRK values. In such cases, the corresponding specifications in the technical regulations are to be considered irrelevant.

1 Scope of application

1.1 This BG regulation applies to work in contaminated areas.

Such work can be, for example:

- *The repair or retrofitting of leachate catchments and pipes, gas catchments and other structural installations at landfills,*
- *the subsequent sealing or encapsulation of landfills,*
- *Construction work (and also demolition work) on industrially or commercially used or formerly used land on which the presence of contaminating substances is to be expected.*

areas within the meaning of Section 2 No. 3 or as yet unknown hazardous substance contamination within the meaning of Section 8.1 must be expected,

- *the remediation of soils, water bodies and structures contaminated by hazardous substances,*
- *Activities involving biological agents during work on landfills and during microbiological soil decontamination*
- *the processing of concentrates of hazardous substances in liquid, paste or solid state,*
- *the relocation and processing of landfill material and other interventions in the landfill body,*
- *preceding work for exploration in accordance with Section 8,*
- *Fire damage restoration measures*
- *Activities involving hazardous substances originating from explosive ordnance*
- *Work on the remediation of building pollutants*

1.2 This BG rule does not apply to

1. the implementation of safety and salvage measures immediately after the occurrence of an incident involving hazardous substances in order to immediately avert acute hazards,
2. the deposit of waste for disposal within the meaning of the Closed Substance Cycle and Waste Management Act (Kreislaufwirtschafts- und Abfallgesetz) and the operation of the necessary facilities, machinery and equipment as well as the handling of animal carcasses within the meaning of the Animal Carcass Disposal Act (Tierkörperbeseiti- gungsgesetz),
3. Work in radioactively contaminated buildings and areas,
4. Work on the recovery and removal of explosive substances within the meaning of the Explosives Act,
5. Asbestos abatement work,
6. Work in waste water facilities,
7. Work with genetically modified organisms within the meaning of the Genetic Engineering Act,
8. Work involving the handling of artificial mineral fibres as defined in Annex IV No. 22 of the Ordinance on Hazardous Substances,

9. Construction work in geogenically contaminated areas,
10. Activities that are exclusively for the remediation of mould or t h e removal of pigeon droppings,
11. Cleaning and maintenance work in areas with exposure to biological agents.

Operation of domestic waste landfills see BG regulation "Landfills" (BGR 127).

Deposit of waste see Closed Substance Cycle and Waste Management Act.

For handling animal carcasses, see the Animal Carcass Disposal Act.

For work in radioactively contaminated facilities and areas, see the Radiation Protection Ordinance.

Removal and recovery of explosive substances in the sense of explosive ordnance disposal see Explosives Act and BG rule "Dismantling of objects with explosives or destruction of explosives or objects with explosives" (BGR 114).

Asbestos abatement work see

- *Annex III No. 2.3 in conjunction with Annex IV No. 1 of the Ordinance on Hazardous Substances,*
- *Technical rules for hazardous substances TRGS 519 "Asbestos; demolition, renovation or maintenance work".*

For handling artificial mineral fibres, see Technical Rules for Hazardous Substances TRGS 521 "Fibre dusts".

Mould remediation see BG information "Health hazards due to biological agents in building remediation" (BGI 858).

For the removal of pigeon droppings, see BG information "Health hazards due to pigeon droppings" (BGI 892).

2 Definitions

For the purposes of this BG rule, the following terms are defined:

1. **Work** includes the construction, maintenance, alteration and removal of structures, including preparatory and final work in contaminated areas.

   This work also includes exploration work, e.g. digging trenches, drilling, probing, sampling and inspection.

2. **Structural installations** are installations connected to the ground and made of building materials and components. A connection to the ground also exists if the installation rests on the ground by its own weight or is movable to a limited extent on fixed tracks or if the installation is intended by its purpose to be used predominantly in a fixed location. Fillings and excavations as well as artificial cavities below the earth's surface are considered as structural installations.

   See also § 2 of the accident prevention regulation "Construction Work" (BGV C22).

3. **Contaminated areas** are sites, structures, objects, soil, water, air and the like that are contaminated with hazardous substances or biological agents beyond a basic level that is harmless to health.

4. **Hazardous substances** are substances or preparations with hazardous properties within the meaning of Section 3a (1) of the Chemicals Act as well as substances, preparations and products within the meaning of the
   § Section 19 para. 2 nos. 1 to 4 Chemicals Act.

   Since, when working in contaminated areas, the hazardous substances to be encountered are initially partly unknown and therefore have to be identified with the associated hazard characteristics (hazardous properties) according to § 3a para. 1 Chemicals Act,
   e.g. explosive, very toxic, toxic, harmful, corrosive, carcinogenic, harmful to fertility, cannot be clearly proven, this BG regulation

The differentiation according to the above-mentioned hazard characteristics is dispensed with.

5. **Biological agents** are microorganisms, including genetically modified microorganisms, cell cultures and human-pathogenic endoparasites, which can cause infectious, sensitising or toxic effects i n humans.

   See also § 2 of the Biological Substances Ordinance.

6. **The client**, hereinafter referred to as the principal, shall be any natural or legal person who
   - As the owner or occupier of a contaminated area.

     or
   - as another person obliged to remediate a contaminated area

   h a s t h e work required for the renovation carried out and finances it.

7. **An entrepreneur**, hereinafter referred to as a contractor, is any natural person or legal entity who, on behalf of
   - of the owner or occupier of a contaminated area

     or
   - of another person obliged to clean up a contaminated area

   carries out work in these areas.

8. **Building pollutants** are building materials or preparations for the treatment of building materials whose constituents may pose a hazard to humans or the environment when installed.

9. **Work for** the **remediation of building pollutants** means construction work including preparatory, accompanying and follow-up work for the remediation of structures (technical installations, buildings, parts of structures or installations) in the construction of which building pollutants were used or which were treated with such substances.

Work to remediate building pollutants includes:

- *Removal of joint compounds containing PCBs ("PCB remediation"),*
- *Removal of PAH-containing adhesives ("PAH remediation")*
- *Removal of wood structures treated with wood preservatives ("wood preservative remediation").*

In this context, it is irrelevant for what reason or with what aim the work is carried out. Causes and objectives of the remediation of building pollutants can be e.g.

- *the elimination of the hazard caused by the constituents of the building materials,*
- *the rehabilitation of a structure for structural reasons,*
- *the conversion of a structure for use-related reasons,*
- *the redevelopment of a demolition object in the course of its se- lective deconstruction for reasons of waste separation.*

3 General Requirements

3.1 Work in contaminated areas must be carried out in accordance with this BG regulation and otherwise in accordance with the generally recognised rules of technology. Deviations are permissible if the same level of safety is ensured by other means.

3.2 The technical solutions contained in this BG rule do not exclude other solutions which are at least as safe and which may also have been found in technical rules of other Member States of the European Union or Turkey or other contracting states of the Agreement on the European Economic Area.

3.3 Test reports of testing laboratories approved in other Member States of the European Union or in Turkey or in other Contracting States to the Agreement on the European Economic Area shall be taken into account in the same way as German t e s t reports if the tests, test procedures and constructive elements on which the test reports of these bodies are based are in conformity with the German test reports.

requirements are equivalent to those of the German body. Such bodies are mainly those that f u l f i l the requirements laid down in the EN 45 000 series of standards.

4 Award of contracts

When awarding contracts for work in contaminated areas, the contracting authority must ensure the professional suitability and qualifications of the contractor applying for the contract. Contracts may only be awarded to contractors who can prove that they have experience appropriate to the work to be carried out and that they have suitable personnel and technical equipment.

According to section 4.2.4 DIN 18 299 "VOB Contracting Rules for Construction Work; Part C: General Technical Terms and Conditions for Construction Work (ATV); General Rules for Construction Work of All Kinds", the special protective measures for work in contaminated areas are special services. Therefore, the necessary measures are to be tendered in individual items.

Appropriate sample tender texts are available from the BG BAU construction industry employers' liability insurance association.

5 Coordination

5.1 Appointment of a coordinator

If work in contaminated areas is carried out by several contractors - if necessary also by their subcontractors - the client shall appoint a person as coordinator in writing in order to avoid possible mutual hazards, to coordinate and to ensure complete safety monitoring of the various works, in particular with regard to material hazards. For this purpose, the client shall

ensure that this person has authority o v e r all contractors and their employees with regard to health and safety.

In all other respects, the contractors' own responsibility for their respective areas of responsibility s h a l l remain unaffected. The corresponding provisions of the Ordinance on Hazardous Substances shall apply.

The tasks and powers of the coordinator according to this BG rule are not identical to those of the coordinator according to the Construction Site Ordinance.

It is pointed out that the coordination tasks arising from this BG regulation and the Construction Site Ordinance can be carried out by ***one*** *person if this person has the necessary qualification.*

For coordination obligations, see also § 17 of the Gefahrstoffverordnung.

5.2 Tasks and suitability of the coordinator

The contracting authority may only entrust coordination to persons who are suitable for the tasks involved and can demonstrate sufficient expertise in safety and health protection.

Proof of sufficient expertise in safety and health protection for the respective activity has been furnished by those who can prove successful participation in a training course for "Safety and Health at Work in Contaminated Areas" recognised by the Employer's Liability Insurance Association; for the contents of the various expertise courses, see Annex 6A or 6B of this BG regulation.

In the case of work on the remediation of building pollutants, proof of expertise shall be provided by those who can prove successful participation in a course on "Safety and Health Protection in the Remediation of Building Pollutants" recognised by the Employer's Liability Insurance Association in accordance with Annex 6B.

The sole proof of ***expertise in safety and health protection in the remediation of building contaminants*** *according to Annex 6B is only regarded as sufficient qualification for the coordinator or site manager if work is exclusively carried out for the remediation of building contaminants. If further work is to be carried out in contaminated areas within the meaning of Section 1.1, the expertise according to Annex 6A must be demonstrated.*

Suitable persons are, for example, those who have

- *Sufficient and relevant vocational training and qualification and*
- *the required knowledge, experience and skills*

The coordinator must be able to perform the tasks of a coordinator safely.

The coordinator's tasks include e .g.

- *Draw up a site-specific work and safety plan,*
- *Instructing the insured persons about the respective hazards and the necessary protective measures of the work or construction site,*
- *Monitoring the requirements laid down in the operating instructions for compliance with them,*
- *Arrange for any additional investigations into hazardous substances and biological agents that may be required,*
- *Arrange for necessary measurements in the air of the working areas,*
- *Evaluate the results in cooperation with the leading companies,*
- *Coordination of the time sequence of individual works and evaluation of their effects on each other with regard to possible hazards.*

6 Management and Supervision

6.1 Management

Work in contaminated areas must be supervised by a professionally qualified supervisor or site manager. This person must ensure that the work is carried out in accordance with the regulations and must be familiar with the particular hazards associated with work in contaminated areas. If this work is carried out by only one company and a coordinator in accordance with Section 5 is therefore not required, the local site manager must provide proof of expertise in accordance with Section 5.2 appropriate to the activity and must also assume the health and safety tasks in accordance with Section 5.2.

Technically suitable supervisors or site managers are, for example, persons who have

- *Sufficient and relevant vocational training and qualification and*
- *Sufficient experience and knowledge regarding safety and health protection*

have the skills to safely carry out the additional tasks that arise when working in contaminated areas due to activities with hazardous substances and biological agents.

Sufficient knowledge with regard to safety and health protection can be acquired, for example, by participating in an expert training course in accordance with section 5.2.

In cases where the local site manager or plant manager does not yet have sufficient knowledge of safety and health protection, it must be agreed with the responsible accident insurance institution whether their use can be permitted as an exception. The basic conditions for this are,

- *that a coordinator is appointed and*

- that a person has been appointed by the executing company who h a s the expertise according to section 5.2 and who supports the local site manager or plant manager in t h e above-mentioned special tasks.

6.2 Supervision

Work in contaminated areas must be supervised by a supervisor.

The supervisor is the person who has to supervise the safe execution of the work and ensure that the work is carried out safely. He must have sufficient knowledge and experience for this and be authorised to give instructions. For management and supervision, see also § 4 Para. 1 and 2 of the accident prevention regulation "Construction Work" (BGV C 22).

7 Employment restrictions

7.1 Young people

The contractor may only employ insured persons in contaminated areas who have reached the age of 18. This does not apply to the employment of young people, insofar as this is done in compliance with § 22 of the Youth Employment Protection Act.

According to section 22 of the Youth Employment Protection Act, young people may be employed, depending on the type of hazardous substance and biological agent, if

- *the activities are required to achieve the training objective,*
- *Young people must be supervised by a qualified person,*
- *the occupational exposure limit value for hazardous substances according to*
  § 3a of the Hazardous Substances Ordinance is not exceeded and

– *there is no targeted activity with biological agents of risk groups 3 and 4 within the meaning of Directive 90/679/EEC or the Biological Agents Ordinance.*

In addition, the protective provisions of the Youth Employment Protection Act must be observed, in particular the obligation to provide instruction on hazards in accordance with § 29 of this Act.

7.2 Women

The contractor may only employ women in contaminated areas if this is done in compliance with the Maternity Protection Directive.

Particular attention must be paid to the provisions of § 5 of the Maternity Protection Directive Ordinance:

– *The employer may not employ expectant or nursing mothers with very toxic, toxic, harmful or otherwise chronically harmful hazardous substances if the workplace limit value is exceeded. He must also not employ expectant or nursing mothers with substances, preparations or products which, according to experience, can transmit pathogens if they are e x p o s e d to the pathogens.*
– *Expectant mothers are also prohibited from working with carcinogenic, teratogenic and mutagenic hazardous substances.*
– *The employer may not employ workers of childbearing age when handling hazardous substances containing lead and mercury alkyls if the workplace limit value is exceeded.*
– *In addition, the protective provisions of the Maternity Protection Act must be observed in the case of expectant or nursing mothers, in particular the employment prohibitions according to §§ 4 and 6 of the Maternity Protection Act.*

7.3 Working alone

If activities in areas contaminated with hazardous substances are carried out by one employee alone, the employer must take additional protective measures or ensure adequate supervision, depending on the result of the risk assessment. This can also be ensured by using technical means.

Additional safeguards or adequate supervision may be, for example:

- *Checks at regular intervals by supervisors, either in person or by means of communication equipment,*
- *the use of technical aids, such as cameras or similar.*

For further information, see BG regulation "Use of personal emergency signal systems (BGR 139).

Reference is made to the obligations according to section 6.2.

8 Investigation, identification and documentation of Hazardous substances and biological agents

8.1 Areas with unknown loads

Before starting work in areas where contamination cannot be ruled out, the contractor shall carry out or have carried out an investigation of the suspected hazardous substances or biological agents and an assessment of the potential risk they pose in terms of safety and health protection. He shall document the results of these investigations and make them available to all contractors in accordance with Section 2 No. 7.

Inspection and evaluation of building files, aerial photographs, business registrations and the like provide insights into the history of the use of the building site and its environs.

bation. Observations, e.g. of the current use of the surrounding area, of the vegetation, detection of gaps in vegetation or reduced growth can also provide indications of possible contamination.

The risk assessment to be carried out according to disposal or environmental aspects, e .g. according to water law, waste law, Federal Immission Control Act, soil protection regulations for contaminated sites, must be supplemented with regard to those hazards which may occur for the insured persons during work in the sense of Section 2 No. 1 according to the history of use of the suspected contaminated site. The hazard during work in contaminated areas is not only determined by the properties and form of the substances, but also essentially by the type of handling (= work procedure !).

Reference is made to the client's obligations to investigate and remove any war contamination, e.g. unexploded bombs, that may be present in the construction area.

8.2 Areas with known exposures

In the case of work in areas with known exposure, the client must carry out or have carried out investigations into the type, quantity and condition of the expected hazardous substances or the type and place of occurrence of t h e biological agents as well as the hazard potential of the exposure to b e encountered in terms of occupational health and safety. He shall document the results of these investigations and make them available to all contractors.

The hazard assessment to be carried out from an environmental point of view shall be supplemented in accordance with Section 8.1 with regard to the hazard potential of the loads encountered.

8.3 Work and Safety plan

The results of the explorations according to section 8.1 or of the investigations according to section 8.2 shall be taken into account by the client.

– the working methods under consideration or envisaged, and
– the interests of safety, health and neighbourhood protection

The contractor shall implement a work and safety plan for the contractor.

The work and safety plan should be part of the tender documents.

A model for the structure and contents of the work and safety plan is given in Annex 3.

If the contractor is required to prepare a SIGE plan in accordance with the Construction Site Ordinance when working in contaminated areas, the work and safety plan in accordance with this BG rule constitutes a special component of the SIGE plan.

According to the Construction Site Ordinance, the provisions of § 4 of the Occupational Health and Safety Act must be taken into account when drawing up t h e SIGE plan. This principle should also be taken into account when preparing the work and safety plan in accordance with this BG regulation.

8.4 Obligation of the contractor

Prior to commencing work, the contractor is obliged to check the results provided and documented by the client with regard to the hazards emanating from contaminated areas for obvious discrepancies and to inform the client of any defects discovered or suspected. If necessary, the contractor shall point out to the client that further investigations are necessary and must be arranged.

The obligations of the contractor according to the Ordinance on Hazardous Substances and the Ordinance on Biological Substances shall remain unaffected, in particular the obligation to carry out a risk assessment. The client's work and safety plan provides the necessary knowledge and basis for this.

For risk assessment, see § 7 of the Ordinance on Hazardous Substances and § 8 of the Ordinance on Biological Substances.

The risk assessment must also take into account any new hazardous substances and metabolites that may arise as a result of t h e chosen working or remediation method.

8.5 Advice from Experts

For the performance of the work in accordance with sections 8.1 to 8.4 the client and the contractor shall seek expert advice if they do not have the necessary knowledge themselves. This also applies to the metrological supervision according to section 9.

9 Metrological monitoring of the workplaces

9.1 Type and scope of the measurements

If the risk assessment carried out on the basis of the investigations in accordance with section 8 shows that the insured persons are affected by

- Oxygen deficiency,
- explosive atmosphere,
- Hazardous gases, vapours, mists, dusts or liquids.

health hazards, the contractor shall ensure that the workplaces in contaminated a r e a s a r e appropriately monitored by measuring equipment. He shall define the measurement concept according to the measurement method and the measurement technology to be used.

as well as the type and scope of the measurements must be agreed with the client prior to the start of the work, in case of doubt with the involvement of the professional association and other technical and supervisory authorities. The measurement results shall be documented.

Since the Biological Substances Ordinance does not have a monitoring obligation comparable to the Hazardous Substances Ordinance, the above requirements refer exclusively to activities involving hazardous substances according to § 3 para. 1 of the Hazardous Substances Ordinance. Nevertheless, it may be necessary to carry out measurements of biological agents as part of the risk assessment or to check the effectiveness of protective measures.

For measurement procedures and evaluation of biological agents with regard to the review of the risk assessment or the protective measures, see the Technical Rules for Biological Agents (TRBA), in particular

- *TRBA 405 "Application of measurement methods and technical control values for airborne biological agents",*
- *BGIA workbook "Measurement of hazardous substances".*

The specifications in the work and safety plan (see section 8.3) regarding the measurement concept must be taken into account.

In the case of work for the remediation of building pollutants, metrological monitoring is only necessary in concrete individual cases if other documents that would enable an exposure assessment for the activities to be carried out, e. g. BG/BIA recommendations, corresponding exposure descriptions or instructions for action, are not available or are not sufficient for the exposure assessment of the individual activity.

If the presence of explosive atmospheres is to be expected, see also

- *"Explosion Protection Rules - (EX-RL)" (BGR 104) for fire and explosion behaviour.*

The Technical Rules for Hazardous Substances TRGS 402 and TRGS 403 contain procedures for the metrological assessment of workplaces where activities involving hazardous substances are carried out. The prerequisite for the application of the procedures is that they are in accordance with Annex 1 No. 2 of TRGS 402:

- *The hazardous substance situation (exposure) is typically measured by the shift mean value,*
- *the hazardous substance situation (exposure) at the workplace remains essentially the same or changes only slightly in the long term,*
- *the operating conditions at the workplace repeat themselves regularly.*

If the prerequisites for the application of the Technical Rules for Hazardous Substances TRGS 402 and TRGS 403 are not met when working in contaminated areas, proceed according to section 9.2.

The obligation to document measurement results primarily concerns measurements to prove compliance with workplace limit values.

9.2 Non-applicability of metrological monitoring and assessment

If metrological monitoring and assessment of the workplaces according to Section 9.1 cannot be reasonably applied because the hazardous substance situation and the exposure conditions are constantly changing due to changing operating conditions, the most unfavourable hazardous substance exposures and corresponding health hazards are to be assumed.

This is the case, for example, if the prerequisites for determining and assessing hazardous substances in the air or assessing mixtures of substances in the air at workplaces according to the Technical Rules for Hazardous Substances TRGS 402 are not met; see section 5.7 of TRGS 402 (excerpt):

(1) There are workplaces where anything can change that has an impact on exposure to hazardous substances. For example ... when working in contaminated areas ... it is usually not known which hazardous substances occur when and in what form. There i s no fixed place of work. Even if the type of activity remains the same, the (u n p r e d i c t a b l e) occurrence of different, partly unknown hazardous substances can lead to strongly changing exposures.

(2) For this reason, exposure to hazardous substances can only be determined retrospectively. The use of the biomonitoring system can provide helpful information here. The necessary protective measures must be planned in advance on the basis of the worst-case scenario. This can mean that the use of personal protective equipment up to full protection is required, that work has to be carried out with protected machines (e.g. vehicles with forced-ventilated cabins) or that appropriate protection levels are triggered by alarms. As a rule, the assessment in individual cases proves to be inappropriate and too time-consuming.

10 Preliminary Investigations

10.1 Inspection

10.1.1 When walking in contaminated areas, smoking, the use of naked flames and light, and the carrying and ingestion of food and stimulants are prohibited. Avoid touching contaminated materials and objects. Precautions must b e taken to ensure that the insured persons, after entering the area, can

– clean dirty parts of the body and
– store used personal protective equipment in a suitable manner

can.

It is pointed out that the protective measures required for the walk-through must also be selected on the basis of a risk assessment.

During inspections for the investigation of building contaminants, the protective measures are limited to a minimum of precautions for hygiene and the use of personal protective equipment.

For personal protective equipment see section 18.

10.1.2 Inspection of rooms below ground level and underground installations is only permitted if, in addition to Section 7.3, the general provisions of the Workplace Ordinance and in particular the provisions of Sections VII "Additional provisions for underground construction work" and VIII "Additional provisions for work in boreholes" of the accident prevention regulation "Construction work" (BGV C 22) are observed.

See also metrological monitoring according to section 9.

10.2 Boreholes and soundings

10.2.1 If irregularities are detected during drilling or sounding work that could lead to hazards for the insured persons, the work must be interrupted immediately, the hazardous area must be left and the supervisor must be informed.

It is pointed out that in this case the risk assessment must be adapted to the work plan if necessary.

Irregularities may include, for example:

- *Unsuspected escape of gases, vapours or dusts,*
- *Obstacles during drilling, such as metal parts, ammunition,*
- *Cavities in the ground, sinkholes and the like,*
- *Changes in the quantity, colour and odour of the cuttings or drilling fluid.*

10.2.2 The supervisor must determine which safety measures are to be taken. If escaping gases or vapours are to be expected, their measurement must be arranged.

Safety measures that may be considered include:

- *Define, mark and cordon off the danger zone,*
- *Clear the danger zone of persons,*
- *ensure that the insured persons stay only on the side facing the wind in the event of escaping gases or vapours,*
- *Generating an artificial air flow by means of a powerful blower,*
- *Gas extraction or inerting,*
- *Wait until the drilled gas bubble has vented.*

The measures to be taken in individual cases depend on the result of the investigations according to section 8 and the risk assessment based on them.

10.2.3 Drilling or sounding work may only be continued after the supervisor has ordered it and determined the protective measures to be taken, if necessary after expert advice.

Despite technical ventilation measures as defined in section 10.2.2, work may continue only with the use of suitable respiratory protective equipment. In the event of a detected explosive atmosphere that cannot be eliminated, work may only continue without ignition sources and with explosion-protected equipment. See also "Explosion protection rules (EX-RL)" (BGR 104).

10.2.4 Drill cuttings and drilling dust produced during drilling or exploration work must be extracted or knocked down at the exit point. The extracted or knocked down material must be collected in suitable containers, transported away and disposed of.

Suitable containers are those that can be tightly closed and are made of a material that is mechanically and chemically impermeable and resistant to the extracted or deposited cuttings or dust.

10.2.5 Drilling mud and drilling fluid must be conducted in a closed circuit. The associated mud troughs must be

bonnets must be covered. Hazardous gases and vapours must be extracted. Excess drilling and flushing fluid must be collected separately and - in case of contamination by hazardous substances or biological agents - disposed of properly.

10.2.6 The disposal of drilling dust, cuttings and drilling fluids must be determined before drilling and exploration work begins.

10.2.7 The equipment used for drilling or probing work must be decontaminated on site after completion of this work. If this is not possible, drill rods, pipes and accessories must be transported in suitable containers to a suitable washing area and cleaned there together with the drilling equipment.

10.3 Working in and around trenches and digging

10.3.1 T h e walls of trenches and excavations must be sloped or reinforced in such a way that insured persons cannot be endangered by slipping masses. All influences that could affect the stability of the ground must be taken into account.

In addition to the general provisions of the Workplace Ordinance, see in particular § 28 of the Accident Prevention Regulation "Construction Work" (BGV C 22) and DIN 4124 "Construction pits and trenches; embankments, shoring, working space widths".

Influences that can affect the stability of the soil are e.g.

- *Disturbances of the soil structure (fissures, faults, adjacent pipe trenches),*
- *Stratification or s l o p e dipping towards the bottom of the trench,*
- *non-compacted or only slightly compacted backfills or fills,*
- *Water inflows,*
- *Quicksand soils,*

– *Vibrations from traffic, pile driving, compaction work, blasting,*
– *adjacent structures or piles.*

10.3.2 By way of derogation from Section 10.3.1, the slope of free embankments of trenches, trenches and the like in landfills must never exceed 45°. Depending on the stability of the landfill body, lower slope angles must be observed.

The stability of landfill bodies is affected by
e.g. through

– *Installation procedures according to which domestic waste and the like were stored,*
– *Type and intensity of compaction during storage,*
– *Composition or components of the landfill material,*
– *Presence of additionally installed intermediate layers o f cohesive material,*
– *Presence of water-bearing layers or water levels,*
– *Location within the landfill body (edge location, centre).*

10.3.3 Protective strips at least 1.50 m wide and as horizontal as possible shall be placed along the edges of trenches and pits that are entered and shall be kept free of excavated material, obstacles and unneeded objects. Ladders of sufficient length or other suitable means of access shall be provided and used for entering trenches and excavations. Trenches and excavations that have to remain open for a longer period of time shall be provided with suitable fall protection or shall be closed off to prevent access by persons.

10.3.4 Trenches and excavations are to be backfilled immediately after completion of the investigation work. Backfilling should be carried out with machines.

10.3.5 Excavated material stored next to trenches and pits must be covered i n a suitable manner to prevent dust development and displacement by wind or water, unless it is immediately removed or backfilled.

Consideration can be given, for example, to covering with foils and the like made of suitable material, which are secured against changes in position, e.g. by wind. When covering with foils, it should be noted that gaseous emissions or biological agents, e.g. moulds, bacteria, can accumulate under the foil covering.

10.3.6 Trenches and excavations may only be entered after it has been established by metrological monitoring in accordance with Section 9 that there is no danger to the insured persons.

10.3.7 If irregularities are found during work in trenches and shafts, proceed according to sections 10.2.1 to 10.2.3.

10.3.8 The equipment used for prospecting shall be decontaminated on site after completion of this work. If this is not possible, proceed in accordance with section 10.2.7.

11 Implementation of Construction work

11.1 General

The contractor may - also as a subcontractor - only carry out construction work in contaminated areas after the client has fulfilled the requirements of section 8. The work procedure(s) to be used, the machines, equipment and tools to be used and the necessary protective measures shall be specified for the performance of the work. Technical measures have priority over organisational measures and the use of personal protective equipment. The protective measures shall be determined on the basis of a risk assessment depending on the type, quantity, concentration and mobility of the material exposure and the intended working procedures. If it is not possible to make an unambiguous assessment of the substance exposure and its hazard potential, the protective measures to be taken must be based on the worst possible case.

Technical protection measures may include, for example:

- *The use of earth-moving machines whose driver's cabs are equipped with filter or compressed air systems,*
- *securing contaminated material, e.g. by means of spray films, foam, icing measures, foils,*
- *adequate ventilation,*
- *an extraction system for gases and vapours,*
- *an inerting,*
- *the humidification of driveways and roads,*
- *Machines and devices with extraction systems.*

11.2 Duty of disclosure

11.2.1 The contractor shall notify the competent trade association in writing of construction work in contaminated areas at least four weeks before it is to begin. The notification shall be accompanied by:

- A summary presentation and evaluation of the hazardous substances suspected or known to be present in the contaminated area according to the documentation in accordance with section 8.1 or 8.2 and the testing in accordance with section 8.4,
- a description of the proposed construction activity and associated work procedures,
- the safety measures provided for by the Contractor,
- the operating instructions in accordance with section 16.

The notification period for work to remediate building pollutants is two weeks.

For a sample notification form, see Annex 1. The Annexes 1 and 3 mentioned in the sample notification form in accordance with the above requirements correspond to the client's work and safety plan in accordance with Section 8.3.

The notification obligations according to § 13 of the Biological Substances Ordinance and § 2 of the Construction Site Ordinance remain unaffected.

11.2.2 In special cases, the Employer's Liability Insurance Association may exempt the contractor from the obligation to report in accordance with section 11.2.1 after having been informed of the planned work.

Special cases are e.g. repetitive work of the same kind.

11.3 Site equipment

The following requirements for construction site equipment can be adapted according to the needs resulting from the risk assessment.

11.3.1 The contractor shall fence off contaminated areas in which he is carrying out construction work to prevent unauthorised access. Safety signs corresponding to the existing hazard shall be attached to the fencing in accordance with the accident prevention regulations.
"Safety and health protection labelling at the workplace" (BGV A 8). Any necessary personnel and vehicle locks shall be included in the fencing.

11.3.2 Social rooms, offices, laboratories, shelters, workshops and storage rooms must not be built in contaminated areas and existing facilities of this kind must not be used. This does not apply if it is ensured that hazardous substances or biological agents cannot penetrate into these facilities or are not present in existing facilities.

11.3.3 The contractor shall ensure that communication is possible between the workplaces located in contaminated areas and between these and at least one permanently manned location outside the contaminated area. If necessary, suitable aids, e.g. telephone, walkie-talkies, shall be used for this purpose.

11.3.4 The contractor shall set up and maintain a black-and-white facility for the changing and sanitary needs of the insured persons and ensure that it is used properly. The rooms shall be equipped in such a way that a room is available at all times.

temperature of at least 21 °C can be achieved. Rooms and accommodation must be sized to accommodate the number of insured persons and must also comply with the Workplace Ordinance and the associated workplace guidelines and be thoroughly cleaned every working day - more frequently if necessary.

A black-and-white facility usually consists of three interconnected rooms. The part facing the public street area or entrance area is used as a so-called white area for depositing, storing and later putting back on street clothes and, if necessary, also as a recreation room. The adjoining middle section (sanitary area) contains the sanitary facilities, e.g. washbasins, showers, toilets. On the side facing the contaminated work area, the sanitary area is followed by the so-called black area, which is used to put on and later take off and store the work clothes.

11.3.5 For the pre-cleaning of soiled work clothing, in particular boots, and to avoid the transfer of dirt into the black area of the black-and-white plant, the contractor shall provide suitable facilities immediately before access to the black area of the black-and-white plant.

Such facilities are e.g.

- *Boot washing facilities (as fording basins or tubs covered with grates) with cleaning showers or -brushes,*
- *Showers for protective clothing,*
- *Boot change place.*

11.3.6 A specially marked storage room must be available within the fenced area for the storage of contaminated equipment and tools. The room must be sufficiently ventilated. In case of technical ventilation, the exhaust air must be cleaned if there is a risk of contamination.

11.3.7 In order to prevent the transfer of hazardous substances and biological agents to non-contaminated areas, de-

decontamination facilities must be available, and
-measures are taken.

Such facilities are, for example:

- *A vehicle and tyre wash,*
- *a paved washing area with a separating device for cleaning vehicles and equipment,*
- *a special personnel airlock for decontamination of personal protective equipment and tools,*
- *Containers for catching, collecting and transporting away contaminated substances, liquids or objects.*

11.3.8 When carrying out construction work in contaminated areas, is knowledge of

- Wind strength and direction,
- Air pressure and humidity,
- Ambient temperature,
- Precipitation amounts

required, appropriate measuring equipment must be available on the construction site.

Such knowledge is required, for example, if measures are defined depending on environmental conditions, e.g. respiratory protection with or without fan support, temperature-dependent defined wearing or break times of stressful personal protective equipment, or if measuring devices are used whose sensor technology is significantly influenced by the environmental conditions, e.g. certain test tubes, certain photoionisation detectors.

11.4 Earth-moving machinery, Vehicles

Earth-moving machinery and vehicles may only be used in contaminated areas if the presence of sufficient breathable air in the driver's cab is ensured by equipping them with filter or compressed air systems. For this purpose, the specifications in section 11.5.2 must be observed. Driver's cabs and filters or compressed air systems must comply with BG-Information
"Driver's cabs with systems for breathing air supply on earthworks

and special machines for civil engineering" (BGI 581).

If, in individual cases, the use of driver's cabs with filter or compressed air systems is to be dispensed with, this must be stated in the work and safety plan in accordance with section 8.3 and the notification in accordance with section 11.2.1 and justified on the b a s i s of the risk assessment.

11.5 Measures against air pollution in working areas

11.5.1 If the risk assessment or measurements in accordance with sections 9 and 11.7.5 show that the air in the working area is likely to be contaminated with substances in concentrations hazardous to health or that such substances are present, suitable technical ventilation measures must be taken. If suction ventilation is used, only suction devices of e x p l o s i o n - p r o o f design may be used for substances presenting a fire or explosion hazard.

In the case of gaseous hazardous substances, preference should be given to ventilation systems that supply fresh air to the workplace (blowing ventilation). The intake point for the air supply should be l o c a t e d at a sufficient distance from the emission source at a height of approx. 1.50 m, taking into account the wind direction, in order to avoid the intake of gases from the area near the surface.

When using suction ventilation, the rapid mixing, dilution and discharge of harmful gases achieved with blowing ventilation is not achieved. In addition, there is a risk of hazardous or explosive gases and vapours escaping to a greater extent and, in the worst case, being carried to the workplace and to the fan as a possible source of ignition.

In the case of hazardous substances in dust form and biological a g e n t s , i t i s necessary to record the emission at the point of origin.

11.5.2 To determine whether the ventilation measures are adequate, repeated individual measurements must be carried out and, in the case of monitoring the oxygen content and the explosive atmosphere, continuous measurements must also be carried out. It must be ensured that

- the oxygen content is more than 19% by volume,
- the concentration of flammable gases and vapours is below 20 % of the lower explosion limit (LEL),
- the concentration dangerous to health of toxic gases, vapours or dusts for which an occupational exposure limit value exists is 10% of this value.

If the oxygen concentration at the workplace is lower than the natural oxygen content of the breathing air of 20.9% by volume, the cause must be determined and an assessment made as to whether a hazard exists. The required oxygen concentration of at least 19% by volume is only sufficient if the reduction of the oxygen content in the breathing air is caused exclusively by inert gases, e.g. nitrogen.

For hazardous substances for which no occupational exposure limit value exists, see sections 9.1 and 9.2.

As a rule, free (natural) and technical ventilation can be considered sufficient if e . g.

- *an air flow of at least 10 m³/min and m² of shaft or pit cross-section is supplied to the deepest point of shafts and pits,*
- *in enclosed spaces there is at least a six to eightfold air exchange per hour.*

The effectiveness of these measures must be monitored at least selectively or, depending on the risk assessment, metrologically.

Measurements to monitor explosion hazards and the oxygen content of the air, as well as measurements to trigger protective measures if threshold values are exceeded, must be carried out exclusively by means of direct-reading measuring devices with an alarm function.

If it is certain that the hazard emanates only from a single hazardous substance, compliance with the workplace limit value is sufficient.

In special cases, e.g. influx of pollutant gases in large quantities or of high toxicity, the data for the standard case are not sufficient. For these cases, special air volume calculations are required.

For limitations regarding metrological monitoring, see sections 9.1 and 9.2.

See also BG regulation "Working in enclosed spaces of waste water systems" (BGR 126).

11.6 Measures in case of explosive atmosphere

If the measurements in accordance with sections 9 and 11.7.5 show that gases, vapours, mists or dusts are present which may form an explosive atmosphere in combination with air, measures must be taken in accordance with the Ordinance on Hazardous Substances, in particular Annex III No. 1, and the Ordinance on Industrial Safety and Health, in particular §§ 3, 6 and Annex 4. If hazardous concentrations cannot be reliably prevented, the employer must classify zones in accordance with section 5 of the Ordinance on Industrial Safety and Health in conjunction with Annex 3 and indicate in the explosion protection document the technical and organisational measures taken to minimise the risk to employees or third parties.

Technical measures are e.g.

- *Inerting,*
- *Ventilation,*
- *Removal of puddles and deposits of flammable liquids or dusts,*
- *Avoid sources of ignition by selecting suitable tools,*
- *Avoidance of ignition sources due to electrostatic charging.*

Organisational measures are e.g.

- *Work permit system for hazardous work,*
- *Work permit system for work that can be dangerous due to interaction with other work,*
- *Marking of areas with corresponding hazards, escape and rescue routes, locations of extinguishing agents.*

11.7 Construction work at landfills

11.7.1 If, during construction work on landfill sites, irregularities are detected which could lead to hazards for the insured persons, the work must be stopped immediately, the hazardous area must be left and the supervisor must be informed. If the risk assessment shows that the occurrence of hazardous explosive atmospheres cannot be safely prevented in the context of these irregularities, the measures in accordance with section 11.6 before commencing work.

Irregularities may include, for example:

- *Unsuspected escape of gases, vapours or dusts,*
- *the unexpected encounter of barrels and other containers with unknown contents,*
- *the encountering of animal carcasses,*
- *the occurrence of free liquid levels,*
- *intense smell.*

Since the probability of irregularities is comparably higher during construction work on landfills, it is recommended to take this into account in the risk assessment and to already provide for measures.

For explosion protection, see Annex III No. 1 of the Ordinance on Hazardous Substances and §§ 3, 6 and Annex 4 of the Ordinance on Industrial Safety and Health.

For information on hazards from biological agents during construction work on landfills, see also BG information "Risk assessment for biological agents during work on landfills (BGI 893).

11.7.2 The supervisor must immediately determine which safety measures are to be taken and monitor their implementation. In the case of escaping gases or vapours, a metrological investigation must be arranged.

Safety measures that may be considered include:

- *Define, mark and c o r d o n off the danger zone,*
- *Cover the excavated material or the exposed areas with foils, foam carpets and the like,*
- *Spreading lime to reduce odour emissions,*
- *ensure that the insured persons stay only on the side facing the wind in the event of escaping gases or vapours,*
- *Generating an air flow by means of powerful blowers.*

11.7.3 The slope of free embankments of excavation pits and trenches in landfills on which mainly decomposable materials have been deposited shall not exceed 45°. If slopes steeper than 45° are envisaged, their stability shall be ensured by suitable technical measures and verified by calculation taking these measures into account. At the edges of excavation pits and trenches, a protective strip of at least 1.50 m width, as horizontal as possible, shall be provided and kept free of excavated material and other loads.

11.7.4 When transferring landfill material, the roads must h a v e sufficient load-bearing capacity and be stable; in the case of two-way t r a f f i c , they must be wide enough for the transport vehicles to maintain a l a t e r a l distance of at least 1.50 metres. The transport vehicles must maintain a distance of at least 10 m when driving and tipping on unpaved slope edges. The landfill material to be relocated shall be placed and compacted in layers.

11.7.5 Workplaces at and in excavation pits, trenches and shafts at landfills shall, in addition to the requirements under Section 9, be monitored by continuously operating measuring and warning equipment to ensure that

The monitoring shall be carried out to determine whether methane, carbon dioxide, hydrogen sulphide or oxygen deficiency are present and whether the specified threshold values are not exceeded or not reached. The area near the ground must also be taken into account in the metrological monitoring.

Usually, for example, devices are used that measure continuously and are equipped with visual and acoustic alarms.

11.7.6 For the measurements according to section 11.7.5, only measuring instruments with self-monitoring of their functions may be used. If this is not guaranteed, a second measuring device of the same type shall be used simultaneously.

11.7.7 If the measurements according to Sections 9 and 11.7.5 show t h a t the insured persons are affected by the presence of

- explosive atmosphere,
- Oxygen deficiency

  or
- gases and vapours hazardous to health

If the workplaces are a t risk, these workplaces may not be entered until the following measures have been carried out or preconditions have been met:

1. Ventilation measures according to sections 11.5.1 and 11.5.2.
2. Use and application of the following equipment:
   - Explosion-proof hand lamps,
   - freely portable respiratory protective devices, also called self-rescuers, which work independently of the surrounding atmosphere and provide a supply of breathing air for a period of at least 15 minutes,
   - Tools made of low-spark material for working on the gas system,
   - at least one fire extinguisher,
   - Radio communication.
3. When using power-operated hoists to transport people, the following must be observed

– the associated access equipment can accommodate all persons working below ground level at the same time

and

– in the event of a power or control failure, the passenger pick-up device can be moved immediately to the starting position above ground level.

4. Have the following rescue equipment ready at the edge of the pit, trench or shaft:
   – Rescue lifting device with safety rope harness form A and fall arrester,
   – freely portable respiratory protective devices that work independently of the surrounding atmosphere,
   – Stretcher.

   For personal lifting equipment, see also BG regulation "Liftable personal lifting equipment" (BGR 159).

11.8 Demolition of contaminated structures

11.8.1 Before commencing demolition work on contaminated structures, the contractor shall, taking into account the results of the investigations and assessments carried out by the client in accordance with section 8 and in compliance with section IV.
"Demolition work" of the accident prevention regulation "Construction work" (BGV C 22). The demolition instructions must be available at the construction site and contain in particular information about

– Sequence and method of working in the individual demolition phases,
– special measures with regard to safety and health protection as well as emission protection,
– technical protection measures.

For demolition work, see also section 5.2 para. 4 of the appendix to the Workplace Ordinance.

Since the demolition instruction only contains measures against the hazards resulting from the demolition procedure, e.g. collapse, use of certain equipment, it does not require the use of the equipment when working in contaminated areas.

Risk assessment according to § 7 of the O r d i n a n c e on Hazardous Substances or § 8 of the Ordinance on Biological Substances.

11.8.2 The contractor shall instruct the insured persons before the start of the demolition work and at intervals of no more than four weeks about the demolition-specific hazards, the given hazardous material situation, possible fire hazards and necessary immediate measures in emergencies.

11.8.3 If hazardous substances or biological agents are released in concentrations that are hazardous to health during demolition work, suitable technical protective measures must be t a k e n .

Suitable technical protective measures are e . g .:

- *Enclosure of structures to be demolished,*
- *Collection (extraction) of the substances at the point of origin in conjunction with substance-specific filter systems,*
- *Humidification of the building structures to be demolished and the demolition material for the purpose of dust precipitation.*

11.8.4 If the use of extraction systems is not possible, the workplaces at risk must be adequately technically ventilated, taking into account sections 11.5.1 and 11.5.2.

11.8.5 Intermediately stored demolition material that may pose health hazards to the insured persons shall be secured against hazardous substance emissions.

Suitable security measures are e.g.:

- *Storage in closed swap containers,*
- *Storage in buildings with exhaust air systems,*
- *For outdoor storage, cover with weather-resistant, tear-proof, gas-tight sheeting that is secured against flying away or being torn loose by the wind.*

12 Fire protection

12.1 When working in contaminated areas, the contractor shall take appropriate precautions for the prevention and immediate suppression of incipient fires.

See also § 22 of the accident prevention regulation "Principles of Prevention" (BGV A1).

12.2 The precautions, fire extinguishing equipment and extinguishing agents to be kept ready must correspond to the type and scope of the work and be adapted to the respective work procedures and hazardous substances present. The functionality of fire extinguishing equipment must not be impaired by external influences. The locations of the fire extinguishing equipment must be permanently and conspicuously marked.

See also BG regulation "Equipping workplaces with fire extinguishers" (BGR 133).

12.3 Areas with a fire hazard must be identified as such by the warning sign W 01 "Warning of flammable substances". Smoking and the use of naked lights and other sources of ignition are prohibited in these areas. The prohibition must be indicated by the prohibition sign P 02 "Fire, naked lights and smoking prohibited". The signs must comply with the accident prevention regulation "Safety and health signs at the workplace" (BGV A 8).

12.4 In the event of fire, the contractor shall draw up fire protection regulations with an alarm plan, if necessary in cooperation with the local fire brigade. Depending on the hazardous substances present, the fire protection regulations must also contain rules on the personal protective equipment to be used. The fire protection regulations and alarm plan shall be made known to the insurers.

12.5 The handling of the fire extinguishing equipment and the measures provided for in the fire safety regulations shall be practised by the insured persons at the beginning of the work and thereafter at intervals of no more than six months.

13 Rescue and First Aid

13.1 After the occurrence of an occupational accident, first aid must be administered immediately and a medical examination must be arranged in case of known or suspected ingestion of hazardous substances or biological agents.

See also accident prevention regulation "Principles of Prevention" (BGV A1).

*It is recommended that **every** insured person be trained as a first aider.*

14 Emergency ID card

14.1 The contractor shall ensure that insured persons who regularly work in contaminated areas - with the exception of preceding examinations - carry an emergency ID card. The emergency ID card shall be m a d e of durable material and protected against moisture.

For a sample emergency card with the required information, see Appendix 2.

14.2 The insured persons shall carry the emergency ID card provided by the contractor also outside working hours.

15 Occupational health Precaution

The Contractor shall ensure that appropriate occupational medical precautions are taken. He shall appoint a specialist in occupational medicine or a doctor with the additional title of "occupational medicine" and provide him with sufficient time to carry out the preventive occupational medicine measures.

See also §§ 15 and 16 of the Hazardous Substances Ordinance and
§§ 15 and 15a of the Biological Substances Ordinance.

The precautionary measures of the employer arising from the Ordinance on Hazardous Substances and the Ordinance on Biological Substances include in particular:

– *The involvement of the occupational physician as a competent person in the run-up to the work if the employer does not have the relevant knowledge himself. The occupational physician must be involved as a matter of priority in the inspections and meetings that serve to determine the information for the risk assessment,*
– *special occupational health check-ups for the early detection of health disorders and occupational diseases,*

  Due to the variety of possible combinations of hazardous substances and the associated special features of the possible health hazards when working in contaminated areas, it must be assumed that special occupational health examinations in accordance with Annex V of the Ordinance on Hazardous Substances or Annex V of the Ordinance on Hazardous Substances must be carried out.
  IV of the Biological Agents Ordinance, not all hazardous substances or biological agents or all activities associated with them can be taken into account. For this reason, the doctor is authorised to take further measures, taking into account the information available on the hazardous substances and biological agents present and the health hazards to be derived from them. Corresponding measures and examinations are described in the so-called "Guideline for occupational health care for workers in contaminated areas" (for reference source see Appendix 7) and should be arranged as a matter of priority.

– *biomonitoring (detection of hazardous substances in biological material), insofar as recognised methods are available for this purpose and values for assessment, in particular biological limit values, are available.*

  See Technical Rules for Hazardous Substances TRGS 710 "Biomonitoring" in conjunction with TRGS 903 "Biological workplace tolerance values".

- *informing and advising employees about the health hazards associated with the activity, including those that may result from pre-existing health impairments.*

16 Operating instructions

16.1 In accordance with § 14 of the Ordinance on Hazardous Substances or In accordance with § 12 of the Biological Substances Ordinance, the employer must draw up activity-related operating instructions before starting work, taking into account the hazardous substances or biological substances to be expected or already identified and the hazards they pose, as well as the intended working procedures. In addition to these requirements, operating instructions must at least contain information on the following matters:

- Ban on eating, drinking and smoking within contaminated areas,
- Obligation to use the hygiene facilities, e.g. black and white facility,
- proper use of the required personal protective equipment, including compliance with any prescribed limits on wearing time, e . g. in accordance with the BG rule "Use of respiratory protective equipment" (BGR 190),
- Obligation t o report abnormal occurrences and sudden personal health complaints,
- Behaviour in case of emergency or danger,
- Carrying out decontamination and disposal measures.

During a construction project in contaminated areas, different activities are i n v o l v e d , whereby even if the same substances are handled, d i f f e r e n t hazards are to be expected. Therefore, special attention m u s t be paid to the activity reference of the individual operating instructions. The reference to the activity can either be e s t a b l i s h e d by creating a separate operating instruction for each activity or by creating a separate operating instruction for each activity within ***one operating instruction.***

In addition to the measures that apply to all activities, the special measures that must be taken when carrying out certain activities must be mentioned separately in the operating instructions.

For building pollutant remediation activities, the preparation of the operating instructions solely on the basis of the Technical Rules for Hazardous Substances TRGS 555 "Operating Instructions and Instruction in Accordance with § 20 GefStoffV" is considered sufficient.

The basis for drawing up the operating instructions is the client's work and safety plan in accordance with Section 8.3.

For examples of the structure, content and design of workplace and activity-related operating instructions, see Technical Rules for Hazardous Substances TRGS 555.

See Annex 4 for a sample structure for the preparation of operating instructions.

16.2 In individual cases, the contractor shall supplement the operating instructions in accordance with Section 18.1 for work involving special hazards and specify in writing the additional safety measures to be observed.

Work that is associated with particular hazards can be, for example:

- *Work in containers and confined spaces, e.g. shafts,*
- *Fire work, e. g. welding, cutting, soldering, in areas subject to fire and explosion hazards,*
- *Salvage and further treatment of containers with dangerous or unknown contents.*

16.3 The operating instructions shall be written in a form and language understandable to the insured persons and shall be made accessible to the insured persons.

The operating instructions can be "made accessible", for example, by posting them in a suitable place in the black-and-white plant.

17 Instruction

17.1 The contractor shall instruct the insured persons on the hazards occurring during their work and on the measures to be taken to avoid them on the basis of the contents of the operating instructions. The instruction shall take place before the start of the activity, or at least every six months in the event of significant changes in the working conditions.

For work on the remediation of building pollutants, a one-year repetition period is sufficient.

17.2 The content and time of the instruction must be recorded in writing and confirmed by the signatures of the persons instructed.

If a coordinator has been appointed in accordance with section 5.1, he should be present when the employer instructs the insured persons in order to avoid loss of information (see also tasks of the coordinator in accordance with section 5.2). The same applies to the SIGE coordinator according to the Construction Site Ordinance.

18 Personal Protective equipment

18.1 The personal protective equipment to be used shall be determined on the basis of the risk assessment.

See also § 29 of the accident prevention regulation "Principles of Prevention" (BGV A 1).

For further information on the selection and use of personal protective equipment, see BG rules.

- *"Use of protective clothing" (BGR 189),*
- *"Use of respiratory protective equipment" (BGR 190),*
- *"Use of foot and leg protection" (BGR 191),*
- *"Use of eye and face protection" (BGR 192),*
- *"Use of head protection" (BGR 193),*
- *"Use of protective gloves" (BGR 195),*

– *"Use of personal protective equipment against falls from a height" (BGR 198),*
– *"Use of personal protective equipment for rescue from heights and depths" (BGR 199).*

The following personal protective equipment is recommended as basic equipment:

– *Head protection,*
– *Foot protection in the form of half-high, high or upper thigh-high upper boots made of rubber or plastic with a puncture-resistant base (marking S 5, form C, D or E) in accordance with DIN EN 345 "Specification of safety footwear for professional use",*
– *Protective gloves made of plastic,*
– *Protective clothing in the form of protective clothing for limited multiple use (disposable clothing).*

If hazards occur where the insured persons cannot be adequately protected with the help of the basic equipment, special equipment must be used in accordance with the risk assessment, e.g.

– *Head protection (safety helmets) with face shield for work where splashing of contaminated liquids is to be expected, e.g. drilling work,*
– *Hand protection in the form of gauntlet gloves made of material resistant to the ingredients and impermeable at least for a limited time, with textile lining or with cotton gloves to be worn underneath, for all work where the hands may come into contact with contaminated liquids or materials,*
– *Respiratory protection in the form of*
  - *Filter devices,*

    A prerequisite for the use of filtering devices is an oxygen content in the breathing air of at least 19% by volume; for oxygen content, see also section 11.5.2.

In order to select the filters required for the individual case, it is advisable to provide the filter manufacturer or distributor with as precise information as possible on the hazardous substances to be expected or already identified and to ask them for the maximum permissible service life (standing or holding times) of the filters.

- *Insulation devices (location-dependent hose devices or location-independent, freely portable devices) for work where it is to be expected that the oxygen content in the breathing air will fall below the limit value of 19 % by volume or the concentration or properties of the hazardous substances in the breathing air preclude the use of filter devices,*

  For further criteria to exclude the use of filter technology, see BG regulation "Use of respiratory protective equipment" (BGR 190).

- *Breathing apparatus for self-rescue (self-rescuer),*

– *Chemical protective suits (type 3 to type 1) for work where direct contact with hazardous substances in large quantities or with a high hazard potential, e.g. surge of hazardous liquids, chemical warfare agents, cannot be excluded,*

– *personal protective equipment against falls from a height and for holding and rescuing, e . g. when entering shafts, silos and similar containers and confined spaces, as well as for rescuing persons from these installations.*

In particular, when selecting personal protective equipment, all hazard factors that may occur during the activity to be assessed must be taken into account. This also includes the hazards that arise from wearing the personal protective equipment, e.g.

– *Heavy physical work under respiratory protection with filter technology □ Measure: Use of fan-assisted equipment (at outside air temperature > 10 °C),*

– *Flame cutting with simultaneous use of "one-way clothing",*

– *the use of "rubber boots" when working in areas where sure-footedness is required.*

18.2 The contractor shall ensure that the personal protective equipment provided is worn and that used and contaminated personal protective equipment is properly decontaminated (cleaned), maintained as necessary or disposed of.

For the maintenance and care of respiratory protective equipment and chemical protective suits, it is recommended to appoint a person trained for this purpose, e.g. equipment attendant.

Reference is made to the relevant provisions of the PPE Use Ordinance.

18.3 When using respiratory protective equipment and chemical protective suits (type 1), the wearing time limitations of BG regulation
"Use of respiratory protective equipment" (BGR 190) must be observed.

18.4 Insured persons shall properly use the personal protective equipment provided.

Reference is made to the relevant provisions of the PPE Use Ordinance.

19 Skin protection

19.1 The contractor shall provide the insured persons with suitable skin cleansing, skin care and skin protection products for the individual case for work in contaminated areas.

19.2 Insured persons must carry out skin cleansing, skin protection and skin care measures during breaks in work and after finishing work.

For skin protection and in particular the skin protection plan, see the BG rule "Use of skin protection" (BGR 197). It is recommended to draw up the skin protection plan with the help of the company doctor in charge.

See also Technical Rules for Hazardous Substances TRGS 330 "Skin contact hazard" (currently draft).

20 Time of application

This BG regulation is to be applied as of April 1997, unless the contents of this BG regulation are already to be observed according to applicable legal standards or as generally recognised rules of technology. It replaces the " Guidelines for work in contaminated areas" (ZH 1/183) of April 1992.

Appendix 1

Sample form for notification of construction work in contaminated areas (in accordance with section 11.2 of this BG regulation)

1 copy shall be handed over to each of the subcontractors.

Company/Company: _____

Full address: _____

Membership no: _____

1 Construction site/site _____

Street, house no., building lot: _____

Postcode/Place/District/County: _____

2 Type of work _____

3 Working methods used in the process:

a) _____

b) _____

c)_____

4 Equipment and construction machinery u s e d on the construction site:

_____

_____

5 Greatest depth below ground levela) for excavations: _____ mb) for trenches: _____ m

6 Days of commencement: _____

7 Expected duration in weeks: _____

8 The average number of workers employed in the process: _____

9 Principal for the work undertaken:

Address: _____

_____

_____

10 Name of the coordinator

Address:

11 Subcontracted parts of the work:

a) _____to company:_____ zust. Berufsgen. _____

b) _____to company:_____ zust. Berufsgen. _____

c) _____to company:_____ zust. Berufsgen. _____

12 The notification attached:

Appendix 1: List of hazardous substances and biological work- are Hazardous substances

Annex 2: Description of the construction measure and the work procedures

Annex 3: Security measures

Appendix 4: Operating instructions

Annex 2

Sample emergency ID card

Attention:

The holder of this emergency badge works on a site that contains hazardous substances. The hazardous substances and biological agents that have been considered essential up to now are listed in this card, but others are also possible. The contact person (site manager or plant manager) can provide more detailed information about the type and occurrence of the hazardous substances. The general practitioner or the authorised doctor who carried out the preventive medical check-up can provide information on the state of health. If the hazardous substances are known, one of the poison control centres listed overleaf can give advice on treatment.

EMERGENCY ID for work in contaminated areas

OWNER	DOCTOR (full address with telephone number)	OFFICIAL INFORMATION CENTRE FOR POISONING CASES:
Name, first name		
Date of birth		
Place of residence, street		
Nationality		

	HAZARDOUS SUBSTANCES BIOLOGICAL AGENTS:	OCCUPATIONAL HEALTH SCREENING:
Operation		G1 to G 46 on (date): by Dr. (full address + tel.)
Building site	G	
Contact person/phone	G	
	G	
	G	
	G	

Annex 3

Sample structure and contents of the work and safety plan

1 General data

- Name of the contaminated area/contaminated site
- Name of the client
- The authorities involved, the occupational health and safety departments, the experts and the
- Name of the coordinator according to the BG rule "Contaminated areas" (BGR 128) and his deputies, including definition of their authority to issue instructions.
- Occasion for the work
- Designation of the group of persons affected by the work and safety plan
- Period of validity (time- or trade-related)

2 Site description

- History of use of the site
- Site plan with overall extent of the construction site and the contaminated area/contaminated site
- Summary of the previous investigations and remediation investigations including a site plan, e.g. of the sampling points from the building fabric, soil, groundwater or groundwater samples.
  Seepage water
- Location plan of the individual contamination sites or extensions including information on safety-relevant concentrations of the contaminants in the soil, groundwater, building structure or similar
- geological-hydrogeological situation of the contamination area (strata inventories, groundwater conditions)

3 Material identification and hazard analysis

- Tabular summary of the results of the investigations on hazardous substances and biological agents
- Tabular compilation of the hazardous substances to be considered with regard to health protection on the basis of their physical, chemical or toxicological properties and their encountered concentration in accordance with assessment parameters pursuant to the Technical Rules for Hazardous Substances TRGS 524 "Remediation and Work in Contaminated Areas".

- Compilation of possible hazard-relevant effects and symptoms of hazardous substance ingestion, e . g. headache,
  Dizziness, irritation of mucous membranes
- Compilation of biological agents relevant to health protection with information on transmission route and effect (infectious, sensitising, toxic).

4 Identify the work areas, work processes, activities and the work area and activity-related factors of exposure ("work area analysis").

- Dividing the construction site into different work areas with potential exposure
- Description of the process steps and working methods for each work area or individual trade, including the time schedule for processing,
- Determination of the individual activities in which a hazard due to hazardous substances or biological agents is to be expected,
- Determination of the process- and environment-related criteria of emission/exposure

5 Risk assessment

- Activity-related combination of the results of the hazard and work area analysis for a semi-quantitative exposure assessment

6 Occupational health and safety

6.1 General protective measures

- Measures according to the respective protection level concepts according to the Ordinance on Hazardous Substances or the Ordinance on Biological Substances and determination of the following
- Description of the special construction site equipment for work in contaminated areas incl. site plan.
- Division of the construction site into protection zones, e.g. black-white areas, A-B-C zones, including site plan corresponding to the different work areas according to work area analysis.
- General rules of conduct including instructions for the use of the decontamination facilities and equipment.
- Occupational health screening

6.2 Work area or activity-related specifications on technical and organisational protective measures and on personal protective equipment.

- Requirements for the working process, e.g. "low emission".
- Requirements for measures for the collection of hazardous substances ("extraction")
- Requirements for blowing ventilation measures
- Requirements for machines, vehicles and equipment
- Requirements for any necessary partitioning measures, e.g. foil doors, negative pressure maintenance
- Special rules of conduct for the case of danger, description of possible cases of danger, if applicable
- Fire and explosion protection requirements
- Determination of lead parameters for metrological monitoring
- Determination of the substance-related threshold values for the use of additional protective measures in the event of the occurrence of hazardous substances in t h e respiratory air in dust, mist, vapour or gas form (10 % of the occupational exposure limit values).
- Determining the intervals of instruction and, if necessary, exercises
- Determination of the personal protective equipment
- Determination of responsibilities for the operational provision o f personal protective equipment, in particular respiratory protective equipment (maintenance and care).

7 Measurement concept for monitoring workplace conditions

- Determination of the measurement target at the place of activity
  - Monitoring of acute hazards (O_2, LEL, TOX),
  - Triggering of protective measures when threshold values are exceeded,
  - Checking the effectiveness of protective measures
  - Documentation of compliance with or undercutting of limit values,
- Determination of the measuring instruments and procedures
- Determination of the monitoring measurements to be carried out continuously by means of direct-reading measuring instruments with alarm function (LEL, O_2, triggering of measures when threshold values are exceeded).

– Determination of the intervals for routine control measurements, e.g. to check the validity of key parameters.
– Definition of responsibilities for keeping the measuring instruments ready for operation (maintenance and care)

8 Disposal

– Rules of conduct for handling and disposing of contaminated protective equipment and other contaminated items
– Rules of conduct, e.g. for handling and disposing of contaminated water from decontamination plants and other waste, such as used breathing filters, protective clothing.

9 Documentation, evidence

– Determination of the documentation to be provided by the various parties involved (site manager of the client, coordinator or executing companies).
– Determination of the evidence to be submitted by the individual contractor, e.g. occupational health precaution, filter book.

Appendix 4

Outline of an operating instruction

(see Technical Rules for Hazardous Substances TRGS 555)

1	**Workspace/workstation:**
	Activity:
	2Hazardous substances/Biological agents
3	**Dangers for humans and the environment:**
3.1	Dangerous properties/reactions of the hazardous substances:
3.2	Hazardous properties of biological agents:
3.3	Recording path:
4	**Measures:**
4.1	Technical measures:
4.2	Organisational measures, rules of conduct, hygiene:
4.3	Personal protective equipment (PPE):
5	**Behaviour in the event of danger:**
5.1	When unknown situations occur:
5.2	In case of alarm by warning devices:
5.3	On fire:
6	**First aid:**
6.1	General (first aiders, telephone numbers):
6.2	Emergency measures in case of accidents with hazardous substances/biological agents **without** injury:
6.3	Accidents involving hazardous substances/biological agents with open injuries:
6.4	Ingestion of contaminated liquid:
7	**Proper disposal of disposable PPE:**
	Date Signature

Annex 5

the previous annex is omitted

Annex 6

A: Course for acquiring the expertise for safety and health at work in contaminated areas according to section 5.2

Course content:	prescribed Teaching units
1 Overview of the legal system of occupational health and safety and applicable rules and regulations Occupational Health and Safety Act Chemicals Act Workplace Ordinance Industrial Safety Ordinance Biological Substances Ordinance Hazardous Substances Ordinance Construction Site Ordinance PPE Use Ordinance Technical Rules for Biological Agents (TRBA) Technical Rules for Hazardous Substances (TRGS) (with restrictions according to BMWA) Trade association regulations for safety and health at work (accident prevention regulations), at least – Principles of prevention (BGV A1) – Construction work (BGV C22) – Occupational health care (BGV A4) Trade association rules and information for safety and health at work, at least – BG Rule: Landfills (BGR 127) – BG rule: Use of protective clothing (BGR 189) – BG rule: Use of respiratory protective equipment (BGR 190) – BG rule: Use of protective gloves (BGR 195) – Leaflet for driver's cabs with breathing air supply systems on earth-moving machinery and special civil engineering machinery (BGI 581) – Leaflet for the handling of biological agents during soil remediation (BGI 583) The processing of the partial aspects from the individual regulations and rules that are important for the course topic should take place in the relevant teaching units.	LE

required units

2 Personnel requirement, responsibility and liabilit

y2 LE
- Management, supervision
- Coordinator

3 Methodology of risk assessment for Working in contaminated areas

5 LE

a) Introduction and material factors
   - Ordinance on Hazardous Substances, Ordinance on Biological Substances
   - Identification and assessment of hazards due to hazardous substances and biological agents (hazard analysis)
   - Limit values/guideline values
   - Metrological monitoring
   - Hazard analysis exercise

4 Methodology of risk assessment for Working in contaminated areas

4 LE

b) job-related factors
   - Methodology for identifying work areas and activities with hazards from hazardous substances and biological agents (work area analysis)
   - Determination of the factors determining the emission or exposure related to the work area and activity.
   - Exercise on work area analysis and exposure assessment based on case studies of different work in contaminated areas.

5 Safety measures and equip

ment9 LE
- Construction site installation, storage and disposal measures
- Technical protective measures
- Personal protective measures

6 Emergency measures, first aid1
LE

		required units
7	Occupational Medicine – Preventive medical check-ups, their contents and legal basis – Hazardous substances, toxicology and risk assessment – Exposure/stress due to hazardous substances/biological agents and personal protective equipment – Hygiene, skin protection	4 LE
8	Risk assessment and determination of measures the work and safety plan or in the operating instructions Instruction, documentation Exercise with reference to the results from teaching sections 3 and 4	LE in
9		Examination1 LE

		Total 32 LE

B: Course for the acquisition of expertise for work on the remediation of building pollutants according to Section 5.2

Course contents	Teaching units
I Hazards due to building pollutants – Occurrence, properties – Medical/toxicological aspects, health risks	4 LE
II Rules and regulations, application and implementation – Occupational Health and Safety Act, Construction Site Ordinance – Ordinance on Hazardous Substances, Technical Rules for Hazardous Substances TRGS 524 "Remediation and work in contaminated areas". – BG rule "Contaminated areas" (BGR 128) – Instructions for action and their significance in the implementation of the BG rule "Contaminated areas" (BGR 128) – Building regulations guidelines/recommendations – Other regulations	2 LE
III Methodology of risk assessment using the example of various remediation works	2 LE
IV Protective measures 1. S t a f f i n g , management, coordination, responsibility and liability 2. Organisational measures – Display – Work and safety plan – Operating instructions/instruction – Hygiene – Preventive medical check-ups 3. Technical measures 4. Personal protective equipment (PPE) selection and use 5. Occupational safety during the preparation and preparation of contaminated materials for disposal. 6. Case studies, exercises	5 LE
V Exam	1 LE
	Total

Annex 7

Rules and regulations

The following is a list of the relevant rules and regulations that must be observed in particular; see also section 3.2:

1. Laws, regulations

(Source of supply: Book trade
or
Carl Heymanns Verlag KG,
Luxemburger Straße 449, 50939
Cologne or
Internet: e.g. www.baua.de, hvbg.de)

Occupational Health and Safety Act (ArbSchG), Chemicals Act (ChemG), Federal Immission Control Act (BImSchG), Genetic Engineering Act (GenTG), Animal Rendering Disposal Act (TierKBG), Equipment and Product Safety Act (GPSG), Recycling and Waste Management Act (KrW-/AbfG), Workplace Ordinance (ArbStättV), Construction Site Ordinance (BaustellV), Biological Substances Ordinance (BioStoffV) with associated Technical Rules for Biological Substances (TRBA), in particular

TRBA 405 "Application ofmeasurement methods and technical control values for airborne biological agents",

Ordinance on Industrial Safety and Health (BetrSichV), Ordinance on the Use of PPE (PSA-BV),

Ordinance on the Placing on the Market of Personal Protective Equipment (8th GPSGV),

Ordinance on Hazardous Substances (GefStoffV) with associated Technical Rules for Hazardous Substances (TRGS), in particular

TRGS 101 "Definitions",

TRGS 102 "Technical guideline concentrations for hazardous substances",TRGS 330 "Danger from skin contact" (currently draft),

TRGS 400 "Determining and assessing the risk from hazardous substances at the workplace; requirements",

TRGS 402 "Determinationand assessment of concentrations of hazardous substances i n the air in working areas",

TRGS 519 "Asbestos; demolition, renovation or maintenance work", TRGS 521 "Fibrous dusts",

TRGS 524 "Remediation and work in contaminated areas", TRGS 540 "Sensitising substances",
TRGS 555 "Operating instructions and instruction in accordance with § 20 GefStoffV", TRGS 900 "Limit values in the air at the workplace; air limit values", TRGS 710 "Biomonitoring",
TRGS 903 "Biological workplace tolerance values; BAT values",
TRGS 905 "List of substances that are carcinogenic, mutagenic or toxic to reproduction,
TRGS 907 "List of sensitising substances".

For the application of the Technical Rules for Hazardous Substances (TRGS), see the Preliminary Remarks.

2. Employer's Liability Insurance Association regulations, rules and information for safety and health at work

(Sources of supply: responsible employers' liability insurance association)
or
Carl Heymanns Verlag KG,
Luxemburger Straße 449, 50939
Cologne or
Internet: www.hvbg.de)

- Accident Prevention Regulations Principles of Prevention (BGV A1), Company doctors and occupational safety specialists (BGV A2), occupational health care (BGV A4), Construction work (BGV C22), waste water systems (BGV C5), tents and aerial structures (BGV C25), noise (BGV B3), Safety and health protection labelling at the workplace (BGV A8),

- BG rules
  Explosion protection regulations - (EX-RL) (BGR 104),
  Working in containers, silos and confined spaces (BGR 117-1),
  Workplace ventilation - Ventilation measures (BGR 121),
  Work in enclosed spaces of waste water systems (BGR 126),
  Equipping workplaces with fire extinguishers (BGR 133),
  Hoistable access equipment (BGR 159), Underground construction work (BGR 160),
  Work in special civil engineering (BGR 161), use of protective clothing (BGR 189),
  Use of breathing apparatus (BGR 190),

Use of foot and leg protection (BGR 191), use of eye and face protection (BGR 192), use of head protection (BGR 193),
Use of protective gloves (BGR 195),
Use of personal protective equipment against falls from a height (BGR 198), use of personal protective equipment for rescuing from heights and depths (BGR 199),

– BG principles
  Acquisition of expertise for supervisors in tent construction (BGG 910),

– BG information
  Handling of biological agents in soil remediation (BGI 583), driver's cabs with systems for breathing air supply on earth-moving machinery and special civil engineering machinery (BGI 581),
  Handling oxygen (BGI 617),
  List of certified respiratory protective devices (BGI 693), Health hazards due to biological agents during building renovation (BGI 858),
  Health hazards due to pigeon droppings (BGI 892),
  Risk assessment for biological agents when working on landfills (BGI 893).

(Source of supply: Berufsgenossenschaft der Bauwirtschaft,
Prävention Tiefbau
Landsbergerstraße 309, 80687 Munich)

Handlungsanleitung zum Entfernen PAK-haltiger Klebstoffe für Holzfußböden, Sonderdruck "Arbeiten im Bereich kontaminierter Standorten - Maßnahmen zum Schutz der Beschäftigten" (Abruf-Nr. 780.1).

(Source of supply: Employer's Liability Insurance Association for the Construction Industry)
Occupational Health Service
Landsbergerstraße 309, 80687 Munich)

Offprint: "Guide to occupational health care for workers in contaminated areas".

3. Standards

(Sources of supply: Beuth Verlag GmbH,
Burggrafenstraße 6, 10787 Berlin,
Germany, or
VDE-Verlag GmbH,
P.O. Box 12 33 05, 10625 Berlin)

DIN EN 137	Respiratory protective devices; Self-contained open-circuit compressed air breathing apparatus (SCBA); requirements, testing, marking,
DIN EN 14387	Respiratory protective devices; gas filters and combination filters; requirements, testing, marking,

DIN EN 143 Respiratory protective devices; particle filters; requirements, testing, marking,

DIN EN 345-1 Safety footwear for professional use; Part 1: Specification,

DIN EN ISO 20346 Personal protective equipment; protective footwear, DIN EN ISO 20347 Personal protective equipment; occupational footwear,

DIN EN 14605 Protective clothing against liquid chemicals; performance requirements for chemical protective suits with liquid-tight (type 3) or spray-tight (type 4) connections between the parts of the clothing, including garments providing protection for parts of the body only (types PB [3] and PB [4]),

DIN 3181-3 Respiratory protective devices; CO and reactor filters; classification, marking,

DIN EN ISO 14122-1 Safety of machinery; Permanent means of access to machinery; Part 1: Choice of fixed access between two levels,

DIN EN ISO 14122-2 Safety of m a c h i n e r y ; Permanent means of access to machinery; Part 2: Working platforms and walkways

DIN EN ISO 14122-3 Safety of machinery; Permanent means of access to machinery; Part 3: Stairs, ladders and guard rails,

DIN VDE 0100 Part 704 particular- Erection of low-voltage systems; Part 7: Requirements for Requirements for operating sites, rooms and installations of

rer type; main section 704: construction sites.

4. Other fonts

(Source of supply: VdS Schadenverhütung, Abt. Verlag, Amsterdamer Straße 174, 50735 Cologne or www.gdv.de)

Guidelines for fire damage restoration (VDS 2357). (Guideline of the German Insurance Association).

Here you can get more information

Employer's Liability Insurance Association for the
Construction Industry, Berlin Prevention

BG BAU prevention hotline: 0800 80 20100 (toll-free)

www.bgbau.de
praevention@bgbau.de

You can find specialist contacts for your local business on the Internet at
www.bgbau.de - Contact persons/addresses - Prevention

To get the contact details of the prevention contact person of the BG BAU, you can search for him directly using the postcode or town name of your construction site.

If you do not have any of these details, you also have the option of "clicking through" to the address of your construction site via the map display.

You will also find the relevant contact details there.

Berufsgenossenschaft der Bauwirtschaft (Employer's Liability Insurance Association for the Construction Industry)

Hildegardstraße 29/30
10715 Berlin
www.bgbau.de
praevention@bgbau.de

BG BAU prevention hotline:
0800 8020 100 (toll-free)