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Bundesamt
für Bevölkerungsschutz
und Katastrophenhilfe

# Recommendations on Sampling for Hazard Control

in Civil Protection

Research in Civil Protection

Volume 5

2nd edition

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Research in Civil Protection

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Dear Reader,
please note that this is a direct translation of the German Recommendations on Sampling for Hazard Control and Protection. All of the standards, regulations and descriptions cited in the handbook refer to German regulations and German law. As such, the information must be adapted in line with the corresponding regulations and law applicable in your location. The BBK does not accept any responsibility for the accuracy of the information provided.

Bundesamt
für Bevölkerungsschutz
und Katastrophenhilfe

# Recommendations on Sampling for Hazard Control in Civil Protection

## On the analysis of chemical, biological and radioactive contamination

2nd edition

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# Contents

# 1 Introduction

These recommendations regarding CBRN sampling (chemical, biological, radioactive and nuclear) were first published in 2010 by the German Federal Office of Civil Protection and Disaster Assistance. This was a result of co-operation with representatives from various centres of expertise (German Federal Office for Radiation Protection, Robert Koch Institute, Military Science Institute for Defence Technologies – NBC Protection, North Rhine-Westphalia State Agency for Nature, Environment and Consumer Protection) as well as representatives from the fire service (Jugenheim Fire Service, Altenahr Fire Service, Herzogenrath Fire Service, Mannheim Fire Service and Speyer Fire Service).

It incorporated results from a study about the "Development of a B sampling set in extended disaster protection" by the German Federal Office of Civil Protection and Disaster Assistance, based on the government-issue detection equipment ("Spürausstattung"). In 2013, the Federal Government equipped all of the federally owned CBRN reconnaissance vehicles with a newly compiled CBRN sampling set. The foundations for the recommendations for the sampling were reviewed during this developmental process. This handbook describes the approach for sampling based on the materials that are available on the CBRN reconnaissance vehicles across Germany. In addition, the CBRN sampling set has been introduced as standard in certain federal states, e.g. Hesse. Furthermore, each of the Analytical Task Force's facilities features a government-issue CBRN sampling set.

The compiled recommendations serve as an introduction to and preparation for the topic of "emergency sampling" for emergency response personnel in the case of emergency. They intend to safeguard the protection of the emergency response personnel, the population and the environment during the removal and transportation of suspected B, C and RN samples, and to guarantee a common standard concerning the taking of samples from the environment. The relevant responsibilities of the various authorities under applicable law are to be taken into account.

This handbook uses the term "CBRN hazards" rather than "NBC hazards". The former allows one to differentiate between nuclear (N) hazards (nuclear fuels, which are distinguished by self-sustaining chain reactions) and radiological hazards (R).

Sampling in the field of biological hazards is of great significance, as there remains a lack of reliable detection techniques in the field, like those that exist in the CRN sector.

This volume has been revised as a result of the experiences that have been made during practical implementation in sampling seminars and in the field.

The recommendations for sampling for danger aversion in civil protection have been compiled to the best of the authors' knowledge. They have been compiled with great care by the German Federal Office of Civil Protection and Disaster Assistance (BBK) together with other authors. The user is responsible for ensuring that they apply in the specific case in question. Together with those who were involved in preparing this volume, the BBK is exempt from all liability.

**What do we need sampling for?**

Sampling in the case of emergency can provide rapid confirmation of whether or not a hazardous substance is present and can help to identify the substance in question. It is generally a qualitative detection. At present, there is no norm or standard for sampling in the case of emergency. The latest version of the vfdb guidelines (Vereinigung zur Förderung des Deutschen Brandschutzes e.V. / Association for the Promotion of German Fire Protection) are used by the fire service. Existing norms, for example quality sampling for chemistry and the environment or from the food industry, only have limited application in emergency situations. This requires extensive and time-consuming planning and is the responsibility of the respective authorities and institutions.

The contamination may be visible or invisible, depending on the type of application.

In order to carry out safe and good quality sampling, the operational staff taking the samples require the correct equipment, training and practice. You can find out what this might entail below.

# Requirements facing sampling

2

## 2.1 Advance preparations

In order to be best-prepared for a dangerous situation and for overcoming the danger in question, the structures required for co-operation between the emergency response personnel on site and the authorities (e.g. environment, health and veterinary authorities) need to be established in advance.

Preparations in advance of an operation include:

- Assessing the capacity and capabilities of laboratories
- Authorities participating in the development of operation plans
- Training the emergency response personnel, including in the use of personal protective equipment (PPE)
- Internal availability of personnel/materials/equipment etc.
- Ensuring expert advice for assessing/advising the incident commander
- Clarifying responsibilities

These must be updated regularly. You can find a checklist and further resources in Appendix 8.

In addition, easy-to-use materials must be provided for the sampling itself, and these materials must make it possible to react in different ways. Recommendations for this are provided in Chapter 3 "Materials" of this book. The CBRN reconnaissance vehicles contain materials for emergency sampling by the fire service. The sampling should take place under the instruction of the expert adviser and under the command of the incident commander. The samples are further processed by the research laboratory or the alerted ATF (Analytical Task Force). The subsequent analysis of the results takes place in conjunction with qualified experts on site and the research laboratory.

Prior to the sampling, the presence of explosive, radioactive and chemical substances must be checked. If these dangers are present, the approach taken must be adapted accordingly.

As it is not possible to predict scenarios in which sampling might be necessary, the sampling material has been designed for various different types of sampling (liquids, solids, gases, wipe samples etc.)

### 2.1.1 Protective and specialist equipment

When it comes to sampling that takes place within the framework of CBRN operations, the various different operational situations and resulting dangers dictate that there must be suitable measures regarding the personal protection of the emergency response personnel. Suitable personal protective equipment (PPE) and breathing protection are to be stipulated in line with applicable norms, directives and regulations. Within the fire service, this is set out for the incident commander and their team in line with the FwDV (fire service service regulation) 7 – Breathing protection – and 500 – Units in NBC operations – as well as in other technical regulations passed by the federal states. Furthermore, it should be clarified to what degree state-of-the-art specialist protective equipment is required.

### 2.1.2 Decontamination of emergency response personnel

The requirements stated in the FwDV 500 and vfdb directive 10/04 concerning decontamination should be adhered to. This means that a decontamination point must be established quickly in the case of a relevant operation (hazard groups II and III). The decontamination of samples is described in Chapter 2.5.1.

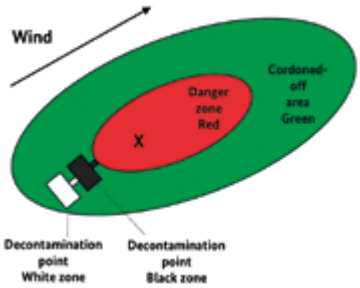



**Fig. 1:** Possible division of the various areas in the case of suspicion of an airborne spread of hazardous agents (in line with FwDV 500)

## 2.2 Assessment of the situation

The aim of an operation is to acquire more detailed information about the event that has taken place. Sampling serves to secure materials; specifically so that the samples can be investigated in a laboratory. Furthermore, each sample is like a snapshot of the real operational situation in terms of the contamination with hazardous substances, as it was found at the time the sampling took place. With this in mind, it makes sense to begin sampling as soon as possible and to take more than one sample. This is especially applicable in the case of sampling airborne hazardous substances.

Prior to the operation, the situation should be assessed and operational tactics developed based on this assessment. The questions from Table 1 may offer some assistance here.

The site from which the substances were released should be secured so that a further spread of the contamination can be avoided to as great a degree possible.

The following approach should be taken:

- Based on available information, local conditions and weather information, the location of the decontamination point and the incident management, as well as the route that the sampling team take, should be determined.

- Prior to sampling beginning, it must be ensured that a suitable laboratory (decided upon in advance)/the ATF is available and ready for the operation, and that the sample can be transported there.

- In order to coordinate special requirements regarding the samples to be taken (quantity, type, maximum dose per sample etc.), there must be a direct line of communication with the responsible laboratory/the ATF.

- Coordination with forces for a possible preservation of evidence (police, State Office of Criminal Investigation) must be ensured.

- Mixed sampling teams should be set up if required. The team leader, or a person nominated in advance, is responsible for all external communication.

- People who have been exposed to the contamination must be evacuated from the contaminated area as quickly as possible in a way that avoids spreading the contamination further. These people must be decontaminated and given medical care where required.

- Those affected must be registered and placed under observation until further measures can be put in place.

| | |
|---|---|
| **What has happened?** | Police intelligence, possible appearance of medical symptoms, other things of note |
| **When did it happen?** | Find out the timeline of events to draw possible conclusions regarding the hazardous substances and their spread (symptoms, incubation period). |
| **Where did it happen?** | Mark out and cordon off the contaminated area if possible. Has the contamination spread in the intervening period? Scenario: Hazardous goods accident, attack? |
| **How did it happen?** | Information about the type of spread is important regarding the release of biological agents for example.<br>In the case of an epidemic outbreak, propagation and infection paths must be clarified. In the case of RN, information should be obtained about the nuclides present. |
| **What is the area like?** | Is it an enclosed building or is the scenario developing outdoors? |
| **What are the environmental conditions?** | Weather, landscape, buildings etc. |

**Table 1:** Checklist for the operation site

## 2.3 Expert advisers

CBRN operations can develop into extremely complex situations. The level of expertise required to guarantee the safe development of the operation is often not held by the emergency response personnel who first arrive at the scene.

As such, it is highly recommended that suitable expert advisers from outside the fire service be identified prior to the operation. They should be involved in planning operations and practices to give them an overview of the work of the fire service. Those especially suited to this task include chemists, biologists, physicists, engineers from relevant fields, toxicologists and medical professionals, as well as people who have acquired the required knowledge from their training and professional experience to act as expert advisers. The expert advisers are incorporated into the fire service operation via the incident command in line with FwDV 100. At this point, FwDV 500 should also be referenced again; it includes specific passages on expert advisers.

The responsible incident commander or, in the case of larger incidents, the head of the measuring department (FwDV 500), sets up a sampling team. They stipulate the sampling strategy together with the expert adviser prior to the operation. A site plan should be drawn up to show the sampling locations. The sampling team can then decide together with the expert adviser/incident commander whether further samples need to be taken, depending on the situation in question.

### 2.3.1 Support from special forces

When it comes to the release of highly dangerous substances that are harmful to health or agents which require special levels of expertise and specific approaches with regard assessing the situation, operational tactics and personal protection to undertake the sampling, the Federal Government has special forces, which the incident commander can call upon to provide assistance in the case of need.

#### 2.3.1.1 Capabilities of the Analytical Task Force C-RN and B

The Analytical Task Force (ATF) is a special unit that can be deployed nationwide. The regional states within Germany have stipulated their own individual reporting procedures for calling up the ATF. You can find detailed information about this in the brochure entitled "The Analytical Task Force (ATF) – Information about services provided and reporting procedures", which can be downloaded from the BBK website.

The ATF's focus lies in providing general advice regarding CBRN incidents and the identification of chemical substances ( ATF C-RN). The capabilities of the ATF are currently being developed to include specialist consultancy and rapid analysis in the case of biological incidents (ATF B).

The ATF can provide the following services to the incident commander on the ground:

- Advising the incident commander in the case of CBRN incidents
- Detection, identification and localisation of chemical substances
- Qualified sampling/professional guidance during the sampling procedure
- (Preventive) monitoring of large areas via remote sensing
- An evaluation of the situation and a prognosis regarding how the incident might develop
- Recommendation of suitable measures

The ATF C-RN has extensive mobile measuring equipment to analyse samples of solid, liquid and gas substances. The Task Force can use samples, which have been taken in line with the stipulations in this volume, to carry out further analysis at the site in question. The Tenax® sorbent tubes contained in the government-issue sampling set (see Chapter 4.4.9) are compatible with the gas chromatograph mass spectrometer used by the ATF.

If the samples are to be taken prior to the ATF's arrival, it is recommended that the ATF be contacted prior to sampling. This allows the sampling to be carried out in such a way that is most compatible with the ATF's technical measuring expertise.

#### 2.3.1.2 Capabilities of the Bio Task Force

The Bio Task Force has been set up at the Robert Koch Institute – the highest health authority in Germany – to deal with biological threats. The release of dangerous, highly infectious biological agents demands special expertise regarding infectiology and countermeasures, which can be taken to protect the people and areas affected. Special attention needs to be paid from the very beginning in these situations. Incubation periods in particular need to be taken into account – the time it takes for an illness to break out or for the affected person to become infectious to others. These incubation periods are often the determining factor for the efficacy of countermeasures and the prevention of infectious illnesses spreading. The Bio Task Force represents the operative link to the laboratory-supported analytical sectors of the Robert Koch Institute and other qualified laboratories. The Bio Task Force offers its capabilities and experience when requested for assistance. These include:

- Support in checking the severity and assessing the situation
- Development of a sampling strategy
- Implementation of the sampling and appropriate field analysis of samples
- Suitable preparation of samples for transportation (packaging)
- Support in the organisation and implementation of transporting the samples
- Analysis of the samples in the laboratory and informing the incident commander of the results
- Advice about suitable countermeasures and support in prophylaxis prior to and after exposure

The fact that the Bio Task Force is based at the Robert Koch Institute means that it is possible to provide the required measures for dealing with the situation – from sampling to transportation and analysis to presenting the findings and assessing the severity of danger or damage – with a single chain of custody from the one source.

## 2.4 Sampling team

The sampling team should be made up of the crew from CBRN reconnaissance vehicles (1/3/4).

Tasks within the contaminated area are allocated as follows:

- Two sample takers (sample, measuring equipment)
- One team leader (radio, documentation). The team leader is equivalent to the officer-in-charge within the fire service.

In the contamination-free area:

- Driver of the CBRN reconnaissance vehicle (communication, managing the sample team)
- Other emergency response personnel if applicable

The allocated tasks are to be continued throughout the sampling process.

The sampling team are not deployed until there is a decontamination and rescue team in place. Only then should they proceed to the sampling site in the specified, potentially contaminated area. Tasks should be allocated amongst the team so that there is always one "clean" (assistant) and one "dirty" (sample taker) team member (see flowchart in Appendix 8.1). The "dirty" sample taker prioritises the sample points and actively takes the samples.

The "clean" assistant is responsible for preparing and providing the sampling materials for a smooth sampling process. If the team only comprises two people, the "clean" assistant is also responsible for the sample documentation (labelling the containers, written documentation) and communications. In order to minimise cross contamination, the assistant should not come into direct contact with the materials being investigated. The team should be extended based on the situation in question. When it comes to sampling in the RN sector, it is recommended deploying a three-man unit, as measurements need to be taken before and during the sampling.

Removing the samples and the documentation – protocols, digital cameras etc. – from the potentially contaminated sampling site should be planned and determined in advance, e.g. camera with sleeve for underwater photography that allows for decontamination. Protocols can be decontaminated in sealed, transparent sleeves without loss of information, and removed together with the samples. It may also be possible to use digital documentation during the operation.

Two points in particular must be taken into account:

- The safety of the sampling team is of the utmost priority.
- Cross contamination must be avoided!

## 2.5 Conducting the sampling

In general, the following applies to the sampling:

- The sampling containers and instruments must be resistant to chemicals and clean. Particular requirements are placed on the sampling containers for substance groups C, B and RN if these are also suitable for posting (see Chapter 2.10).
- It must be decided on a case-by-case basis whether just one or several types of sampling are required for the situation in question.
- Leaking, unknown hazardous materials/substances must be sampled.

**Visible contamination:**

In the case of visible contamination, the sampling of the suspicious substance should be conducted without it being mixed with any other material from the site of the sampling.

**Invisible contamination:**

Invisible contamination may involve the spread of gas or aerosol. In this case, the sample is taken directly from the air or from an exposed surface. A cloud of particles can contaminate the ground/soil, bodies of water and the surfaces of objects (e.g. vegetation) as it passes through and/or settles. Particle concentrations and factors affecting the flow of air (wind, fans, air conditioning systems etc.) play key roles in the type and degree of surface contamination.

Depending on the scenario, the following priority levels are recommended for sampling.

| | |
|---|---|
| **Priority level 1** | Sample-taking in areas with very high risks of contamination or where people are endangered. These samples take priority. |
| **Priority level 2** | Sample-taking in areas with a possible risk of contamination. |
| **Priority level 3** | Samples are only to be taken in the case of moderate, uncertain risks of contamination if capacities allow. |

**Table 2:** Priority levels for taking samples

**Conducting the sampling**

An overview of the steps:

1: Inspect the sampling site

2: Mark the sample points

3: Prioritise the sample points

4: Prepare the materials for conducting the sampling

5: Conduct the sampling

6: Decontamination and removal of the samples

During sampling, the direct-reading equipment from the CBRN reconnaissance vehicle should be deployed in the area around the sampling site and alarms should be observed.

**This means:**

**Steps 1 and 2: Inspecting the sampling site and arranging identification markings**

The first step sees a reconnaissance team carry out a metrological and visual survey and sequential numerical designation of the possible sample points (Fig. 2).

Taking photographs of the sampling site as a whole, as well as detailed photographs of the individual sample points, is recommended here.


**Fig. 2:** Sample points marked with number cards

**Step 3: Prioritising**

The priority level of the sample points is to be decided upon in discussion with the expert adviser based on the designated sample points and photographs.

**Step 4: Preparing the sampling materials**

The materials for carrying out the sampling are collected together based on the priority levels. Deviations from this approach are permitted if necessary.

**Step 5: Conducting the sampling**

Conduct the sampling in accordance with the handbook.

It should be ensured that the sample is as representative as possible of the material samples and the site in question. Samples can be in solid, liquid, gas or vaporous forms.

**Step 6: Decontamination and removal of the samples**

Decontamination is to be carried out in line with the respective stipulations for C, B or RN contaminations (see Chapter 2.5.1).

See the flowchart in Appendix 8.1 for how to carry out sampling in a biological or chemical situation.

Further points to consider when taking samples:

- Additional retention samples are only to be taken in agreement with the expert adviser.
- Where possible, control samples from the non-contaminated area are to be taken so that background levels can be calculated.
- Samples should offer a representative overview of the spread of a hazardous substance (here it should be considered whether there is sufficient time for this measure → Prioritising the sampling).
- Sampling along a possible dispersion is necessary, depending on the scenario, in order to be able to make a decision about the contaminated area, and to estimate the number of people who have been exposed to the contamination. Dispersion models should be used, where possible, to ascertain the sampling area, taking weather information into account.

If the source of the contamination can be identified, a sample should be taken to identify the substance (primary substance, biological agent) (only B, C).

### 2.5.1 Decontaminating the samples, protocols and sample packaging

Decontamination prevents third parties who are involved in investigating the samples further, as well as the testing environment, from becoming endangered. Sample containers are to be cleaned on the outside so as to prevent the contamination from spreading.

As such, samples must be packaged so that they are liquid-tight.

The packaged samples are decontaminated at the boundary between the contaminated/non-contaminated areas as depicted in the "Flowchart for biological and chemical scenarios" (Appendix 8.1).

There are various possible procedures for liquid decontaminants.

### Dipping method

The samples and protocols, which have been packaged so they are liquid-tight, are passed out of the contaminated area in a container with decontamination solution (Fig. 3). Once sufficient exposure time has been guaranteed (dependent on the solution being used), tweezers or gripping pliers are used to remove the items so that they can dry and be packaged in secondary packaging. The required concentration of the solution in question and the decontamination time must be ascertained prior to the decontamination.

**Fig. 3:** Example of a disinfectant bath: Sample bags can be dipped in decontamination solution.

### Spraying method


**Fig. 4:** Portable pressure sprayer from a government-issue CBRN reconnaissance vehicle

The samples, which have been packaged so they are liquid-tight, are passed out of the contaminated area on a solid, moisture-absorbent surface, and moistened sufficiently with decontamination solution using a pump spray (e.g. portable pressure sprayer found in CBRN reconnaissance vehicles) (Fig. 4). Spray drift from the sprayed solution should be avoided. If this is not possible, e.g. due to windy weather, then the dipping method should be used.

Following the required exposure time – which is always dependent on the solution used and the surface/material being treated – the items are dried and packaged in secondary packaging in the non-contaminated area.

**Wiping method**

This method involves the simultaneous moistening and rubbing with decontamination solution. This is generally used for surfaces with especially dirty/contaminated surfaces. The wiping method can be used as an alternative to the dipping and spraying methods. It can also be combined with the other two methods. The incident commander should decide upon the most appropriate method for the situation in question.

## 2.6 Documentation

Complete, comprehensible and clear documentation is a basic requirement for analysing the samples and, as such, forms a key part of the sampling process. It is important to stipulate the type of documentation required and how it is to be compiled in advance and to describe these processes clearly in the operational documentation.

The individual sample containers must be labelled by hand or using pre-printed/written labels so that the samples can be identified. In order to guarantee clear sample classification, the labels must contain a sample number, which is made up of the CBRN reconnaissance vehicle ID and a sequential numerical designation, as a bare minimum (see Fig. 5).

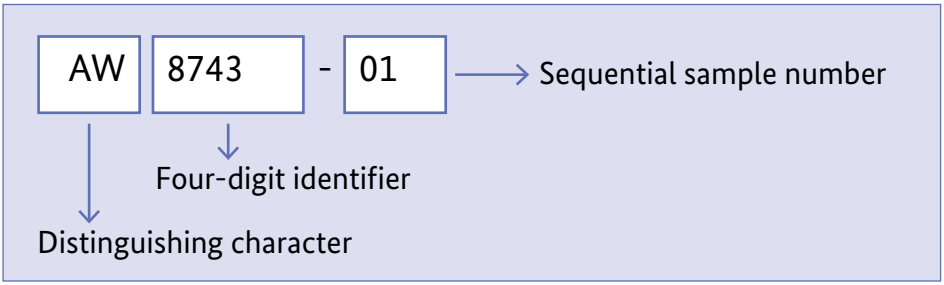



**Fig. 5:** Example of sample numeration

In addition, the sample point, date and time of the sampling should be noted. The person taking the sample should also be noted, e.g. initials.
In order to cover as wide a range of sampling scenarios as possible, various pre-printed forms have been developed and can be found in the appendix. They can also be downloaded in DIN A4 format from the download area of the BBK home-page. They can be adapted for the fire service in question by incorporating the logo and contact details.

The complete set of pre-printed forms comprises

- Accompanying form
- Sample protocol
- Sample overview
- Chain of Custody

**Accompanying form**

Basic documentation is to be drawn up at the sample point using the accompanying form (appendix 8.5). In the case of the supplied sample bags, the printed surface of the bag can be used for this purpose. It should, however, be noted that the print is not resistant to some organic solvents. If the bag is to come into contact with solvent, it is better to use a pre-printed paper form. For the most part, this pre-printed sheet is only used for information referring to the sample itself. It can also be used to note down any possible dangers that the sample poses, if it can be identified by the instruments contained in a CBRN reconnaissance vehicle.

Generally speaking, one accompanying form / individual sample bag is to be completed for each sample. Sample type RN 02 is the only exception here.

Key information about the individual samples:

- Type of sample (cross one of the symbols on the accompanying form)
- Sample number
- Unit that took the sample
- Name of the sample taker
- Date
- Time
- Location of the sample point

All other information serves the purpose of making a rough estimation using the tools available to the CBRN reconnaissance vehicle of whether the sample poses a threat. As soon as there is a suspicion (B, C scenario) or it can be proven using measuring instruments, that contamination can be ruled out, this is documented by crossing the appropriate box. The dose rate or pH value of the sample are then noted.

The accompanying form is to be placed in the secondary packaging together with the decontamination packaging. The accompanying form must be clearly legible from the outside. It is sensible to photograph the accompanying form if a camera is available.

Additional documentation is compiled using the sample protocol (Appendix 8.6) depending on the situation.

Video or photographic documentation is recommended in addition to the written documentation. A method to decontaminate the devices in question and the information that they have gathered should be decided upon in advance. Waterproof packaging for digital cameras is available from specialist retailers, for example.

Photographic and video equipment are not provided by the Federal Government.

**Sample protocol**

In order to be able to analyse the results of the sample analyses, certain information needs to be documented during the operation (sample protocol in Appendix 8.6).

The documentation begins in the header with the operation location; in other words, the place where the potential harm had its root, e.g. a leaking tanker. Then there is the date and time of the sampling. The sample number, which can also be marked on the protocol with a label, is required for classification purposes. The "sample point" field is to be used to describe the place where the sample was taken as precisely as possible. Outdoors, the road and house number or co-ordinates are to be used, with the sample height above ground.

Sample procedure is used to document the procedure used to take the sample. The abbreviation (e.g. C01) stands at the top right of the instruction card.

The following field is used to document additional parameters depending on the sample type; e.g. the type of tubes used for sampling gases. In the case of Tenax® tubes, it is vital that the imprinted number is noted for clear identification!

The description of the sample summarises information that can be perceived through the senses: a description of the colour, consistency, odour, opacity or a multiphase mixture in the case of a liquid sample.

In the case of measurements taken on site, information acquired using the CBRN reconnaissance vehicle equipment should be documented. This may be radiological measurements with the dose rate meter and the contamination monitoring device, as well as pH values and measurements from the photo-ionisation detector (PID) and the ion-mobility spectrometer (IMS). Water and ground temperature are also specified, depending on the type of sample. The "Other" field can be used to note down measurements taken with other instruments, e.g. oil test paper, water detection paste, test-tubes or other measuring devices.

The site plan is for sampling situations where it is possible to mark the location of the sample point clearly on a sketch of the area. In order to make analysis easier, you can either provide a scale or the size of the boxes can be given a scale.

The section to document the weather is intended for outdoor sampling. Depending on the type of sampling, the respective parameters are to be ascertained and documented. This is done using a simplified version of the weather support message form (for details see KatsDV (disaster service regulation) 507). The individual parameters should be filled out in line with the KatsDV. Cloud coverage is given in eighths. A cloud-free sky is denotes as 0/8; an overcast sky 8/8. The air temperature is to be measured in the shade with a dry thermometer. Air moisture/humidity is given in % (unit: rel. H.). Wind strength is measured in m/s, km/h or, if no anemometer is to hand, by observing the Beaufort (Bft) scale. Wind direction is to be stated either in degrees (°) or in direction, e.g. north-west (NW). Important: The wind direction is the direction from which the wind is coming! For precipitation during sampling, write either yes or no.

The "Decontamination" heading is used to document whether decontamination has taken place; which decontamination solution was used, in which concentration and for how long; and whether dipping or spraying/wiping decontamination was used.

The "Comments" field is a free-text field for stating any other important observations, such as unnatural discolouration on the vegetation, large numbers of dead animals, in particular from the same class (e.g. birds or fish).

The form concludes with the signature boxes for the person completing the protocol and the sample taker, along with their names written in block capitals to ensure legibility. The footnote includes the address, telephone and fax numbers, as well as a central email address for the fire service, which took the samples, in the case of any further questions.

**Sample overview**

For cases in which a large number of samples are taken, it can be helpful to provide a list of these samples together with a sketch of their locations: This makes it possible to gain an overview of the type of samples taken and the places where they were taken (Appendix 8.7). This pre-printed form features a table for clear identification of the samples and space for a sketch detailing the sample points. Besides the actual sample number, the table includes the abbreviation of the type of sample (e.g. B02) for clear classification. It is of benefit to include several photographs from various perspectives to provide an overview of the sample points with this pre-printed form.

**Chain of Custody**

This serves to document the path a sample takes from sampling to analysis so that it can be easily traced (sample in Appendix 8.8). In the case of environmental crimes, for example, this can result in legal consequences. The header of the pre-printed form identifies the sample by its sample number and the sampling date. The form then documents each transfer to another person with name, date and time, as well as the person passing the sample on and the person receiving the sample, in the respective fields, until the sample has been delivered to the laboratory.

## 2.7 Sample collection point

The sample collection point is downstream from the sample decontamination. All of the samples collected during the operation are collected, processed and prepared for transportation or professional disposal here.

This means:

- Listing the incoming samples
- Proof of successful decontamination in the C field, disinfection in the B field or freedom from contamination in the RN field
- Checking the documentation is complete and comparing with the entries in the operations diary
- Proper, sample-specific packaging, storage and transportation
- List of outgoing samples
- Proper distribution to professional laboratories, in accordance with applicable regulations (designations)

All of these processes are to be clearly documented.

## 2.8 Sample packaging and transportation

In Germany, transportation of dangerous goods is subject to the European Agreement on the International Transportation of Dangerous Goods by Road (ADR). A basic pre-requisite for a proper and unproblematic application of the ADR is awareness of the substance being transported and the clear classification of the substance using the UN numbers provided. In most CBRN operations, in which the samples need to be transported so that the dangerous substance can be precisely identified, this is not possible. Furthermore, most cases involve an urgency that requires a fast, pragmatic, safe approach.

As these samples concern dangerous goods, the stipulations of the ADR and the StrlSchV (German Radiation Protection Ordinance) apply to their transportation by road. Insofar as there is no opportunity to prepare for sample transportation in advance, and the transportation of the samples falls in line with the "emergency transportation to protect human life or the environment" (ADR Part I: 1.1.3.1 e and d, exemption in conjunction with the type of transportation), it is possible to deviate from the regulations, so long as all measures to ensure the totally safe transportation are met and there is no risk of harm to the haulier or the laboratory staff (biological threat I).

The implementation guidelines for hazardous goods (RSEB 2013) state:

Sub-section 1.1.3.1 character d:1-7.1 Emergency response personnel are only the competent bodies in line with German law for the emergency measures.

1-7.2 Character d is invoked when measures during an emergency incident (danger ahead) require transportations outside the legal framework by state emergency response personnel or the companies that they have commissioned and are overseeing. This also includes the transportation of explosives, munitions and bombs, as well as other dangerous goods (in particular NBC substances), which need to be taken to a safe location as part of the emergency measures. The stipulation of the type and method of monitoring of the emergency transportation is the responsibility of the incident commander in question. The incident commander determines the safe location and, with it, the end of the emergency transportation based on the circumstances. As a result of the urgent involvement of the responsible bodies, completely safe transportation is not expressly demanded, in contrast

to sub-section 1.1.3.1 character e (ADR). In other words, the responsible body can compensate for a residual risk by additional measures, e.g. evacuations, closing traffic routes (dangerous goods exception for operations – in accordance with 1.1.3.1. GGVSEB/ADR – "exemptions in conjunction with the type of transportation" RV 003/2013 Annex 3).

Regional regulations must be taken into account in Germany. The responsible bodies for applicable exemptions can be found in the RSEB.

The packaging of the samples for transportation to the responsible laboratory should be standardised wherever possible. In the case of emergency, transportation is to be carried out by personnel from the bodies described in RSVB d:1-7.1. It should be ensured that all measures are met to ensure safe transportation of the samples to a safe location. This location is determined by the incident commander and should be a laboratory that is equipped to investigate the samples professionally.

For further clarity, the following table lists the various primary and secondary packagings described in the various instructions and their equivalent designation in the ADR. A decontamination packaging is also defined for purely practical purposes. This is the outer sample packaging, which is decontaminated as the sample is removed from the danger area (Table 3). Note: The rules and regulations of the country where the sampling is conducted must be adhered to.

## 2.9 Selection of the material deposition / preparation area

The material deposition and preparation area should, wherever possible, be identical and should be located at the boundary between the contaminated/non-contaminated areas (Appendix 8.1). The distance from the sample point should be as far as necessary but as close as possible, taking the routes and protective levels of the team members into account.

In principle, prior to depositing the materials, the plastic foil located in the outer pocket of the rucksacks should be spread out and the material placed on top. This serves to minimise contamination of the sampling materials.

| | **Primary packaging** | **Decontamination packaging** | **Secondary packaging** |
|---|---|---|---|
| C01 | Glass bottle | Sealable PE bag | Transport medium |
| C02 | Glass bottle | Sealable PE bag | Transport medium |
| C03 | Glass bottle | Sealable PE bag | Transport medium |
| C04 | Sealable PE bag | Sealable PE bag | Transport medium |
| C05 | Glass bottle | Sealable PE bag | Transport medium |
| C06 | Glass bottle | Sealable PE bag | Transport medium |
| C07 | Glass bottle | Sealable PE bag | Transport medium |
| C08 | Glass bottle | Sealable PE bag | Transport medium |
| C09 | Sealable PE bag | Sealable PE bag | Transport medium |
| C10 | Glass container | Sealable PE bag | Sealable PE bag |
| B01 | PE bottle | Sealable PE bag | BAM-certified PE container |
| B02 | PE bottle | Sealable PE bag | BAM-certified PE container |
| B03 | Glass bottle | Sealable PE bag | BAM-certified PE container |

| | Primary packaging | Decontamination packaging | Secondary packaging |
|---|---|---|---|
| B04 | Sealable PE bag | Sealable PE bag | BAM-certified PE container |
| B05 | Culturette outer packaging | Sealable PE bag | BAM-certified PE container |
| B06 | Sterile PE bag | Sealable PE bag | BAM-certified PE container |
| B07 | PE bottle | Sealable PE bag | BAM-certified PE container |
| B08 | PE bottle | Sealable PE bag | BAM-certified PE container |
| B09 | Sterile PE bag | Sealable PE bag | BAM-certified PE container |
| RN01 | Sealable PE bag | Sealable PE bag | Sealable PE bag |
| RN02 | Parchment bag | Sealable PE bag | Sealable PE bag |
| RN | PE bottle | Sealable PE bag | Sealable PE bag |

**Table 3:** Classification of the packaging used in the brief instructions in the categories primary packaging, decon. packaging, secondary packaging

# Materials 3

**Materials contained in the government-issue CBRN sampling equipment**

The government-issue CBRN sampling equipment, which replaced the government-issue detection equipment ("Spürausstattung") on the CBRN reconnaissance vehicle in spring 2013, comprises four packs (Fig. 6). These are an orange rucksack, a blue rucksack, a box of spare materials and a bottle holder for six half-litre bottles. The packs contain all of the materials that are required to carry out the sampling as described in the sampling instructions provided below.

The orange rucksack contains materials for carrying out instructions C01 to C10 (from p.72) and RN01 to RN03 (from p.138). The blue rucksack contains all of the materials for carrying out instructions B01 to B09 (from p.110. The box of spare materials contains spare materials for CBRN sampling, which can be used to fill the rucksacks as required, as well as two receptacles for dispatching biological materials. The government-issue equipment does not contain any materials for photographic or video documentation.


**Fig. 6:** Packs from the government-issue CBRN sampling equipment

The orange and blue rucksacks are of the same design and made from the same single-use material (Fig. 7 and 8).

They feature a robust, simple carrying system with inner compartments for modular use. The inner compartments feature a velcro system so that they can be removed depending on the operation in question, or can be positioned in the second rucksack, for example. As such, it is possible to transport the materials that might be needed in the danger area in just one rucksack. In cases where it is impossible to estimate the scope of the sampling for the operation in question, it is recommended taking both rucksacks. Various different strategies can be adopted depending on the operation, as shown on the flow diagram for CBRN incidents.

In the case of a contamination, it is not necessary to prove that all surfaces of these materials are free from contamination, which inevitably leads to proper disposal.

It is important for the sampling team to check the objects required (Table 4) prior to operations. This is highly recommended as some objects have a use-by date, such as the gas sorbent tubes, the short-term measuring tubes, the separating instruments; a microbiological infestation of the dist. water can also not be ruled out, for example.

Quality control documentation should be completed for these regular inspections.

**Fig. 7 and 8 The rucksacks contain materials held in numbered inner compartments and in fixed positions in the large inner compartment and outer pocket of the rucksack. The precise materials and quantities are listed in the material list.**

| Position | Pack | Quantity |
|---|---|---|
| **1** | **Rucksack C/RN, orange** | **1** |
| 1.0.1 | PE cover | 1 |
| 1.0.2 | Sampling instructions, set | 1 |
| 1.0.3 | Clipboard, A4 | 1 |
| 1.0.4 | Measuring cup | 2 |
| 1.0.5 | Sample bag, 225 x 390 mm | 20 |
| 1.0.6 | Kitchen roll | 1 |
| 1.0.7 | Rubbish bag | 5 |
| 1.0.8 | Powder funnel | 2 |
| 1.0.9 | Water sampling device | 1 |
| 1.0.10 | Lowering cable | 1 |
| 1.0.11 | PE bottle, 500 ml dist. water | 1 |
| 1.0.12 | PE bottle, 500 ml ethanol 70 % | 1 |
| 1.0.13 | Spray bottle attachment | 2 |
| 1.0.14 | Glass bottle, 250 ml | 2 |
| 1.0.15 | Aluminium foil, roll | 1 |
| | | |
| 1.1 | Inner compartment, red, "CBRN documentation" | 1 |
| 1.1.1 | Adhesive label | 20 |
| 1.1.2 | Lab marker | 1 |
| | | |
| 1.2 | Inner compartment, red, "CBRN gen." | 1 |
| 1.2.1 | Disposable tongue depressor, plastic | 5 |
| 1.2.2 | Spoon spatula, 250 mm | 1 |
| 1.2.3 | Spoon spatula, 180 mm | 1 |

| Position | Pack | Quantity |
|---|---|---|
| 1.2.4 | Spoon spatula, 150 mm | 1 |
| 1.2.5 | Combination scissors | 1 |
| 1.2.6 | Knife | 1 |
| 1.2.7 | Tweezers, 310 mm | 1 |
| 1.2.8 | Tweezers with hook | 1 |
| 1.2.9 | Roll of fabric tape | 1 |
| 1.2.10 | Scoop | 1 |
| 1.2.11 | Tape measure | 1 |
| 1.2.12 | Cable tie, 300 mm | 10 |
| 1.2.13 | Dipper | 1 |
| 1.2.14 | PVC tube | 1 |
| 1.2.15 | Thermometer, glass | 1 |
| 1.2.16 | Crucible tongs | 1 |
| | | |
| 1.3 | Inner compartment, green, "RN02" | 1 |
| 1.3.1 | Round filter, packet | 1 |
| 1.3.2 | Parchment bag | 20 |
| | | |
| 1.4 | Inner compartment, yellow, "C09" | 1 |
| 1.4.1 | Silica gel sorbent tubes, packet | 2 |
| 1.4.2 | Tenax® sorbent tubes 10, packet | 1 |
| 1.4.3 | Phosgene short-term measuring tubes, packet | 2 |
| 1.4.4 | Carbon monoxide short-term measuring tubes | 2 |
| 1.4.5 | Hand pump | 1 |
| 1.4.6 | Test-tube rack | 1 |

| Position | Pack | Quantity |
|---|---|---|
| 1.5 | Inner compartment, yellow, "C08" | 1 |
| 1.5.1 | Pipette, single-use, 3 ml | 5 |
| 1.5.2 | Syringe, 50-60 ml | 2 |
| | | |
| 1.6 | Inner compartment, yellow, "pH indicator" | 1 |
| 1.6.1 | Detection canister with detection powder in line with SDB, 300 g | 1 |
| 1.6.2 | Detection paper, pad | 1 |
| 1.6.3 | pH paper 1-14 | 1 |
| | | |
| 1.7 | Inner compartment, yellow, "bottles 100 ml" | 1 |
| 1.7.1 | Glass bottle, 100 ml | 3 |
| | | |
| **2** | **Rucksack B, blue** | **1** |
| 2.0.1 | PE cover | 1 |
| 2.0.2 | Sampling instructions, set | 1 |
| 2.0.3 | Clipboard, A4 | 1 |
| 2.0.4 | Measuring cup | 2 |
| 2.0.5 | Sample bag, 225 x 390 mm | 20 |
| 2.0.6 | Kitchen roll | 1 |
| 2.0.7 | Rubbish bag | 5 |
| 2.0.8 | Powder funnel | 2 |
| 2.0.9 | Spray bottle, 1 litre | 1 |
| 2.0.10 | PE bottle, 500 ml | 2 |

| Position | Pack | Quantity |
|---|---|---|
| 2.0.11 | PE bottle, 250 ml | 2 |
| 2.0.12 | Disposal bag | 8 |
| 2.0.13 | Barbecue tongs, wooden | 1 |
| | | |
| 2.1 | Inner compartment, red, "CBRN documentation" | 1 |
| 2.1.1 | Adhesive label | 20 |
| 2.1.2 | Lab marker | 1 |
| | | |
| 2.2 | Inner compartment, red, "CBRN gen." | 1 |
| 2.2.1 | Disposable tongue depressor, plastic | 5 |
| 2.2.2 | Spoon spatula, 250 mm | 1 |
| 2.2.3 | Spoon spatula, 180 mm | 1 |
| 2.2.4 | Spoon spatula, 150 mm | 1 |
| 2.2.5 | Combination scissors | 1 |
| 2.2.6 | Knife | 1 |
| 2.2.7 | Tweezers, 310 mm | 1 |
| 2.2.8 | Tweezers with hook | 1 |
| 2.2.9 | Roll of fabric tape | 1 |
| 2.2.10 | Scoop | 1 |
| 2.2.11 | Tape measure | 1 |
| 2.2.12 | Cable tie, 300 mm | 10 |
| 2.2.13 | Dipper | 1 |
| 2.2.14 | PVC tube | 1 |
| 2.2.15 | Thermometer, glass | 1 |
| 2.2.16 | Crucible tongs | 1 |

| Position | Pack | Quantity |
|---|---|---|
| 2.3 | Inner compartment, blue, "B05" | 1 |
| 2.3.1 | Protective container for swabs | 24 |
| 2.4 | Inner compartment, blue, "B06/B09" | 1 |
| 2.4.1 | SteriBag, 720 ml | 20 |
| 2.5 | Inner compartment, blue, "B06/B09" | 1 |
| 2.5.1 | Compress | 10 |
| 2.5.2 | Sodium chloride solution | 10 |
| 2.6 | Inner compartment, blue, "B05" | 1 |
| 2.6.1 | Sterile swabs | 4 |
| 2.6.2 | Bacteria swabs and transport system | 4 |
| 2.6.3 | Virus swabs and transport system | 4 |
| 2.6.4 | Sodium chloride solution | 4 |
| 2.7 | Inner compartment, blue, "B08" | 1 |
| 2.7.1 | Pipette, single-use, 3 ml | 5 |
| 2.7.2 | Syringe, 50-60 ml | 2 |
| 2.7.3 | pH paper 1-14 | 1 |
| **3** | **Crate of spares** | **1** |
| 3.0.1 | Sample bag, 225 x 390 ml | 60 |
| 3.0.2 | Packaging in line with P620, 2 litre | 2 |

| Position | Pack | Quantity |
|---|---|---|
| 3.0.3 | Glass bottle, 250 ml | 2 |
| 3.0.4 | Roll of bin bags | 1 |
| 3.0.5 | Nitrile gloves, packet | 1 |
| 3.0.6 | PE bottle, 250 ml | 4 |
| 3.0.7 | Adhesive label | 60 |
| 3.0.8 | Bacteria swabs and transport system | 8 |
| 3.0.9 | Virus swabs and transport system | 8 |
| 3.0.10 | Sodium chloride solution | 8 |
| 3.0.11 | Sterile swabs | 8 |
| 3.0.12 | SteriBag, 720 ml | 10 |
| 3.0.13 | Packing list | 1 |
| 3.0.14 | Parts list for replacing items with use-by date | 1 |
| 3.0.15 | Training CD | |
| **4** | **Bottle carrier** | **1** |
| 4.0.1 | Glass bottle, 500 ml | 6 |

**Table 4:** List of materials for the government-issue CBRN sampling set, which has been on federal CBRN reconnaissance vehicles since the beginning of 2013. The list of materials reflects the status up to 2016.

# C-sampling 4

## 4.1 Recommendations for C-operations

If there are suspicions of a contamination with chemical substances and it is necessary to identify the substance(s), samples must be taken. There is no measuring device available at present that can identify unknown chemical substances on site with total accuracy. This identification process requires various independent measuring and verification procedures on site or in a laboratory.

If a quantitative analysis is needed, this can only take place in a laboratory. It is the responsibility of the incident commander, in discussion with the expert adviser / the responsible authorities, to decide whether or not a sample and/or quantitative analysis is required.

## 4.2 Protecting the emergency response personnel

In the case of unclear situations with unknown substances, self-contained breathing apparatus must be used together with gas-tight chemical protection suits (personal protection type 3PPE Type 1 according to EN 943 or Level A according to NIOSH/NFPA Standards). If the type, amount and properties of the hazardous substances are known, the personal protective equipment can be adapted accordingly to make the work of the emergency response personnel as easy as possible (Table 5).

The government-issue personal CBRN protective equipment is also suitable for protection against chemical substances. It comprises the following components:

- Overgarment to protect against chemical agents in vapour and aerosol form
- Liquid-tight protective clothing to protect against splashes from liquid industrial chemicals (splash suit in line with EN 14605)
- Butyl gloves
- Protective footwear against chemicals (boots)
- Protective mask with two ABEK2-Hg-P3 filters
- Liner gloves for better grip when wearing the protective gloves
- Functional socks for better grip in the protective footwear
- Carry case for mask and filter

The liquid-tight protective clothing is very well-suited to sampling thanks to its low weight and wide-band retention capacity. It should be noted that the overgarment should only be used if chemical agents are present in vapour or aerosol form. The filters are ABEK2-Hg-P3 and also offer a wide-band retention capacity.

The protective gloves are made from butyl rubber and are the same as those for use with gas tight chemical protective suits. The same applies to the protective boots, which are made from a mixture based on butyl rubber.

| Type | Definition | Norm |
|---|---|---|
| 1 | Protective clothing against hazardous solid, liquid and gas chemicals, including liquid aerosols and solid particles – Part 1: Performance requirements for type 1 (gas-tight) chemical protective clothing. Part 2: Performance requirements for gas-tight (type 1) chemical protective suits for emergency teams (ET) | EN 943-2<br>EN 943-1 |
| 3 | Full-body protective clothing with liquid-tight seams between the various parts of the clothing, if applicable, liquid-tight joins between the components (gloves, visors etc.) Protective clothing against liquid chemicals – Performance requirements for chemical protective suits with liquid (type 3) or spray-tight (type 4) seams between the parts of the clothing, including the pieces of clothing that only protect part of the body (types PB 3 and PB 4) | EN 14605 |
| 4 | Full-body protective clothing with spray-tight seams between the various parts of the clothing, if applicable, spray-tight joins between the components (gloves, visors etc.) Protective clothing against liquid chemicals – Performance requirements for chemical protective suits with liquid (type 3) or spray-tight (type 4) seams between the parts of the clothing, including the pieces of clothing that only protect part of the body (types PB 3 and PB 4) | EN 14605 |
| 5 | Full-body protective clothing that covers the trunk, body and legs, and provides a barrier against suspended airborne particles. Protective clothing against solid particles – Part 1: Performance requirements for chemical protective clothing, which offers protection against airborne solid particles for the whole body (clothing type 5) | EN ISO 13982-1 |

| Type | Definition | Norm |
|---|---|---|
| 6 | Full-body protective clothing that covers at least the body and limbs, and protects against some spray, liquid aerosols and small, low-pressure splashes, where no permeation barrier is required. Protective clothing against liquid chemicals – Performance requirements for chemical protective clothing offering limited protection against liquid chemicals (equipment type 6 and type PB 6) | EN13034 |

**Table 5:** Classification of chemical protective suits in line with EN

## 4.3 Decontamination

The various different properties of the multitude of chemicals make it impossible to prescribe a universally applicable means of decontamination. Assistance from an expert adviser should be sought when deciding whether it is possible to conduct a successful decontamination of a chemical protection suit in the case of the specific contamination in question. In order to remove external contamination from the primary packaging, in many cases washing thoroughly with lukewarm water to which a detergent (surfactant) has been added is recommended. Experts from the ATF can be contacted by telephone around the clock via the GMLZ (Joint Federal State Situation and Reporting Centre) or the TUIS (Transport Accident Information and Assistance System for the chemical industry). Depending on the point of contact, information can be provided regarding how to deal with hazardous substances, goods and their characteristics, or their disposal (Appendix 8.9.1).

## 4.4 Conducting the C-sampling

The C-sample can be taken directly from the air, from exposed surfaces or leaking substances. A cloud of hazardous substances will contaminate the ground, bodies of water, the surfaces of objects and vegetation etc.

The sample location and the samples are selected based on the following criteria:

- Suitable areas lie in the measured propagation area of a cloud and are protected from direct sunlight.
- The sample location should be representative of the overall contamination; several sample points may be selected.
- The individual sample points at the sample locations must be clearly marked and distinguishable.
- Substance samples should avoid contamination from materials that occur naturally at the sample location.
- Depending on the type of chemical and the location and area of propagation, specific instruction should be provided regarding the type, location and scope of the sampling by the responsible authorities. Recommended quantities are provided in Table 6.

**Recommendations for the minimum quan-**

| Type of sample | | Quantity/Volume/Area/Stroke rate |
|---|---|---|
| Solid samples<br>Powder and granulate | C01 | 10-20 ml (approx. 5 heaped spoons) |
| Pastes | C02 | 2 x spatula length – front and rear side) |
| Soil, snow samples | C03 | Standard = 10 cm x 10 cm<br>(larger areas upon instruction) |
| Vegetation samples | C04 | 2 litres of cut vegetation<br>(slightly bulging filled sample bag) |
| Wipe sample | C05 | Standard = 20 cm x 20 cm<br>(larger areas upon instruction) |
| Water samples | C06 | 500 ml (several bottles upon instruction) |
| Water samples<br>(depends on depth) | C07 | 500 ml (several bottles upon instruction) |
| Liquid samples, coverings or puddles | C08 | with 1-5 filled pipettes, more with absorbent tip in case of larger puddles |
| Gas samples | C09<br>and<br>C10 | Sampling 1 1 stroke<br>Sampling 2 10 strokes |

**Table 6:** Recommended minimum quantities for chemical sampling

The following descriptions of C01 to C10 do not mention preparation, wrap-up, documentation or decontamination. This information can be found on the relevant operating sheets.

### 4.4.1 Solid samples C01

**Powder, granulate**

If powder or granulate is present, C01 for solid samples should be applied. A distinction should be made here between visible amounts (small piles) and solids

that have been distributed thinly across a larger area. A larger proportion of foreign matter should be avoided.

If a powder has been distributed thinly across a large area, it can be pushed together using a laminated sheet (e.g. laminated work instruction) or something similar so that it is easier to collect with the spatula.

A partial amount of approx. 10-20 ml – approx. 5 heaped spoonfuls – is to be taken from the powder and placed in a 100 ml glass bottle.

**Fig. 9:** Suitable sampling materials for solids (from bottom to top): scoop, crucible tongs, small spoon spatula, large spoon spatula, tweezers

Larger samples of adherent powder should be packed in a 500 ml glass bottle.

The spoon spatula can be used to take samples of powders and other looser forms. The crucible tongs serve to lift larger objects; whilst the tweezers are for smaller items (Fig. 9).

Both the area/ground and air temperature are to be taken using a thermometer for the sample parameters. Furthermore, the pH value of the substance should be taken using a damp strip of pH paper.

All values are to be recorded on the accompanying form.

### 4.4.2 Pastes C02

Paste-like materials are sampled as described in operating sheet Pastes C02. If the sample is sufficiently liquid – thin-liquid layer – follow the instructions for sampling C08 liquid samples, coverings or pools.

Use a plastic spatula to pick up 5-10 ml – approx. 2 x spatula length – and fill a 100 ml glass bottle. In the case of strongly adhesive pastes, the spatula can be placed in the glass bottle too; this may require using a 250 ml or 500 ml bottle instead. The entire spatula should be included – do not break the spatula or cut it.

Both the area/ground and air temperature are to be taken using a thermometer for the sample parameters. Furthermore, the pH value of the paste should be taken using a damp strip of pH paper.

All values are to be recorded on the accompanying form.

### 4.4.3 Soil and snow samples C03

When it comes to taking soil and snow samples, an area of 10 x 10 cm is marked using a tape measure or set square as described in the operating sheet. Material is scooped out from the upper surface to a depth of 2 cm within the markings using a spoon spatula or scoop and then placed in a 250 ml glass bottle using a powder funnel and seal the bottle.

Both the snow/soil and air temperature are to be taken using a thermometer for the sample parameters. Furthermore, the pH value of the soil or snow should be taken using a damp strip of pH paper.

All values are to be recorded on the accompanying form.

### 4.4.4 Vegetation samples C04

When it comes to taking vegetation samples, leaves from the outer part of the tree/bush should be cut off using combination scissors where possible and packed in a sample bag. Approx. 2 litres of cuttings should be taken and placed in the sample bag (equivalent to a slightly bulging bag).

In order to avoid cross contamination, turn the sample bag inside out and place your hand inside. Use the bag to collect the cut leaves and package securely by turning the bag back the right way round.

Be aware that hard, pointed pieces of vegetation, e.g. branches and thorns, may perforate the sample bag. It may be necessary to place an additional sample bag over the first bag or to use a bottle rather than a bag.

Use a thermometer to take the air temperature as a sample parameter. Furthermore, the pH value of the surface of the vegetation should be taken using a damp strip of pH paper.

All values are to be recorded on the accompanying form.

### 4.4.5 Wipe samples C05

A wipe sample is used for surface contamination. Standard procedure is to use the tape measure or set square on the operating sheet to mark an area of 20 x 20 cm. The selected surface should be reasonably level and smooth. Furthermore, no layers of paint should be removed during sampling.

A dry wipe is attempted first. If the material to be sampled remains adhered to the surface, a solvent should be used. This could be distilled water or ethanol. This should be discussed with the expert adviser in advance, depending on the situation. If the substance is unknown, two wipe samples should be taken – one with distilled water and one with ethanol. These samples should be taken from different sample points.

In order to carry out a wipe sample, wipe a round paper filter (Fig. 23) over the contaminated area, pressing only very lightly, as shown in Fig. 10. If a solvent is to be used, first moisten the filter paper with the relevant solvent and then wipe the area. Following the sample, the paper is folded so that the contaminated side is on the inside, and placed in a 100 ml glass bottle. A blind sample – filter paper, either dry or soaked in solvent, depending on how the sample was taken – is to be placed in a separate 100 ml glass bottle.

Record any changes to the surface during sampling in the protocol.

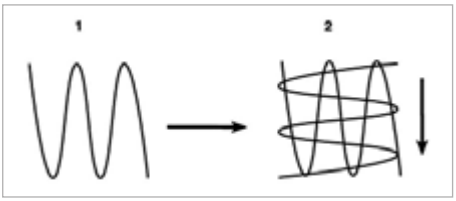



**Fig. 10:** Carrying out a wipe sample, area 20 x 20 cm

A larger sample area may be prescribed in special cases.

Use a thermometer to take the air and surface temperature as sample parameters. Furthermore, the pH value of the surface should be taken using a damp strip of pH paper.

All values are to be recorded on the accompanying form.

### 4.4.6 Water samples C06

This procedure describes taking a sample to determine the chemical substances contained in the water.

If possible, all of those materials that could come into contact with the water sample should be rinsed with the water being sampled prior to sampling taking place.

There are two different methods for taking water samples:

- If the water is sufficiently deep, open a 500 ml glass bottle, place below the surface of the water and wait until there are no more air bubbles. Close the bottle below the surface of the water. The measuring cup should also be filled with an additional 100 ml of the water being sampled.

- If the water depth is too low for this, use the scoop or ladle to remove water and fill a 500 ml glass bottle using the powder funnel. Overfill the bottle and try to Close without any air bubbles. Approx. 100 ml of the water should remain in the measuring cup.

Any films or coverings on the water surface should be sampled in line with operating sheet C08 liquids, coverings or puddles.

In special cases, it may be necessary under instruction to fill additional glass bottles using the same procedure.

Use a thermometer to take the air and water temperature as sample parameters. Furthermore, the pH value of the water should be taken using a damp strip of pH paper. The water temperature and pH value are calculated in the remaining water in the measuring cup.

All values are to be recorded on the accompanying form.

### 4.4.7 Water sample (specific depth) C07

All of the instructions listed in C06 are to be carried out here prior to sampling.

The actual sampling takes place using the water sampling device.

The water sampling device (Fig. 11) comes in several parts and consists of a 250 ml polyethylene bottle, the apparatus with clamp and weight for securing the bottle, the removable bottle top with holes, and two ropes rolled in one roll. The white rope is used to release the weight with the bottle. The yellow rope opens the bottle top, thus allowing the liquid to flow into the bottle through various openings at the desired depth.

To take the sample, use the white rope to lower the bottle to the desired depth, hold the sampling device securely by the white rope in one hand and use the second hand to open the bottle top by pulling the yellow rope against the spring resistance. Close the bottle by releasing the tension in the yellow rope. Finally, raise the device by pulling the white rope.

In order to make it easier to estimate the depth, it is recommended that the white rope be marked, e.g. every 0.5 metres. Take a note of the sampling depth. The sample is then poured into a 500 ml glass bottle. The depth-specific sampling procedure is repeated until the 500 ml glass bottle overflows, with as few air bubbles as possible, and with the measuring cup holding the excess water (approx. 100 ml).

**Fig. 11:** Water sampling device for removing water from a specific depth

In special cases, it may be necessary under instruction to fill additional 500 ml glass bottles using the same procedure.

Use a thermometer to take the air and water temperature as sample parameters. Furthermore, the pH value of the water should be taken using a damp strip of pH paper. The parameter determinations are calculated immediately in the remaining water in the measuring cup.

All values are to be recorded on the accompanying form.

### 4.4.8 Liquid samples, coverings or puddles C08

Small amounts of liquids, e.g. a puddle or pool, liquid coverings, films of liquid on various surfaces, flowable/slightly viscose pastes etc. can either be collected using a syringe, pipette or scoop and placed in a 100 ml glass bottle. Very small samples should be taken using the pipette – the tip of the pipette should be bent and removed with a cable tie. Place the pipette spout downwards in a 100 ml glass bottle and screw together (Fig. 12 and 13).

**Fig. 12:** Disposable pipette; the tip is bent to close

**Fig. 13:** Placing the pipette and sample in a glass bottle

Use a thermometer to take the air and liquid temperature as sample parameters. Furthermore, the pH value of the liquid should be taken using a damp strip of pH paper.

All values are to be recorded on the accompanying form.

### 4.4.9 Gas samples C09/C10

**Hand pump (gas detection pump)**

Pumps are required to draw the required amount of air into the tubes. A manual hand pump can be found in the detection equipment. The following should be noted when using the pump:

- The pump must be checked for impermeability directly prior to sampling. To do this, place an unopened tube in the pump's tube opening, fully compress the pump bellows and then release. Upon release, the bellows should stay in the same position for one whole minute. If the bellows expand, the pump is not impermeable and must be repaired in line with the operating manual.

- Next, the suction power must be calculated. To do this, compress the pump bellows. When released, they should jerk back to their original position.

After each completed sampling, the pump should be compressed without a tube to rinse it with air.


**Fig. 14:** Government-issue CBRN equipment with hand pump (1) and tube opener (2), silica gel sorbent tube (3) and direct-reading short-term measuring tube for carbon monoxide (4) and phosgene (5)

The sampling equipment features two types of sorbent tubes with different carrier materials (Fig. 14):

**Silica gel tubes type G (C09):**

The silica gel tubes are suitable for taking samples of methanol, ethanol, phenol, formic acid and acetic acid, etc.

**Tenax® tubes (C10):**

The sorbent tubes are filled with a polymer as an absorption material. They can be used to sample a range of organic substances. Air humidity has a very limited effect on Tenax® tubes.

As it is almost impossible for a non-chemically-trained sample taker to know which type of sorbent tube to choose in a situation with unknown gaseous substances, the following sampling strategy is recommended:

For each sample, 2 silica gel tubes **and** 2 Tenax® tubes are to be prepared in line with the operating sheet.

For sampling, the stroke rates listed in Table 7 are to be carried out for each sorbent tube:

| Instruction | Amount | Sorbent tubes | Stroke rate |
|---|---|---|---|
| C09 | 1 | Silica gel | 1 |
| C09 | 1 | Silica gel | 10 |
| C10 | 1 | Tenax® | 1 |
| C10 | 1 | Tenax® | 10 |

**Table 7:** Instructions for the sorbent tubes to be used during a gas sample, including stroke rates

The number of strokes may vary. The different stroke rates are used to compensate for differences in concentrations.

The tubes are to be labelled, including the stroke rate used, as described in the operating sheet. It should be noted that the tubes are not to be drawn on or labelled directly.

In order to ascertain whether unused tubes have been contaminated, a sorbent tube labelled as a blind sample is to be provided for every type of sorbent tube for analysis purposes. Blind tubes are the same as the sorbent tubes – ideally from the same packet, stored and transported under identical conditions as the tubes used for sampling. This means that three tubes are required for each type of sample.

The government-issue Tenax® tubes PAS T-Sorb are vacuum-packed in packets of three (1 packet = 1 sample). In addition, one packet contains a single replacement tube.

**Fig. 15:** Vacuum packaging, each containing three Tenax® tubes

The sample should be taken approx. 1.5 metres above the ground. A suitable distance in the direction of the wind is to be maintained from large buildings, trees etc. wherever possible (approx. 5-10 times the height).

In enclosed spaces, samples should be taken 1.5 m above the ground, directly above the ground and under the ceiling.

In order to protect the tubes against additional external contamination, fresh disposable gloves should be worn over the normal protective gloves.

A full weather support message should be provided as a sample parameter. Furthermore, the pH value of the air should be taken using a damp strip of pH paper.

All values are to be recorded on the accompanying form.

**Direct-reading short-term measuring tubes**

Although direct-reading short-term measuring tubes are not, strictly speaking, used for sampling, they should be mentioned here for the sake of completeness. They bridge a gap in the scope of detection offered by the electronic measuring devices on the CBRN reconnaissance vehicles.

The sample conditions, sample framework conditions, reaction mechanisms and results analysis are all described in detail in the instruction leaflets and must be implemented accordingly.

It is recommended that the loaded tube be photographed on a piece of white paper in order to document the colour change.

## 4.5 Other useful accessories for C-sampling

### Detection powder

Detection powder (Fig. 16) is used to detect chemical agents or an acid with a colour change from yellow to red. It can take up to one minute. The powder is spread generously across the area that is suspected to be contaminated.

The powder has a very non-specific reaction and reacts differently to many different substances. This should be taken into account during use. The chemical agent detection paper (Fig. 16) offers more precise proof of chemical agents.


**Fig. 16:** Chemical agent detection paper (left) and tin of detection powder (right)

### Detection paper for chemical agents

The detection paper is suitable for detecting liquid, sedentary chemical agents on surfaces. Upon contact, the paper changes colour in line with the key on the inside

of the cover (Table 8). Despite this and as with the detection powder, the results are comparatively non-specific.

The detection paper reacts to even very small amounts of chemical agents.

| Detection paper | | | | |
|---|---|---|---|---|
| Beige | ➡ | Yellow-ochre | ⇨ | G-agent (nerve agent) |
| | ➡ | Red | ⇨ | H-agent (blister agent) |
| | ➡ | Dark green | ⇨ | VX-agents |
| | ➡ | Beige | ⇨ | Acids |

**Table 8:** Colour change of chemical agent detection paper in the presence of liquid G-, H- and V-agents.

### Universal indicator paper

The universal indicator paper (Fig. 17) is suitable for determining the pH value of liquids, solids and gases. The pH range spans from one to eleven.

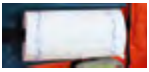
In order to carry out a pH value measurement, the upper part of the box is rotated anti-clockwise. Remove the desired strip length, turn the lid back again and tear off the strip. The strip should be moistened with distilled water and placed in contact with the sample medium. The moist strip is then compared with the colour scale on the box to determine the corresponding value. Suspensions, coloured or highly viscous sample liquids can be dropped onto a moist pH paper strip. The back of the strip should then be compared with the scale. pH sticks are also a good alternative. Highly reactive substances, e.g. concentrated sulphuric acid, will destroy the colouring and, possibly, the carrier paper too. In this case, it is impossible to take a reading.


**Fig. 17:** Universal indicator paper, pH range 1-11

### Aluminium foil

The government-issue equipment contains a roll of aluminium foil. This is used to wrap sample bottles in a light-proof way to protect them from light. Brown glass bottles are an alternative to this. However, in this case, cloudiness and colourations within the liquid inside the bottle are not visible without opening the bottle.

## 4.6 Brief instructions for C-sampling

| Solid sample: Powder/granulate | | C01 |
|---|---|---|
| **List of materials** | | |
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Glass bottle, 100 ml |  |
| | Aluminium foil |  |
| | Paper towels |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Spoon spatula |  |
| | Scoop |  |
| | Powder funnel |  |
| | Tweezers with hook |  |
| | Thermometer, glass |  |

## Solid sample: Powder/granulate C01

**Note: Wear disposable gloves**

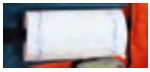
**Conducting the sampling**

| | | |
|---|---|---|
|  | • Position powder funnel<br>• Use a spoon spatula or scoop to fill the glass bottle with sample material | A |
|  | Bottle<br>• Close<br>• Clean from the outside<br>• Affix completed label | B |
|  | • Cover bottle with light-proof aluminium foil | C |
|  | • Measure pH of the sample using moistened pH paper strip<br>• Calculate air and ground temperature | D |
|  | • Complete accompanying form | E |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | F |
|  | • Carry out decontamination | G |

Store sample in a cool and, ideally, dark place

## Pastes C02

**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Glass bottle, 100 ml |  |
| | Aluminium foil |  |
| | Paper towels (kitchen roll) |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Plastic spatula |  |
| | Tweezers with hook |  |
| | Thermometer, glass |  |

| Pastes | C02 |
|---|---|

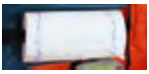
**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Fill 100 ml glass bottle with material using plastic spatula<br>In the case of highly viscous, adhesive pastes, the spatula can be left in the bottle. Ensure the bottle is large enough in this case. | A |
|  | Bottle<br>• Close<br>• Clean from the outside<br>• Affix completed label | B |
|  | • Cover bottle with light-proof aluminium foil | C |
|  | • Measure pH of the sample using moistened pH paper strip<br>• Calculate air and ground temperature | D |
|  | • Complete accompanying form | E |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | F |
|  | • Carry out decontamination | G |

Store sample in a cool and, ideally, dark place

## Soil and snow samples C03

| List of materials | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Glass bottle, 250 ml |  |
| | Aluminium foil |  |
| | Paper towels |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Spoon spatula |  |
| | Scoop |  |
| | Powder funnel |  |
| | Tape measure |  |
| | Tweezers with hook |  |
| | Thermometer, glass |  |

## Soil and snow samples C03

**Note: Wear disposable gloves**

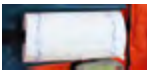
**Conducting the sampling**

| | | |
|---|---|---|
|  | • Measure out 10 cm x 10 cm area with tape measure or set square<br>• Remove at least max. 2 cm deep with scoop or spoon spatula | A |
|  | • Place powder funnel over 250 ml glass bottle<br>• Fill with material | B |
|  | Bottle<br>• Close<br>• Clean / dry from the outside<br>• Affix completed label | C |
|  | • Cover bottle with light-proof aluminium foil | D |
|  | • Measure pH of the sample using moistened pH paper strip<br>• Calculate air and ground temperature | E |
|  | • Complete accompanying form | F |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press out air<br>• Close so it is watertight | G |
|  | • Carry out decontamination | H |

Store sample in a cool and, ideally, dark place

## Vegetation samples C04

**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Paper towels |  |
| | pH paper |  |
| | Decontamination packaging |  |
| | Tweezers with hook |  |
| | Combination scissors |  |
| | Thermometer, glass |  |

## Vegetation samples C04

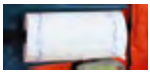
**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Cut vegetation with combination scissors | A |
|  | • Fill sample bag full with cuttings (min. 2 litre)<br>• Press/squeeze air out of the bag | B |
|  | • Close<br>• Clean<br>• Dry<br>• Affix completed label | C |
|  | • Calculate pH value by placing moistened pH paper strips on the surface of the vegetation<br>• Calculate air temperature | D |
|  | • Complete accompanying form | E |
|  | • Place sample bag and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | F |
|  | • Carry out decontamination | G |

Store sample in a cool and, ideally, dark place

## Wipe samples C05

| List of materials | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Paper towels |  |
| | Glass bottle, 100 ml |  |
| | Round filter |  |
| | PE bottle,<br>500 ml dist. water or ethanol 70% |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Tape measure |  |
| | Tweezers with hook |  |
| | Thermometer |  |

## Wipe samples C05

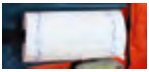
**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Measure out 20 cm x 20 cm sampling area with tape measure or set square<br>Use larger area if instructed | A |
|  | • Wipe marked area dry with filter paper | B |
|  | If no results:<br>• use solvent – dist. water and/or ethanol | B1 |
|  | • Fold filter so the wiped side is on the inside<br>• Pack into an empty 100 ml glass bottle | C |
|  | • Close<br>• Affix completed label | D |
|  | • Measure pH of the sample using moistened pH paper strip<br>• Calculate air and ground temperature | E |
|  | • Complete accompanying form | F |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | G |
|  | • Carry out decontamination | H |

Store sample in a cool and, ideally, dark place

## Water samples C06

| List of materials | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Glass bottle, 500 ml |  |
| | Aluminium foil |  |
| | Paper towels (kitchen roll) |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Dipper |  |
| | Measuring cup |  |
| | Powder funnel |  |
| | Tweezers with hook |  |
| | Thermometer, glass |  |

| Water samples | C06 |
|---|---|

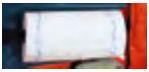
**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Rinse materials with the water to be sampled<br>Note: Do not pour water back over sample site | A |
|  | • Hold 500 ml glass bottle below the surface of the water<br>• Close with lid whilst underwater | B |
|  | • Place funnel over 500 ml glass bottle<br>• Overfill bottle with measuring cup or dipper, and close with as few air bubbles as possible | If B not possi-ble |
|  | • Close<br>• Clean / dry from the outside<br>• Affix completed label | C |
|  | • Cover bottle with light-proof aluminium foil | D |
|  | • Calculate pH value of the sample in measuring cup<br>• Calculate temperature of the sample in measuring cup | E |
|  | • Complete accompanying form | F |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | G |
|  | • Carry out decontamination | H |

Store sample in a cool and, ideally, dark place

## Water sample (specific depth) C07

| List of materials | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Glass bottle, 500 ml |  |
| | Aluminium foil |  |
| | Paper towels (kitchen roll) |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Water sampling device |  |
| | Powder funnel |  |
| | Tweezers with hook |  |
| | Thermometer, glass |  |

## Water sample (specific depth) C07

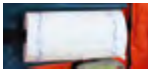
**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Lower water sampling device to the prescribed water depth<br>• Fill device, measuring cup and 500 ml glass bottle with water to be sampled<br>Note: Do not pour water back over sample site | A |
|  | • Place funnel over 500 ml glass bottle<br>• Fill glass bottle with water<br>• Pour remaining water into measuring cup | B |
|  | Bottle<br>• Close<br>• Clean / dry from the outside<br>• Affix completed label | C |
|  | • Cover bottle with light-proof aluminium foil | D |
|  | • Calculate pH value of the remaining water sample in measuring cup<br>• Calculate air and ground temperature | E |
|  | • Complete accompanying form | F |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | G |
|  | • Carry out decontamination | H |

Store sample in a cool and, ideally, dark place

## Liquid samples, coverings or pools C08

| List of materials | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Aluminium foil |  |
| | Glass bottle, 100 ml |  |
| | Paper towels (kitchen roll) |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Pipette |  |
| | Measuring cup |  |
| | Absorbent tip |  |
| | Tweezers with hook |  |
| | Thermometer, glass |  |

## Liquid samples, coverings or pools C08

**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Collect the liquid using the tip or pipette | A |
|  | • Fill 100 ml glass bottle<br>If using a pipette, add pipette to the glass bottle too | B |
|  | Bottle<br>• Close<br>• Clean from the outside<br>• Affix completed label | C |
|  | • Cover with aluminium foil | D |
|  | • Calculate pH value of the sample<br>• Calculate air and ground temperature | E |
|  | • Complete accompanying form | F |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | G |
|  | • Carry out decontamination | H |

Store sample in a cool and, ideally, dark place

## Silica gel air samples C09

| List of materials | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Aluminium foil |  |
| | pH paper |  |
| | Detection pump |  |
| | Tube opener |  |
| | Decontamination packaging |  |
| | Silica gel sorbent tube |  |
| | Sealing caps for sorbent tubes |  |
| | Tweezers with hook |  |
| | Thermometer, glass |  |

## Silica gel air samples C09

**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Check seal and suction power of hand pump | A |
|  | • Open tubes on both sides with tube opener | B |
|  | • Place tube in position, noting direction of arrow<br>• Sample 1; 1 x 1 stroke, sample 2: 1 x 10 strokes | C |
|  | • Close tubes at both ends with sealing caps | D |
|  | • Cover tubes with aluminium foil so it is light-tight, and stick on completed label<br>Note: Do not label the tubes directly | E |
|  | • Place sorbent tube 1 stroke, 10 stroke and blind tube in sample bag<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | F |
|  | • Measure pH value of the air using moistened pH paper strip<br>• Calculate air temperature | G |
|  | • Complete accompanying form<br>Full weather support message and number of strokes | H |
|  | • Place sample bag and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | I |
|  | • Carry out decontamination | J |

Blind sample: Unopened sorbent tube from same batch
Store sample in a cool and, ideally, dark place

## Tenax® air samples C10

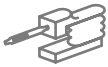
**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | pH paper |  |
| | Tweezers with hook |  |
| | Detection pump |  |
| | Decontamination packaging |  |
| | Tenax® sorbent tubes (pack of three) |  |
| | Thermometer, glass |  |

## Tenax® air samples C10

**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Check seal and suction power of pump | A |
|  | • Open vacuum packaging with three tubes | B |
|  | • Remove tubes from the glass tube with screw lid<br>• Note down numbers | C |
|  | • Position tubes (arrow points in direction of the pump)<br>• Tube 1: 1 x 1 stroke, tube 2: 1 x 10 strokes | D |
|  | • Put back in glass tube and close screw lid | E |
|  | • Stick completed label on glass tube | F |
|  | • Place tube and blind sample in sample bag<br>• Press/squeeze air out of the bag<br>• Close | G |
|  | • Measure pH value of the air using moistened pH paper strip<br>• Calculate air temperature | H |
|  | • Complete accompanying form<br>Full weather support message and number of strokes | I |
|  | • Place sample bag and protocol bag in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | J |
|  | • Carry out decontamination | K |

Blind sample: Unopened sample tube from same batch
Store sample in cool and dark place

# B-sampling

5

## 5.1 Recommendations for B-operations

Sampling in the case of suspected biological agents may be required as part of an accidental or intentional release of the agents in question, or in the case of an epidemic outbreak or abnormal spread of illness. It may also be necessary to take a sample or to take certain steps in conjunction with other emergency response personnel in response to police intelligence regarding suspicion of a dangerous biological situation.

Dangerous biological situations can cause great unrest amongst emergency response personnel, as the real-time, on-site detection of possible B-agents is not yet good enough, unlike for chemical or radioactive/nuclear hazards. In order to find out more about the presence or absence of the suspected agent, it is necessary to take targeted samples and to investigate these samples further in mobile or stationary laboratories.

## 5.2 Protecting the emergency response personnel

The greatest risk of being infected by biological agents is via the airways and mucous membranes, through food intake and, in the case of some agents, through damaged skin (e.g. cutaneous anthrax). As such, protecting the airways and eyes is crucial. In addition, the body must be protected by way of suitable clothing. Suitable protective clothing must be provided as part of the operational planning, and personnel must be trained in its use on a regular basis. Protective equipment is classified under personal protective equipment as stated in the Regulation (EU) 2016/425 of the European Parliament and of the Council of the 9th March 2016. The regulation specifies three different categories.

Category I: This encompasses basic protective equipment for low health risks. Manufacturers provide an EU declaration of conformity with this equipment. It incorporates the provision of technical documentation and the obligation of the manufacturer to adhere to specific requirements in the manufacturing process. CE type tests are not required; the items come with a non-numbered CE label.

Category II: This includes protective suits for which the technical design of the PPE is investigated and checked by a notified body. An EU CE type test is carried out on a sample PPE. The CE label includes the ID number from the authority, which carried out the CE type test.

Category III: This applies to protective equipment used to protect against dangers that could be fatal or could pose serious health risks. The protective equipment used in dangerous biological situations is solely from Category III. In addition to the requirements for categories I and II, an additional quality monitoring of the suits is carried out. This takes place by way of spot checks of the suits and materials as part of audits. The results are communicated to the manufacturers in the form of a report. The CE label includes the ID number from the authority, which carried out the CE type test.

For recommendations concerning protective equipment see Resolution 45/2011 from the ABAS (Committee for Biological Substances) from 05.12.2011, BGI/GUV-I 8676 June 2009, vfdb 0806, GUV R189 (updated edition 2007), GUV R190 (2011) and the "Biologische Gefahren 1" (Biological Hazards 1) handbook. Further information concerning choosing PPE can be found on the pages of the Robert Koch Institute

website.
http://www.abig.rki.de/ABiG/DE/Content/Informationen/Schutzmassnahmen/Schutzkleidung/Schutzkleidung_node.html (as on 09.03.2016)

The proper decontamination and removal of the protective clothing / undressing should be ensured following the operation. See the "Biologische Gefahren 1" (Biological Hazards 1) handbook and other literature for specific procedures and the correct order for undressing to minimise the spread of contamination. Incident command is responsible for selecting the protective equipment to be used on a case-by-case basis. The emergency response personnel must be familiar with the protective equipment that is used.

## 5.3 Packaging P 620 for class A agents and transport in line with ADR

**Inner packaging**

The inner packaging consists of a liquid-proof primary bottle (Fig. 18-1) and a secondary packaging (Fig. 18-3). Absorbent padding is inserted between this packaging: This padding must be able to fully absorb any liquid that escapes.

At least one of the containers must be approved as category 6.2 packaging. This means that, regardless of the transport temperature:

- Stable with an internal pressure of 95 kPa,
- Resistant to temperatures from -40°C to +55°C without leakages, authorised by the Federal Institute for Materials Research and Testing (BAM).

In the case of packaging to be purchased, this authorised container (Germany-only) is generally the secondary container of the inner packaging.

**Primary container**

The inner packaging comprises the primary container (Fig. 18-1); it could be a bottle (glass or plastic), bag or special packaging. As the primary container is filled with the sample in the contaminated area, the outer surface is to be treated in line with the measures stipulated for B agents (see Chapter 2.5.1). Unless otherwise stated in the sampling instructions, the primary container is always to be packaged in a leakproof, sealable PE bag (Fig. 18-2) at the sample site, together with the accompanying form. It should be ensured that the bag contains as little air as possible when sealed. The bag is to be submerged in disinfectant at the decontamination point upon leaving the contaminated area. The sample material must not come into contact with disinfectant.

Following the required exposure time, the sample bag is removed from the disinfectant, the surface dried, and the samples placed in the secondary container (Fig. 18-3) of the inner packaging at the sample collection point. The person responsible for this remains in the non-contaminated area.

The secondary container is separated from the rest of the sampling equipment by its box. It is not taken into the contaminated area.

### Outer packaging

The outer packaging (Fig. 18-4) is a sufficiently rigid and sturdy shell (e.g. imprinted carton).


**Fig. 18:** Example packaging in line with P 620 (ADR): Sample container (1) = primary container, PE bag (2), secondary packaging (3) and external packaging (4) (carton)

## 5.4 Disinfection in the contaminated area

The sampling team should take a pressurised spray bottle with freshly mixed disinfectant with them so that they can spray surfaces. If the outer gloves are contaminated, the gloves should be replaced. Prior to replacing the gloves, the pair being swapped should be decontaminated. Disinfecting the gloves can damage the glove material, which may have a negative effect on their durability and elasticity when used in the future. In addition, it is difficult to grip items securely with moistened gloves.

The outer pair of gloves should, therefore, be decontaminated and then replaced following every sampling and after any contact with items that may be contaminated. The inner packaging of the samples and the PE bag containing the samples which is to be passed out of the contaminated area should be covered with disinfectant when still in the contaminated area (Chapter 2.5.1). It should be checked in advance that the disinfectant does not affect the labelling of the samples.

**The label on the government-issue decontamination bag is not resistant to all detergents. It is, for example, not resistant to alcohol. Check in advance whether or not the disinfectant being used loosens the label. The label is resistant to per-compounds and aldehydes.**

The samples may be submerged at the decontamination point. A container with fresh disinfectant solution can be used to fully submerge the samples in the PE bag. This is positioned at the checkpoint between the contaminated area and the decontamination point. Pockets of air make the samples float, making it necessary to weigh the samples down. The samples are placed in designated containers by the sampling team at the decontamination point. Once the exposure time has passed, and depending on the

- disinfectant used,
- its concentration,
- the temperature,
- pH values,
- degree of contamination of the items being disinfected,

the samples can be removed by a decontamination assistant. The surface of the primary packaging is dried at the sample collection point (e.g. wiped with paper towels), and the samples are packed for transportation.

### 5.4.1 Disinfecting the sample bags and PPE

In the case of a B situation, it is necessary to decontaminate potentially contaminated PPE with a disinfectant that is able to effectively reduce the microbial load through chemical inactivation (by at least five powers of ten).

Peracetic acid is – based on the results of experiments from a research project commissioned by the BBK – a suitable means for decontaminating PPE suspected to be contaminated with B-agents. During testing, it achieved good results regarding the germ reduction for Bacillus spores (including Bacillus anthracis spores), viruses and even limited results for ricin.

Peracetic acid solutions are highly corrosive, including to plastics. It is not possible to advocate increasing the pH value through the addition of alkalis – as recommended by some manufacturers to reduce corrosiveness and the release of gases – if efficacy against Bacillus spores with short exposure times (≤ 5 min.) is to be achieved. The durability of non-disposable items must be investigated in advance.

Paracetic solution for the disinfection of PPE in the case of B incidents (decon P):

A two-percent solution of peracetic acid with 0.2% SDS (sodium dodecylsulphate) surfactant quantity has been proven effective with an exposure time of five minutes. Other peracetic acid products, such as technical peracetic acid, have not been tested.

The surfactant-containing detergent Alcapur® N can be combined with 0.5% peracetic acid solution to create an alternative to SDS. As Alcapur® N – in contrast

to the products Alcapur® and Alcapur® E (all Alcapur products are offered by the manufacturer as add-on products for Wofasteril® solutions) – does not contain any sodium hydroxide, the pH value remains in the highly acid range. As such, adding Alcapur® N does not inhibit the spore-killing properties of the peracetic acid.

The solution can be sprayed on or applied through pouring or douching, and should be distributed with a soft brush so that the suit is completely covered. Spraying (light pressure to avoid secondary aerosoling) increases the likelihood that even difficult to reach areas are sufficiently covered (e.g. under the arms, between the legs, in folds in the fabric). The PPE is covered with disinfection solution, which is then mechanically distributed, and then the PPE is covered again with disinfection solution for a total of five minutes. This method increases the likelihood that all parts of the suit are covered with a constant film of liquid. Wipe off roughly once the required exposure time has elapsed. The PPE is to be deposited at the decontamination point, packaged, labelled and disposed of. This should take place independently of the results of the B analysis – the materials may have become damaged during the operation and subsequent disinfection process.

Formula calculations for a solution for disinfecting PPE and devices
(for ten litres of disinfectant solution):

Take 9.45 litres of cold water and add 50 ml Alcapur® N, stir and add 0.5 litres of Wofasteril® E 400 (contains approx. 40% vol. peracetic acid). Be sure to follow the order as described. This is equivalent to a 2% vol. peracetic acid solution.

For the fire service, this means approx. 9.5 litres water plus 0.5 litres Wofasteril® E 400 and 50 ml surfactant (e.g. Alcapur® N).

Warning! The formulas using Alcapur are different from the usage recommendations issued by the manufacturer of Wofasteril and Alcapur. It is vital that the pH remains below 5.

This recommendation is based on the list of disinfectants and procedures tested and approved by the Robert Koch Institute from 31st August 2013, in the Appendix, concerning the disinfection of hydrophobic, (flexible) surfaces with a concentration of 5% Wofasteril E400 and 0.5% Alkapur N.

Exposure time: 5 min. Amount applied: ≥ 50 ml/m$^2$, Application: NBC.

The information provided is subject to the framework conditions described in the list.

Suitable decontamination of the sampling team upon leaving the contaminated operations area is to be adhered to, following the instructions of the incident commander and in consultation with the responsible authorities (e.g. health authority, veterinary authority) (see Chapter 2.3).

## 5.5 Conducting the B-sampling

Instruments that are as sterile as possible, and at a minimum clean, should be used to take samples of biological agents. In order to avoid cross contamination between two different samples, fresh disposable gloves should be worn at each sample point. Environmental samples should be packaged in disposable materials wherever possible, e.g. a PE bag or plastic bottle. The sampling sites are to be selected prior to operations by the incident commander in discussion with the responsible authorities.

Sampling at outdoor sites to investigate a spread of contamination in the direction of the wind should be conducted in line with the following criteria:

- Suitable spaces lie in the exposed/contaminated area.
- Spaces with a high likelihood of contamination are protected from environmental influences, e.g. the sun, and moisture.

Aerosol propagation means that, in some circumstances, invisible contaminations may be ascertained by sampling the exposed surfaces.

There will often not be any visible contamination. Depending on the location and area of propagation, specific instruction should be provided regarding the type, location and scope of the sampling by the responsible authorities (e.g. health authority or veterinary authority). In addition, the sampling should be agreed upon with the expert adviser. In some cases, the expert adviser may be the investigating laboratory. Recommendations for sample quantities can be found in Table 9.

## Recommendations for the minimum quan-

| Type of sample | | Quantity/Volume/Area |
|---|---|---|
| Solid samples | B01 | 10-20 ml (approx. 5 heaped spoons) |
| Pastes | B02 | 5-10 ml (approx. 2 x spatula length – front and rear side) |
| Soil samples | B03 | Standard = 10 cm x 10 cm, max. 2 cm depth (larger areas if instructed) |
| Vegetation samples | B04 | 2 litres of cut vegetation (slightly bulging filled sample bag) |
| Swab samples | B05 | Standard = 10 cm x 10 cm (larger areas if instructed) |
| Wipe sample compress | B06 | Standard = 10 cm x 10 cm (larger areas if instructed) |
| Liquid sample, larger quantities | B07 | 500 ml (several bottles upon instruction) |
| Liquid sample, small quantities | B08 | 50 ml, use all if little sample material available |
| Liquid sample, covering, puddles | B09 | 1-5 ml (filled pipettes), more in case of larger puddles |

**Table 9:** Recommended minimum quantities for biological sampling

### 5.5.1 Solid samples (powder and loose sample materials) B01

Wherever possible, only the suspicious substance should be collected at the sampling site.

In the case of small amounts of a suspicious substance, all of the material is to be collected in a container. If there is sufficient solid (powder, granulate etc.) sample material, a partial amount should be collected (max. 50 ml). This is either to be placed in a clean, unused PE bottle, or in a clean, unused PE bag. All objects shown in Fig. 9 are suitable for solid biological samples.

The spoon spatula can be used to take samples of powders and granulates. Laminated cards are also suitable: The material can be pushed together on the smooth surface. If they are sufficiently flexible, they can also be used for bottling.

### 5.5.2 Pastes B02

Pastes can either be collected with a plastic or stainless steel spatula, or with a spoon.

### 5.5.3 Soil samples B03

The top max. 2 cm of soil in an area of 10 cm x 10 cm is removed using a spoon spatula or a scoop, and placed in a PE bottle.

Note: If possible, soil samples should be avoided in favour of other samples, as they are difficult to process.

Other solids:

The crucible tongs and barbecue tongs are for lifting small stones and objects; the tweezers for smaller items.

### 5.5.4 Vegetation samples B04

Vegetation samples should be cut using the combination scissors or knife and packed in a sample bag. In order to avoid cross contamination, turn the bag inside out and place your hand inside. Use the bag to collect the cut leaves and package securely by turning the bag back the right way round. In the case of hard and pointed pieces of vegetation, a solid PE container should be used rather than a bag. There is a risk of perforation when using PE bags.

### 5.5.5 Wipe samples B05/B06

A wipe sample is taken in the case of contamination spread across surfaces.

**Wipe sample with swab B05**

When using a sterile swab without transport medium, the head of the swab must be moistened with physiological sodium chloride solution prior to taking the sample (Fig. 19).

The sample should be taken from an area measuring 100 $cm^2$. The moistened swab head is drawn over the area to be sampled in S or Z formations. The swab is rolled between the fingers whilst taking the sample, so that all sides of the foam head come equally into contact with the surface. The second time the swab is passed over the surface, it should be done at a 90° angle (Fig. 10).

Swabs with foam heads are better than cotton heads as they better fulfil the requirements concerning sterility.

**Fig. 19:** Sterile swab without transport medium with sterile sodium chloride solution

Exception: Taking samples from people

If it is suspected that people have been exposed to biological agents via the respiratory tract, it is a good idea to take swabs from the nose/mouth area. The samples should be taken from exposed, unprotected people in the green area following decontamination. These samples should only be taken by people with medical training.

### Wipe sample with compress B06

If sterile compresses are used for the wipe samples, they must first be moistened with sterile sodium chloride solution (Fig. 20). Swab samples are always preferred to wipe samples with compresses, as they are easier to process in the laboratory. Sterile cotton compresses can be obtained from pharmacies, laboratory suppliers etc. Compresses are also ideal for cleaning up afterwards and as retention samples.


**Fig. 20:** Sterile cotton wool compress with sterile sodium chloride solution

### 5.5.6 Liquid samples B07/08/09

The dipper or measuring cup can be used to take larger volumes of liquid (B07). The skimmed liquid should then be poured into a sample bottle (Fig. 21).

Smaller amounts of liquid or coverings on the surface of other liquids can be extracted using the tip (Fig. 21) or disposable pipette (B08). In addition, sterile compresses can be used to collect small amounts of liquid (B09). The method used should be noted in the protocol.

**Fig. 21:** Dipper, measuring cup and syringe for removing liquid samples

Additional samples, e.g. animal carcasses:

If there are suspicions of epizootic disease, the veterinary authorities should be contacted for further advice (e.g. bird flu, foot and mouth etc.).

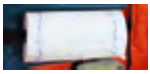
## 5.6 Packaging and transportation of biological samples

The provisions detailed in Chapter 5.3 apply to the transportation of biological samples.

The documents contained in the Appendix can be used as accompanying documents.

In the case of transportation times for biological samples lasting well over two hours, it should be ensured that the samples are kept suitably cool (2-8°C but free from frost and not below 0°C). Mechanically activated cool packs can be used for this purpose. Ideally, they should be packed between the decontamination and secondary packaging. Insulated boxes can also be used.

## 5.7 Brief instructions for B-sampling

| Solid samples: Powder/granulate | | B01 |
|---|---|---|
| **List of materials** | | |
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | PE bottle, 250 ml |  |
| | Spray bottle |  |
| | Paper towels |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Spoon spatula |  |
| | Scoop |  |
| | Powder funnel |  |
| | Tweezers with hook |  |

## Solid samples: Powder/granulate B01

**Note: Wear disposable gloves**

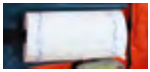
**Conducting the sampling**

| | | |
|---|---|---|
|  | • Position powder funnel<br>• Use a spoon spatula or scoop to fill the PE bottle with sample material | A |
|  | • Close | B |
|  | • Disinfect<br>• Dry<br>• Affix completed label | C |
|   | • Measure pH of the sample using moistened pH paper strip | D |
|  | • Complete accompanying form | E |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | F |
|  | • Carry out decontamination | G |

Store sample in a cool and, ideally, dark place

## Solid samples: Pastes B02

**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | PE bottle, 250 ml |  |
| | Spray bottle |  |
| | Paper towels (kitchen roll) |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Tweezers with hook |  |
| | Plastic spatula |  |

## Solid samples: Pastes B02

**Note: Wear disposable gloves**

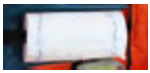
**Conducting the sampling**

| | | |
|---|---|---|
|  | • Use plastic spatula to fill PE bottle with material.<br>In the case of highly viscous, adhesive pastes, the spatula can be left in the bottle. Ensure the bottle is large enough in this case. | A |
|  | • Close | B |
|  | • Disinfect<br>• Dry<br>• Affix completed label | C |
|   | • Measure pH of the sample using moistened pH paper strip | D |
|  | • Complete accompanying form | E |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | F |
|  | • Carry out decontamination | G |

Store sample in a cool and, ideally, dark place

## Soil samples B03

**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Tape measure |  |
| | PE bottle, 250 ml |  |
| | Spray bottle |  |
| | Paper towels |  |
| | Decontamination packaging |  |
| | Scoop |  |

## Soil samples B03

**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Measure out 10 cm x 10 cm area with tape measure<br>• Remove at least max. 2 cm deep with scoop or spoon spatula | A |
|  | • Place powder funnel over 250 ml PE bottle<br>• Fill with material | B |
|  | • Close | C |
|  | • Disinfect<br>• Dry<br>• Affix completed label | D |
|  | • Complete accompanying form | E |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | F |
|  | • Carry out decontamination | G |

Store sample in a cool and, ideally, dark place

## Vegetation samples B04

| List of materials | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Spray bottle |  |
| | Waterproof pen (lab marker) |  |
| | Tape measure |  |
| | Decontamination packaging |  |
| | Combination scissors |  |

## Vegetation samples B04

**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Cut vegetation with combination scissors or knife | A |
|  | • Fill sample bag full with cuttings (min. 2 litre)<br>• Press/squeeze air out of the bag<br>• Close | B |
|  | • Disinfect exterior<br>• Dry<br>• Affix completed label | C |
|  | • Complete accompanying form | D |
|  | • Place sample bag and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | E |
|  | • Carry out decontamination | F |

Store sample in a cool and, ideally, dark place

## Wipe sample with swab B05

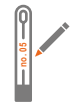
**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Tape measure |  |
| | Swab |  |
| | Outer packaging |  |
| | Sterile NaCl solution |  |
| | Decontamination packaging |  |

## wipe sample with swab B05

**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Label swab tube | A |
|  | • Rotate the swab to break the seal | B |
|  | • Open salt solution<br>• Moisten swab head | C |
|  | • Wipe surface<br>• Area: 10 cm x 10 cm | D |
|  | • Close swab<br>• Place in packaging<br>• Affix completed label | E |
|  | • Complete accompanying form | F |
|  | • Place packaging with swab and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | G |
|  | • Carry out decontamination | H |

Store sample in a cool and, ideally, dark place

## Wipe sample with compress B06

**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Tape measure |  |
| | Compress |  |
| | Sterile PE bag |  |
| | Sterile NaCl solution |  |
| | Tweezers |  |
| | Decontamination packaging |  |

## Wipe sample with compress B06

**Note: Wear disposable gloves**

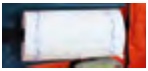
**Conducting the sampling**

| | | |
|---|---|---|
|  | • Tear off compress | A |
|  | • Moisten compress with salt solution in the open packaging | B |
|  | • Remove with tweezers | C |
|  | • Wipe surface<br>• Area: 10 cm x 10 cm<br>• Please state if area size different | D |
|  | • Pack compress in sterile PE bag | E |
|  | • Close<br>• Disinfect<br>• Dry<br>• Affix completed label | F |
|  | • Complete accompanying form | G |
|  | • Place sample and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | H |
|  | • Carry out decontamination | I |

Store sample in a cool and, ideally, dark place

## Water sample (surface) B07

**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | PE bottle, 250 ml |  |
| | Paper towels (kitchen roll) |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Dipper |  |
| | Measuring cup |  |
| | Powder funnel |  |
| | Tweezers with hook |  |
| | Thermometer, glass |  |

## Water sample (surface) B07

**Note: Wear disposable gloves**

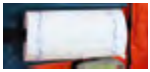
**Conducting the sampling**

| | | |
|---|---|---|
|  | • Place funnel on bottle<br>• Pour liquid from measuring cup or dipper into 250 ml PE bottle<br>Note: No more than half full | A |
|  | • Close bottle | B |
|  | • Disinfect<br>• Dry<br>• Affix completed label | C |
|  | • Measure pH of sample<br>• Calculate temperature of the sample | D |
|  | • Complete accompanying form | E |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | F |
|  | • Carry out decontamination | G |

Store sample in a cool and, ideally, dark place

## Liquids, small quantities B08

**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Spray bottle |  |
| | PE bottle, 250 ml |  |
| | Paper towels (kitchen roll) |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Pipette |  |
| | Syringe |  |
| | Tweezers with hook |  |

## Liquids, small quantities B08

**Note: Wear disposable gloves**

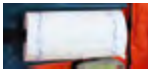
**Conducting the sampling**

| | | |
|---|---|---|
|  | • Collect the liquid using the pipette (or tip) | A |
|  | • Decant to 250 ml PE bottle<br>• Max. half full | B |
|  | • Close | C |
|  | • Disinfect<br>• Dry<br>• Affix completed label | D |
|   | • Measure pH of sample | E |
|  | • Complete accompanying form | F |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | G |
|  | • Carry out decontamination | H |

Store sample in a cool and, ideally, dark place

## Liquids coverings/puddles B09

**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Spray bottle |  |
| | Sterile PE bag |  |
| | Paper towels |  |
| | Decontamination packaging |  |
| | pH paper |  |
| | Compress |  |
| | Tweezers with hook |  |

## Liquids coverings/puddles B09

**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Tear off compress | A |
|  | • Absorb liquid with dry compress | B |
|  | • Fold compress using tweezers<br>• Place in sterile PE bag | C |
|  | • Close<br>• Disinfect<br>• Dry<br>• Affix completed label | D |
|   | • Measure pH of sample | E |
|  | • Complete accompanying form | F |
|  | • Place bottle and accompanying form in decontamination packaging<br>• Press/squeeze air out of the bag<br>• Close so it is watertight | G |
|  | • Carry out decontamination | H |

Store sample in a cool and, ideally, dark place

# RN-sampling 6

## 6.1 Recommendations for RN-sampling

Emergency response personnel like the fire service are only required to take samples in areas contaminated with radioactive materials in exceptional cases. Radioactive contamination can be detected on site. The ambient dose rate or the count rate are calculated on site using the relevant equipment (local dose rate meter, contamination monitoring device). Specially trained staff from the responsible regional authority will carry out nuclide identification and take any samples required. Nuclide identification can also take place directly on site (in-situ measuring procedure). There is no acute problem of time in this case. With regard the immediate danger aversion as far as civil protection is concerned, the statement "Contamination present or not" and the degree of this contamination (ambient dose rate, count rate) are of the utmost significance.

Sampling mainly comes into play for the purposes of conservation of evidence in special situations, e.g. if radioactive materials have entered flowing water, or to control contaminated/extinguishing water. For this reason, the only radiological samples that are relevant to the fire service are: vegetation samples, liquid samples and wipe samples. Removing material for on-site measuring, e.g. with the radiological measurement extension I (MER-1) on-board the CBRN reconnaissance vehicle, is not considered to be sampling in this context.

## 6.2 Protecting the emergency response personnel

During operations in areas contaminated with radioactive materials, it must be ensured that the radioactivity cannot be incorporated by the body and that the emergency response personnel are protected from contamination. Disposable suits approved in line with EN 1073-2 and made from as tear-resistant material as possible, gloves, overshoes and full masks with universal filters (ABEK2-P3) are generally sufficient for radioactivity. Alternatively, powered air purifying respirators (PAPR) can be used.

The emergency response personnel must act in accordance with the applicable fire service regulations and carry the appropriate measuring and warning devices with them. It can be a good idea to take a contamination monitoring device to help identify the best sample site. Protection measures in the RN area include: Maintaining distance from the source of the danger, minimising amount of time spent, planning and utilising screening.

## 6.3 Decontamination

In the case of contamination of people, the most effective measure is to remove the contaminated items of clothing (e.g. protective suits). Incorporating the radioactive substances should be avoided at all costs. Water or water with an added detergent is generally sufficient as a means of decontamination on site.

Furthermore, the ambient dose rate of the decontaminated packaging should be measured and documented on the accompanying form. Each sample should be brought to the edge of the cordoned off area in an additional transport bag (secondary packaging) and sealed tightly.

It must be ensured that the radioactive material does not spill onto the surface of the secondary packaging. A wipe sample (indirect proof of contamination) should be taken from the secondary packaging to prove it is free from contamination, and should be documented on the bag. The wipe test is evaluated at a location with a low zero rate – to be chosen in advance – with the help of the mobile contamination identification device. If it is ascertained that the surface of the secondary packaging is contaminated, it needs to be packaged in an additional bag. It is then necessary to carry out a further indirect proof of contamination using a wipe sample.

## 6.4 Conducting the RN-sampling

RN samples are only taken for liquids, wipe and vegetation samples. Samples for analysis or clearances are not to be taken by the fire service; but can be carried out to support the ordering authority.

The process for the sampling, the investigation, the analysis and the evaluation is to be ascertained in advance.

Note: Advance clarification should be sought with the laboratories to ascertain the maximum limit values for which samples should be taken (e.g. the maximum ambient dose rate). This must be taken into account when selecting the sample point, especially for liquids. If the dose rate is too high, the volume of samples should be restricted so that the limit value is adhered too, or sampling should be abandoned altogether. The laboratory should be contacted in the case of doubt.

The site should be viewed prior to sampling. The sampling is organised based on the radiological situation, in coordination with incident command. Ambient dose rate and contamination measurements must be taken.

The materials listed in Table 8 are required for sampling. The quantities listed for the samples should be taken to make analysis in the laboratory more straightforward.

**Recommendations for the minimum quan-**

| **Type of sample** | | **Quantity/Volume/Area** |
|---|---|---|
| Vegetation samples | RN01 | 2 litres of cut vegetation<br>(slightly bulging filled sample bag) |
| Wipe samples | RN02 | Standard = 10 cm x 10 cm<br>(larger areas upon instruction) |
| Liquid samples | RN03 | 500 ml (fill to shoulder of bottle) |

**Tab. 10:** Recommended minimum quantities for radiological sampling

### 6.4.1 Vegetation samples RN01

In order to avoid cross contamination, turn the primary packaging inside out and place your hand inside. The leaves/grasses etc. are held in the primary packaging and cut, then packaged by turning the bag the right way round.

Leaves from the outer area of the tree/bush or stalks from green spaces are to be cut with the combination scissors, packed in the primary packaging and sealed tightly. The materials should be cut as small as possible, and the primary packaging should be filled so it is bulging.

The mechanical damaging of the primary packaging must be avoided. In the case of hard and pointed pieces of vegetation, a PE bottle should be used as primary packaging. There is a risk of perforation when using PE bags. The primary packaging is placed inside the decontamination packaging, which is labelled with the sample number.

The decontamination packaging is checked to ensure it is free from contamination using indirect contamination proof (wipe test) at the edge of the cordoned off area. The absence of contamination and ambient dose rate of the vegetation sample are to be documented on the decontamination packaging and accompanying form.

The accompanying form and decontamination packaging are then placed in secondary packaging. A further indirect contamination proof should then be carried out to ensure that the secondary packaging is also free from contamination.

### 6.4.2 Wipe samples RN02

Radiological wipe samples can only be taken on dry and smooth surfaces. The wipe sample is taken using filter paper (diameter: 55 mm). The wipe test paper is to be labelled with the number of the sample point in advance, so that the wipe sample can be classified in line with the protocol. Several numbered wipe tests can be allocated to one sample site using the number plate and a consecutive number (Fig. 21).

The wipe sample should be taken with the side of the paper that is marked accordingly. An area of at least 100 $cm^2$ is to be wiped with gentle pressure (Fig. 10, page 62). It should be noted that the wipe test paper has neither been folded nor mechanically damaged. The wipe samples are packed individually in parchment bags (Fig. 22-2) and then placed together in the decontamination packaging (Fig. 22-1) and taken to the borderline of the cordoned off area.

The decontamination packaging is checked to ensure it is free from contamination using indirect contamination proof (wipe test) at the borderline of the cordoned off area. The freedom from contamination and ambient dose rate of the wipe samples are to be documented on the decontamination packaging and accompanying form. One accompanying form can be used for several wipe samples.

The accompanying form (Fig. 23-3) and decontamination packaging are then placed in secondary packaging. A further indirect contamination proof should then be carried out to ensure that the secondary packaging is also free from contamination.

Information about the state of the surface and the area wiped in the wipe sample must be recorded on the protocol.


**Fig. 22:** Components of an RN wipe sample: PE bag (1, decontamination packaging), parchment bag (2, primary packaging) with wipe samples, accompanying form (3)


**Fig. 23:** Wipe sample with labelled filter and size comparison

**Taking samples from people affected:**

If it is suspected that people have incorporated radioactive substances via the respiratory tract, a nasal sample should be taken. The samples should be taken from exposed, unprotected people in the non-contaminated area following decontamination. A normal tissue can be used for this and given to the rescue service in suitable packaging.

### 6.4.3 Liquid samples RN03

The water sampling device from the sampling equipment, as described in Chapter 4.4.7, is to be used to collect liquid samples at various depths from pools of water or containers.

Depending on the amount required, the dipper, measuring cup, pipette or syringe can be used to collect surface water. The removed water is then decanted **up to the neck** of a 500 ml PE wide-necked bottle using a funnel In order to avoid contamination in the laboratory, the bottle must not be filled right to the top.

The wiped bottle (primary packaging), which should be labelled with the sample number, is then placed in the decontamination packaging.

The decontamination packaging is checked to ensure it is free from contamination using indirect contamination proof (wipe test) at the borderline of the cordoned off area. The freedom from contamination and ambient dose rate of the liquid sample are to be documented on the decontamination packaging and accompanying form.

The accompanying form and decontamination packaging are then placed in the secondary packaging. A further indirect contamination proof should then be carried out to ensure that the secondary packaging is also free from contamination.

## 6.5 Transportation of RN-samples

As the samples being transported in reference to this recommendation are for the protection of human life and the environment, the exemption stated in the ADR, Part 1 applies: 1.1.3.1 e ("Emergency transportation to protect human life or the environment"). See Chapter 2.8 for more information.

The sample containers and sample bags are to be labelled accordingly (documentation). For radioactive samples, both the absence of contamination and the ambient dose rate of the secondary packaging must be measured.

## 6.6 Brief instructions for RN-sampling

| Vegetation samples | | RN01 |
|---|---|---|
| **List of materials** | | |
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Decontamination packaging |  |
| | Combination scissors |  |

## Vegetation samples — RN01

**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Cut vegetation with combination scissors | A |
|  | • Fill sample bag full with cuttings (min. 2 litre)<br>• Press/squeeze air out of the bag | B |
|  | • Label bag | C |
|  | • Place sample bag in decontamination packaging<br>• Close<br>• Check it is free from contamination<br>• Measure ambient dose rate | D |
|  | • Complete accompanying form | E |
|  | • Place decontamination packaging and accompanying form in contamination-free secondary packaging at the edge of the cordoned off area<br>• Close so it is watertight<br>• Check it is free from contamination with wipe test<br>• Record on secondary packaging and protocol | F |

## Wipe samples RN02

**List of materials**

| | | |
|---|---|---|
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | Decontamination packaging |  |
| | Parchment bags |  |
| | Filter paper |  |

## Wipe samples RN02

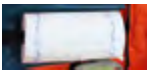
**Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Number round filter with pen | A |
|  | • Wipe area using labelled side of the dry filter and applying gentle pressure<br>• Area: 10 cm x 10 cm | B |
|  | • Pack filters in individual parchment bags | C |
|  | • Place parchment bags in contamination-free decontamination packaging<br>• Check it is free from contamination<br>• Measure ambient dose rate | D |
|  | • Complete accompanying form | E |
|  | • Place decontamination packaging and accompanying form in contamination-free secondary packaging at the edge of the cordoned off area<br>• Close so it is watertight<br>• Check it is free from contamination with wipe test<br>• Record on secondary packaging and protocol | F |

## Liquid samples RN03

**List of materials**

| | | |
|---|---|---|
| | Empty labels |  |
| | Accompanying form |  |
| | Waterproof pen (lab marker) |  |
| | PE bottle, 500 ml |  |
| | Paper towels |  |
| | Decontamination packaging |  |
| | Water sampling device |  |
| | Dipper |  |
| | Syringe |  |
| | Measuring cup |  |
| | Pipette |  |
| | Powder funnel |  |

## Liquid samples RN03

**Note: Wear disposable gloves**

**Conducting the sampling**

| | | |
|---|---|---|
|  | • Take sample<br>• Place funnel over 500 ml PE bottle<br>• Fill bottle to the shoulder of the bottle | A |
|  | • Close | B |
|  | • Wipe clean<br>• Affix completed label | C |
|  | • Place bottle in decontamination packaging | D |
|  | • Check decontamination packaging is free from contamination<br>• Measure contact dose rate | E |
|  | • Complete accompanying form | F |
|  | • Place decontamination packaging and accompanying form in contamination-free secondary packaging at the edge of the cordoned off area<br>• Close so it is watertight<br>• Check it is free from contamination with wipe test<br>• Record on secondary packaging and protocol | G |

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# Appendix 8

# 8.1 Flow chart for CBRN sampling

## Procedure for CBRN sampling/personnel deployed CBRN reconnaissance vehicle 1/3/4

| Action | WHO? | Task | Comment |
|---|---|---|---|
| Contaminated area: Investigation | Sample taker 1 + 2/ assistant **Note how long personnel deployed** | Mark the sample point with numbers.<br>Carry out measurements with direct-reading equipment.<br>Communication | The team decides who is in charge of safeguarding communications. |
| Contaminated area: Prioritising | Expert CBRN driver CBRN reconnaissance vehicle | Decide at which sample point sampling will begin. | |
| Non-contaminated area: Preparation | Driver of CBRN reconnaissance vehicle<br>Assistant | Based on this order, the materials for sampling are prepared.<br>Preparation of decontamination/disinfection/ contamination proof. | |
| Contaminated area: Implementation | Sample taker 1 + 2/ assistant **Note how long personnel deployed** | Constant metrological monitoring is to take place in the case of C- and RN-sampling. Conduct the sampling, document on the accompanying form, make radio contact with incident command or head of measuring. | The team organise themselves during sampling, based on the situation to hand. |
| Boundary between contaminated/ non-contaminated/C-decontamination areas (for C) | Assistant (decontamination personnel) | During decontamination, the assistant in the contaminated area is assisted by the assistant in the non-contaminated area.<br>The assistant in the contaminated area places the decontamination bag with the samples in the decontamination basin.<br>The assistant in the non-contaminated area removes the decontamination bag from the basin. | The decontamination basin is kept at the boundary with the contaminated area. |
| Boundary between contaminated/ non-contaminated/B-disinfection areas (for B) | Assistant (decontamination personnel) | During disinfection, the assistant in the contaminated area is assisted by the assistant in the non-contaminated area.<br>The assistant in the contaminated area places the decontamination bag with the samples in the disinfection basin.<br>The assistant in the non-contaminated area removes the decontamination bag from the basin. | The disinfection basin is kept at the boundary with the contaminated area. |
| RN contamination proof (for RN) | Assistant (decontamination personnel) | The wipe test contamination control takes place at the boundary between the contaminated and non-contaminated areas. If there is evidence of contamination, the contaminated secondary packaging is placed in clean secondary packaging. A second contamination control test then takes place. | |
| Removal | | | |

## 8.2 Measures to be taken prior to operations

**Sample checklist**

Assessing the capacity and capabilities of laboratories

| | Chemistry | Biology | Physics |
|---|---|---|---|
| Address: | | | |
| Contact person: | | | |
| Name: | | | |
| Tel.: | | | |
| Fax: | | | |
| Mobile: | | | |
| Email: | | | |

Authorities participating in the development of operational plans

| | Chemistry | Biology | Physics |
|---|---|---|---|
| Name: | | | |
| Tel.: | | | |
| Fax: | | | |
| Mobile: | | | |
| Email: | | | |
| (Stand-by) Name: | | | |
| Tel.: | | | |
| Fax: | | | |
| Email: | | | |

Training the emergency response personnel, including in the use of personal protective equipment (PPE)

Trained personnel:

Internal availability (personnel/materials/equipment etc.)

Personnel:

Materials/equipment:

Stipulation of radio channels:

## 8.3 Checklist for the operation site

| | |
|---|---|
| **What has happened?** | Description: |
| **When did it happen?** | Date: |
| **Where did it happen?** | Address: |
| **How did it happen?** | Incident: |
| **How is the area supplied?** | Description: |

**Pocket sample checklist**

- Take sample from source of contamination if possible (only B, C)
- Take sample along possible dispersion
- Control sample from non-contaminated area (B, C)
- Blind samples
- Label packaging as described in instructions
- Complete accompanying form
- Pack securely
- Remove properly
- Accompanying documents (accompanying form, protocol, ADR accompanying document)

## 8.4 Accompanying document for the transportation of category A pathogens

### 8.4.1 UN 2814

UN number: 2814

Official designation for transportation:

INFECTIOUS SUBSTANCE, AFFECTING HUMANS

Class: 6.2
Classification code: I1
Number of units (samples):
Type of sample/sample material:

Estimated infectious substance contained:


| Recipient | Sender |
|---|---|
| Name: | Name: |
| Institution: | Institution: |
| Address: | Address: |
| Tel.: | Tel.: |

Place/Date

Signature of sender

### 8.4.2 UN 2900

UN number: 2900

Official designation for transportation:

INFECTIOUS SUBSTANCE, AFFECTING ANIMALS

Class: 6.2
Classification code: I2
Number of units (samples):
Type of sample/sample material:

Estimated infectious substance contained:


| Recipient | Sender |
|---|---|
| Name: | Name: |
| Institution: | Institution: |
| Address: | Address: |
| Tel.: | Tel.: |

Place/Date

Signature of sender

## 8.5 Accompanying form

# CBRN sample!

May contain (please cross):


☐


☐


☐

Sample no.: _____ Unit: _____

Name of sample taker: _____

Date: _____ Time: _____

Location of sample point: _____

For radioactive samples: Bag exterior free from contamination? ☐ Yes

Local dose rate [µSv/h]: _____

pH value: _____

Other: _____

## 8.6 Sample protocol

| | | |
|---|---|---|
| **Sender:** | | Logo |
| **Deployment site:**<br><br>**Date/Time:** | **Sample number:**<br>(Affix completed label) | |

**Sampling point** (e.g. coordinates/address/room number)

Description:

**Sample procedure**

| ☐ **C** **No.:** | ☐ **B** **No.:** | ☐ **RN** **No.:** |
|---|---|---|
| Air<br>☐ Tenax® ☐ silica gel | No.<br>No.<br>No. | ☐ 1 stroke or ☐ strokes<br>☐ 10 strokes or ☐ strokes<br>Blind sample |
| ☐ Liquid | Depth of sample if applicable: m | |
| ☐ Soil | State area: cm x cm | |
| ☐ Wipe | Solvent: | |
| ☐ Solid | ☐ Vegetation | ☐ Paste/covering |
| ☐ Other: | | |

**Description of sample** (Colour, appearance, smell, multiphase mixture, ...)

| **Measurements on site** | | | |
|---|---|---|---|
| Dose rate on the surface: | | ☐ n ☐ µ ☐ m Sv/h | |
| pH value: | | IMS: | |
| Ground temperature: | °C | Water temperature: | °C |

| | | | |
|---|---|---|---|
| Sample temperature: | °C | PID: | |
| Other: | | | |

**Sketched map**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Scale/box side | | | | | | | | | | |

**Weather** (in the sampling area)

| | | | |
|---|---|---|---|
| Air temperature: | °C | Clouds: | /eighth |
| Humidity: | % | Wind strength: | |
| Precipitation: ☐ no ☐ yes | | Wind direction from | |
| **Decontamination** | | carried out ☐ yes ☐ no | |
| active agent used: | | Implementation: ☐ Dipping disinfection ☐ Spraying/wiping disinfection | |
| Concentration: | | Exposure time: | min |

**Comments**

Signature of protocol taker

Signature of sampler

## 8.7 Sample overview

**Sample overview**

Deployment site:

Date/Time:

| Sample number | Sample type | Sample number | Sample type |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Sketched map

## 8.8 Chain of Custody

| Sample number/s: | Transferred | Received |
|---|---|---|
| Date: | (Printed name) | (Printed name) |
| Time: | (Signature) | (Signature) |
| Date: | (Printed name) | (Printed name) |
| Time: | (Signature) | (Signature) |
| Date: | (Printed name) | (Printed name) |
| Time: | (Signature) | (Signature) |
| Date: | (Printed name) | (Printed name) |
| Time: | (Signature) | (Signature) |

## 8.9 List of investigative laboratories

Below you can find a list of example contact addresses for competent investigative laboratories for CBRN. The lists were correct at the time of print. In addition, relevant website addresses are provided. These can be used to find the current status of the laboratory in question. This list makes no claim to completeness.

### 8.9.1 Laboratories for chemical samples

**TÜV Rheinland**

http://www.tuv.com/de/deutschland/gk/produktpruefung/generelle_pruefungen_de/chemische_analytik/chemische_analytik.html

**TÜV Nord**

https://www.tuev-nord-group.com/de/startseite/

**Wehrwissenschaftliches Institut für Schutztechnologien – ABC-Schutz (WIS)**

Humboldtstraße
29633 Munster
Tel. (0 51 92) 136-2 01
Fax (0 51 92) 136-3 55

**Landesanstalt für Umwelt, Messung und Naturschutz Baden-Württemberg**

Location: Großoberfeld 3
Abteilung 3 – Technischer Arbeits- und Umweltschutz
Abteilung 6 – Messtechnik und Analytik

Location: Hertzstraße 173
Abteilung 3 – Technischer Arbeits- und Umweltschutz
Abteilung 4 – Wasser

https://www.lubw.baden-wuerttemberg.de/lubw

**Bayerisches Landesamt für Umwelt**
**Zentrallabor mit Laborleitstelle Umwelt**

Bürgermeister-Ulrich-Straße 160
86179 Augsburg
Tel. (08 21) 90 71-0
Fax (08 21) 90 71-55 56

**Abfallüberwachung, Luftgütemessung Nordbayern,**
**Strahlenschutz Nordbayern, Radiotoxikologie**

Steinenhausen 1
95326 Kulmbach
Tel. (0 92 21) 6 04-0
Fax (0 92 21) 6 04-18 50

http://www.lfu.bayern.de/kontakt/index.htm

**Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz**
**Mecklenburg-Vorpommern**

Goldberger Straße 12
18273 Güstrow
Tel. (0 38 43) 7 77-0
Fax (0 38 43) 7 77-106

http://www.regierung-mv.de/cms2/Regierungsportal_prod/Regierungsportal/de/lm/

**Landesamt für Landwirtschaft, Lebensmittelsicherheit und Fischerei Mecklenburg-Vorpommern (LALLF M-V)**

Thierfelderstraße 18
18059 Rostock
Tel. (03 81) 4 03 50
Fax (03 81) 4 00 15 10

http://www.lallf.de/LALLF-Das-Landesamt.5.0.html

**Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein-Westfalen (LANUV)**

Leibnizstraße 10
45659 Recklinghausen
Tel. (0 23 61) 3 05-0
Fax (0 23 61) 3 05-32 15

Bereitschaftszentrale LANUV NRW: 24/7
Rufnummer: (02 01) 71 44 88

**Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz**

Kaiser-Friedrich-Straße 7
55116 Mainz/Rhein
Tel. ( 0 61 31) 60 33-0
Fax (0 61 31) 1 43 29 66

Zentrallabor
Wallstraße 1, 55122 Mainz

**Landesamt für Umwelt- und Arbeitsschutz Saarland**

Don-Bosco-Straße 1
66119 Saarbrücken (headquarters)
Tel. (06 81) 85 00-0
Fax (06 81) 85 00-13 84

Geschäftsbereich 5 – Umweltüberwachung, -analytik
Tel. (06 81) 85 00-12 41
Fax (06 81) 85 00-17 99

http://www.saarland.de/SID-18DD2DFF-2DB30E4C/39151.htm

**Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie (LfULG)**

Abteilung 4: Wasser, Boden, Wertstoffe
Zur Wetterwarte 11
01109 Dresden
Tel. (03 51) 89 28-40 00/-40 01

Abteilung 5: Klima, Luft, Lärm, Strahlen
Söbrigener Straße 3 a
01326 Dresden
Tel. (03 51) 26 12-50 01

http://www.smul.sachsen.de/lfulg/7585.htm

**Landesbetrieb für Hochwasserschutz und Wasserwirtschaft Sachsen-Anhalt (Schwerpunkt Wasseranalytik)**

Labor Magdeburg
Otto-von-Guericke-Straße 5
39104 Magdeburg
Tel. (03 91) 5 81-11 49

**Labor Wittenberg**

Sternstraße 52 a
06886 Lutherstadt Wittenberg
Tel. (0 34 91) 46 71-2 15

**Labor Halle**

Willy-Brundert-Straße 14
06132 Halle (Saale)
Tel. (03 45) 54 84-2 20

http://www.lhw.sachsen-anhalt.de/untersuchen-bewerten/wasseranalytik-im-gld/

**Landeslabor Schleswig-Holstein**

Max-Eyth-Straße 5
24537 Neumünster
Tel. (0 43 21) 9 04-5
Fax (0 43 21) 9 04-6 19

https://www.schleswig-holstein.de/DE/Fachinhalte/L/lebensmittel/landeslaborAktuelles.html

**Landesuntersuchungsamt für Chemie, Hygiene und Veterinärmedizin der Freien Hansestadt Bremen**

Lloydstraße 4
28217 Bremen
Tel. (04 21) 3 61-1 00 01
Fax (04 21) 3 61-1 55 04

http://www.lua.bremen.de/sixcms/detail.php?gsid=bremen02.c.730.de

**Contacting the Task Force**

The Analytical Task Force can be contacted via the Gemeinsame Melde- und Lagezentrum (GMLZ) operated by the German Federal Office of Civil Protection and Disaster Assistance,

Provinzialstraße 93, 53127 Bonn, Postfach 18 67, 53008 Bonn,
Tel. (02 28) 99-5 50 21 99, Fax (02 28) 99-5 50 21 89.

Please always telephone to notify of fax communication.

**TUIS**

You can find general information about the TUIS at
https://www.vci.de/themen/logistik-verkehr-verpackung/tuis/listenseite.jsp.

**TUIS emergency services around the clock** (as at January 2014)**:**

BASF SE, Ludwigshafen, Tel. (06 21) 6 04 33 33

BASF Schwarzheide GmbH, Schwarzheide, Tel. (03 57 52) 6 21 12

Bayer HealthCare, Berlin, Tel. (0 30) 46 81 42 08

Currenta GmbH & Co. OHG, Leverkusen, Tel. (02 14) 3 09 93 00

Dow Deutschland Anlagengesellschaft mbH, Stade, Tel. (0 41 46) 91 23 33

Evonik Industries AG, Chemiepark Marl, Tel. (0 23 65) 49 22 32

Henkel AG &Co. KGaA, Düsseldorf, Tel. (02 11) 7 97 33 50

InfraLeuna GmbH, Leuna, Tel. (0 34 61) 43 43 33

InfraServ GmbH & Co. Gendorf KG, Burgkirchen an der Alz, Tel. (0 86 79) 7 22 22

Infraserv GmbH & Co. Höchst KG, Frankfurt am Main, Tel. (0 69) 30 564 18

Merck KGaA, Darmstadt, Tel. (0 61 51) 72 24 40

Wacker Chemie AG, Burghausen, Tel. (0 86 77) 83 22 22

### 8.9.2 Laboratories for biological samples

In the case of samples from a suspected biological terrorist attack, the information office at the Bund für Biologische Sicherheit should be contacted.

**Robert Koch Institute**

The coordination centre for the NaLaDIBA laboratory network can be reached under
Tel. (0 30) 1 87 54-21 40
Fax (0 30) 1 87 54-23 28

Other NaLaDiBA laboratories. Where available, the link to accompanying forms from the individual institutes is provided. Please note when filling out that these do generally not cover environmental samples. These should be marked accordingly.

**Friedrich-Loeffler-Institut**

Bundesforschungsinstitut für Tiergesundheit
Institut für bakterielle Infektionen und Zoonosen

Naumburger Straße 96 a
07743 Jena
Tel. (0 36 41) 8 04–21 00

Friedrich Loeffler Institute (FLI)
Südufer 10
17493 Greifswald – Insel Riems
Tel. (03 83 51) 7-0

**Landesgesundheitsamt (LGA) Baden-Württemberg**

Nordbahnhofstraße 135
70191 Stuttgart
Monday to Thursday 7:30am-3:30pm, Friday 7:30am-2pm
Tel. (0711) 9 04-3 50 00

**Niedersächsisches Landesgesundheitsamt (NLGA)**

Roesebeckstraße 4–6
30449 Hanover
Monday to Friday 7:30am-4pm, Saturday 8am-12noon

| | |
|---|---|
| Switchboard | (05 11) 45 05-0 |
| Virology | (05 11) 45 05-2 01 |
| Bacteriology | (05 11) 45 05-2 53 |
| Microbiological-infectiological problem situations | (01 60) 1 60 31 30 |
| Chemical-toxicological risk assessment | (01 63) 5 37 44 37 |

**Institut für Mikrobiologie der Bundeswehr (InstMikroBioBw)**

Neuherbergstraße 11
80937 Munich

Normal office hours: Monday to Thursday 8am-4pm,
Friday 8am-12noon, 24/7 by tel. appointment

**Wehrwissenschaftliches Institut für Schutztechnologien – ABC-Schutz (WIS)**

Humboldtstraße
29633 Munster
Tel. (0 51 92) 136-2 01
Fax (0 51 92) 136-3 55

**Institut für Virologie des Universitätsklinikums Freiburg**

Hermann-Herder-Straße 11
79104 Freiburg
Gate: Tel. (07 61) 2 03-65 10
Fax (07 61) 2 03-65 62

Sample laboratory:
Tel. (0761) 2 03-65 67
Fax (0761) 2 03-66 03

**Bernhard-Nocht-Institut für Tropenmedizin (BNITM) 24/7**

Bernhard-Nocht-Straße 74
20359 Hamburg
Tel. (040) 42818-0
Fax (040) 42818-400

https://www.bnitm.de/fileadmin/media/de/documents/labordiagnostik/Eschein_03_04_BAK_05_2015_02.pdf

https://www.bnitm.de/fileadmin/media/de/documents/labordiagnostik/Eschein_04_04_VIRO_04_2015.pdf

**Bayrisches Landesamt für Gesundheit und Lebensmittelsicherheit (LGL)**

Veterinärstraße 2
85764 Oberschleißheim
24/7: Tel. (09131) 6808-0
Tel. (0179) 1157603
Fax (09131) 6808-5425

**Institut für Virologie der Philipps-Universität Marburg**

Hans-Meerwein-Straße
35043 Marburg, Diagnosis 24/7
Tel. (0177) 3108196

Monday to Friday 8am-6pm, Saturday 9am-1pm
Tel. (06421) 58-64313 (Serology)
(06421) 2865147 (PCR)

https://www.uni-marburg.de/fb20/virologie/diagnostik/leistungsprogramm-diagnostik.pdf

**Robert Koch-Institut (RKI)**

Nordufer 20
13353 Berlin (Wedding)
Available 24/7
Tel. (0 30) 1 87 54-0

http://www.rki.de/DE/Content/Infekt/Diagnostik_Speziallabore/Bakterien/Begleitschein_Probeneinsendung.pdf?__blob=publicationFile

## 8.10 Competence and treatment centres

The members of the Standing Consortium of Competence and Treatment Centres (STAKOB) are also available 24 hours a day

Note from the STAKOB: The telephone numbers provided are **solely** for use by **professionals/expert personnel**

### Treatment centres

**Charité, Campus Virchow-Klinikum**

Med. Klinik für Infektiologie und Pneumologie
Augustenburger Platz 1
13353 Berlin

Rettungsstelle Innere Medizin CVK (headquarters)
Tel. (0 30) 4 50-50

**Treatment centre in Düsseldorf**

Klinik für Gastroenterologie,
Hepatologie und Infektiologie, Universitätsklinikum Düsseldorf
Moorenstraße 5, 40225 Düsseldorf

**Availability (24/7):**

SIS station MX01
Tel. (02 11) 8 10-82 45

A&E MA01
Tel. (02 11) 8 11-70 12

**Treatment centre in Frankfurt/Main**

Klinik der Goethe-Universität
Zentrum für Innere Medizin
Medizinische Klinik II – Infektiologie
Theodor-Stern-Kai 7
60590 Frankfurt

**Availability (24/7):**
Tel. (01 60) 7 01 55 50 (on-call service)

**Competence and treatment centre North in Hamburg**

Bernhard-Nocht-Klinik für Tropenmedizin
1. Medizinische Klinik und Poliklinik
Universitätsklinikum Hamburg

In co-operation with the Institut für Hygiene und Umwelt der Behörde für Gesundheit & Verbraucherschutz, Hamburg

**Availability (24/7):**

Bernhard-Nocht-Institut für Tropenmedizin (headquarters)
Tel. (0 40) 4 28 18-0

Universitätsklinikum Eppendorf, Tropenmedizin Hintergrunddienst (headquarters)
Tel. (0 40) 74 10-0

**Treatment centre in Leipzig**

Klinikum St. Georg gGmbH
Klinik für Infektiologie, Tropenmedizin und Nephrologie
Delitzscher Straße 141
04129 Leipzig

**Availability (24/7):**
Tel. (03 41) 9 09 40 05

**Treatment centre in Munich**

Städtisches Klinikum München-Schwabing
1. Medizinische Abteilung
Kölner Platz 1
80804 Munich

**Availability (24/7):**
Dienstarzt Infektiologie
Tel. (0 89) 30 68-0 (switchboard)

**Treatment centre in Stuttgart**

Robert-Bosch-Krankenhaus
Zentrum für Innere Medizin 1
Gastroenterologie, Hepatologie, Endokrinologie
Auerbachstraße 110
70376 Stuttgart

**Availability (24/7):**
Infectiology on-call service (via reception)
Tel. (07 11) 81 01-0

## Competence centres

### Competence centre in Berlin

Senatsverwaltung für Gesundheit und Soziales
Oranienstraße 103
10969 Berlin

**Availability (24/7):**
Berliner Lagezentrum
(telephone number at RKI)

### Competence and treatment centre North in Hamburg

Bernhard-Nocht-Klinik für Tropenmedizin
1. Medizinische Klinik und Poliklinik
Universitätsklinikum Hamburg

In co-operation with the Institut für Hygiene und Umwelt der Behörde für Gesundheit & Verbraucherschutz, Hamburg

**Availability (24/7):**

Bernhard-Nocht-Institut für Tropenmedizin (Zentrale)
Tel. (0 40) 4 28 18-0

Universitätsklinikum Eppendorf, Tropenmedizin Hintergrunddienst (headquarters)
Tel. (0 40) 74 10-0

### Competence centre in Frankfurt am Main

Gesundheitsamt
Breite Gasse 28
60313 Frankfurt/Main

**Availability (24/7):**
The doctor on duty can be reached via the Frankfurt control centre.

**Competence centre in Leipzig**

Stadt Leipzig – Dezernat V
Gesundheitsamt
Abteilungsleitung Hygiene
04092 Leipzig

**Competence centre in Munich**

Referat für Gesundheit und Umwelt,
Hauptabteilung Gesundheitsschutz,
Abteilung Infektionsschutz
RGU-GS-IFS
Bayerstraße 28 a
80335 Munich

**Availability (24/7):**
Monday to Thursday 8am-4pm, Friday 8am-1pm
The contact number for outside these hours is available at the RKI and the integrated control centre in Munich.

**Competence centre in Münster**

Landeszentrum Gesundheit Nordrhein-Westfalen
Fachgruppe Infektiologie und Hygiene
Von-Stauffenberg-Straße 36
48151 Münster

**Availability (24/7):**
Tel. 02 51/7 79 34-2 15
**Outside office hours:** Landeszentrum Gesundheit NRW on-call service via the local health authority (control centre)

**Competence centre in Stuttgart**

Regierungspräsidium Stuttgart, Abteilung 9
Landesgesundheitsamt Baden-Württemberg
Referat 95 – Epidemiologie und Gesundheitsberichterstattung
SG 1 – Kompetenzzentrum Gesundheitsschutz/Infektionssurveillance
Nordbahnhofstraße 135
70191 Stuttgart

**Availability (24/7):**
**On workdays:** Tel. (07 11) 9 04-3 95 09
**Outside office hours:** Bereitschaftsdienst des Landesgesundheitsamts
via the local health authority of the Lagezentrum des Innenministeriums
Baden-Württemberg

## 8.11 Laboratories for RN samples

If there is a suspicion that radionuclides have been incorporated, the Leitstelle Inkorporationsüberwachung des Bundesamts für Strahlenschutz (BfS) should be contacted. This body has created a list of the incorporation measuring laboratories that have been approved by the authorities in line with § 41 StrlSchV, and it can be viewed online here:
http://www.bfs.de/DE/themen/ion/service/inkorporation/messstellen/messstellen.html

The Leitstelle Inkorporationsüberwachung can be reached by email on lsinko@bfs.de or via the BfS telephone switchboard on (0 30) 1 83 33-0. The addresses and email addresses for both of the BfS measuring laboratories are as follows:

Bundesamt für Strahlenschutz
Inkorporationsmessstelle Neuherberg
Ingolstädter Landstraße 1
85764 Neuherberg
ikm-neuherberg@bfs.de

Bundesamt für Strahlenschutz
Inkorporationsmessstelle Berlin
Köpenicker Allee 120–130
10318 Berlin
ikm-berlin@bfs.de

### 8.11.1 State measuring laboratories

**Baden-Württemberg measuring laboratory – LMst, Karlsruhe**

Office building/delivery address: Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg, Referat Radioaktivität, Strahlenschutz, state measuring laboratory in line with StrVG and REI
Hertzstraße 173, 76187 Karlsruhe

Postal address: Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg
Postfach 21 07 52, 76157 Karlsruhe

Tel. switchboard (07 21) 56 0300 -0
Fax (07 21) 56 0300 -23

**Baden-Württemberg measuring laboratory – LMst 2 Fellbach**

Office building/delivery address: Chemisches- und Veterinäruntersuchungsamt Stuttgart, Dienstsitz Fellbach, state measuring laboratory in line with StrVG
Schaflandstraße 2/3, 70736 Fellbach

Postal address: Chemisches- und Veterinäruntersuchungsamt Stuttgart, Dienstsitz Fellbach
Postfach 12 06, 70702 Fellbach

Tel. switchboard (07 11) 34 26-12 34
Fax (07 11) 58 038 176

**Baden-Württemberg measuring laboratory – LMst 3 Freiburg**

Office building/delivery address: Chemisches- und Veterinäruntersuchungsamt Freiburg, state measuring laboratory in line with StrVG
Bissierstraße 5, 79114 Freiburg

Postal address: Chemisches- und Veterinäruntersuchungsamt Freiburg, state measuring laboratory in line with StrVG

Tel. switchboard (07 61) 88 55-0
Fax (07 61) 88 55-1 00

**Bavaria measuring laboratory Kempten**

Office building/delivery address: Milchwirtschaftliche Untersuchungs- und Versuchsanstalt, state measuring laboratory in line with StrVG
Hirnbeinstraße 10, 87435 Kempten/Allgäu

Postal address: Milchwirtschaftliche Untersuchungs- und Versuchsanstalt
Postfach 20 25, 87410 Kempten/Allgäu

Tel. switchboard (08 31) 52 90-0
Fax (08 31) 52 90-100

**Bavaria measuring laboratory – LMst 3 Augsburg**

Office building/delivery address: Bayer. Landesamt für Umwelt,
state measuring laboratory in line with StrVG
Bürgermeister-Ulrich-Straße 160, 86179 Augsburg

Postal address: Bav. Landesamt für Umwelt, state measuring laboratory in line with StrVG

Tel. switchboard (08 21) 90 71-0
Fax (08 21) 90 71-55 54 and 90 71-56 87

**Bavaria measuring laboratory – LMst 6 Oberschleißheim**

Office building/delivery address: Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit, state measuring laboratory in line with StrVG
Veterinärstraße 2 85764 Oberschleißheim

Postal address: Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit, state measuring laboratory in line with StrVG
Veterinärstraße 2, 85764 Oberschleißheim

Tel. switchboard (0 89) 3 15 60-0
Fax (0 89) 3 15 60-4 57

**Berlin measuring laboratory – LMst 1 Berlin**

Office building/delivery address: Senatsverwaltung für Gesundheit, Umwelt und Verbraucherschutz state measuring laboratory in line with StrVG and REI
Rubensstraße 111, 12157 Berlin

Postal address: Senatsverwaltung für Gesundheit, Umwelt und Verbraucherschutz
Strahlenmessstelle

**Brandenburg measuring laboratory – LMst 1 Oranienburg**

Office building/delivery address: Landeslabor Berlin-Brandenburg, Fachbereich IV-1 Strahlenschutz Landesmessstelle Oranienburg, state measuring laboratory in line with StrVG
Sachsenhausener Straße 7 b, 16515 Oranienburg

Postal address: Landeslabor Berlin-Brandenburg, Fachbereich IV-1 Strahlenschutz

**Brandenburg measuring laboratory – LMst 2 Frankfurt (Oder)**

Office building/delivery address: Landeslabor Berlin-Brandenburg, Fachbereich IV-1 Strahlenschutz, Landesmessstelle Frankfurt (Oder), state measuring laboratory in line with StrVG, Gerhard-Neumann-Straße 2/3, 15236 Frankfurt (Oder)

Postal address: Landeslabor Berlin-Brandenburg, Fachbereich IV-1 Strahlenschutz Postfach 1469, 15204 Frankfurt (Oder)

Fax (03 35) 5 21 77 92

**Bremen measuring laboratory – LMst 1 Bremen**

Office building/delivery address: Landesmessstelle für Radioaktivität Bremen, Universität Bremen/FB 1
Otto-Hahn-Allee 1 (NW 1), 28359 Bremen

Postal address: Universität Bremen

Tel. switchboard (04 21) 2 18-6 27 60/-6 27 61
Fax (04 21) 2 18-95

**Hamburg measuring laboratory – LMst 1 Hamburg**

Office building/delivery address: Freie und Hansestadt Hamburg, Behörde für Soziales, Familie, Gesundheit und Verbraucherschutz, Institut für Hygiene und Umwelt, state measuring laboratory in line with StrVG
Marckmannstraße 129 b, Haus 6, 20539 Hamburg

Postal address: Freie und Hansestadt Hamburg, Behörde für Soziales, Familie, Gesundheit und Verbraucherschutz, Institut für Hygiene und Umwelt, state measuring laboratory in line with StrVG

**Hamburg measuring laboratory – LMst 2 Hamburg**

Office building/delivery address: Freie und Hansestadt Hamburg, Behörde für Soziales, Familie, Gesundheit und Verbraucherschutz, Institut für Hygiene und Umwelt, state measuring laboratory in line with StrVG
Marckmannstraße 129 b, Haus 6, 20539 Hamburg

Postal address: Freie und Hansestadt Hamburg, Behörde für Soziales, Familie, Gesundheit und Verbraucherschutz, Institut für Hygiene und Umwelt, state measuring laboratory in line with StrVG
Marckmannstraße 129 b, Haus 6, 20539 Hamburg

Tel. switchboard (0 40) 4 28 45-77
Fax (0 40) 4 28 45-38 40

**Hesse measuring laboratory – LMst 2 Kassel**

Office building/delivery address: Hessisches Landesamt für Umwelt und Geologie

Dienststelle Kassel – Dez. I5 – state measuring laboratory in line with StrVG
Ludwig-Mond-Straße 33, 34121 Kassel

Postal address: Hessisches Landesamt für Umwelt und Geologie/Dienststelle Kassel

Tel. switchboard (05 61) 20 00-0
Fax (05 61) 20 00-2 22

**Hesse measuring laboratory – LMst 3 Darmstadt**

Office building/delivery address: Hessisches Landesamt für Umwelt und Geologie, Dienststelle Darmstadt – Dez. I5 – state measuring laboratory in line with StrVG and REI
Kasinostraße 60, 64293 Darmstadt

Postal address: Hessisches Landesamt für Umwelt und Geologie Dienststelle Darmstadt – Dez. I5 – state measuring laboratory in line with StrVG and REI

Tel. switchboard (0 61 51) 92 79-0
Fax (0 61 51) 92 79-40

**Mecklenburg-Western Pomerania measuring laboratory – Stralsund**

Office building/delivery address: Landesamt für Umwelt, Naturschutz und Geologie Mecklenburg-Vorpommern, Außenstelle Stralsund, state measuring laboratory in line with StrVG
Badenstraße 18, 18439 Stralsund

Postal address: Landesamt für Umwelt, Naturschutz und Geologie Mecklenburg-Vorpommern, Außenstelle Stralsund, state measuring laboratory in line with StrVG

Tel. switchboard (0 38 31) 6 96-0
Fax (0 38 31) 6 96-6 67

**Lower Saxony measuring laboratory – LMst 1 Hildesheim**

Office building/delivery address: Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz – Betriebsstelle Hannover-Hildesheim state measuring laboratory in line with StrVG and REI
An der Scharlake 39, 31135 Hildesheim

Postal address: Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz – Betriebsstelle Hannover-Hildesheim
Postfach 1010 62, 31110 Hildesheim

Tel. switchboard (0 51 21) 5 09-0
Fax (0 51 21) 5 09-3 33

**Lower Saxony measuring laboratory – LMst 2 Hildesheim**

Office building/delivery address: Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz AB 35, state measuring laboratory in line with StrVG and REI
An der Scharlake 39, 31135 Hildesheim

Postal address: Niedersächsischer Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz (NLWKN) – Betriebsstelle Hannover-Hildesheim, Geschäftsber. 111/ Aufgabenber. V
Postfach 1010 62, 31110 Hildesheim

Tel. switchboard (0 51 21) 5 09-0
Fax (0 51 21) 5 09-5 20

**Lower Saxony measuring laboratory – LMst 3 Braunschweig**

Office building/delivery address: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit, Lebensmittelinstitut Braunschweig, state measuring laboratory in line with StrVG and REI
Dresdenstraße 2, 38124 Braunschweig

Postal address: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit
Postfach 45 18, 38035 Braunschweig

Tel. switchboard (05 31) 68 04-0
Fax (05 31) 68 04-1 01

**Lower Saxony measuring laboratory – LMst 4 Cuxhaven**

Office building/delivery address: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit, Veterinärinstitut für Fische und Fischwaren Cuxhaven, state measuring laboratory in line with StrVG
Schleusenstraße 1, 27472 Cuxhaven

Postal address: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit, Veterinärinstitut für Fische und Fischwaren Cuxhaven
Schleusenstraße 1, 27472 Cuxhaven

**Lower Saxony measuring laboratory – LMst 5 Oldenburg**

Office building/delivery address: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit, Lebensmittelinstitut Oldenburg, state measuring laboratory in line with StrVG
Martin-Niemöller-Straße 2, 26133 Oldenburg

Postal address: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit
Postfach 24 62, 26014 Oldenburg

Tel. switchboard (04 41) 99 85-0
Fax (04 41) 98 85-1 21

**Lower Saxony measuring laboratory – LMst 6 Hanover**

Office building/delivery address: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit, Veterinärinstitut Hannover, state measuring laboratory in line with StrVG and REI
Eintrachtweg 17, 30173 Hannover

Postal address: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit, Veterinärinstitut Hannover, state measuring laboratory in line with StrVG and REI

Tel. switchboard (05 11) 2 88 97-0
Fax (05 11) 2 88 97-2 99

**Lower Saxony measuring laboratory – LMst 7 Oldenburg**

Office building/delivery address: LUFA Nord-West, LUFA-Institut für Futtermittel, state measuring laboratory in line with StrVG and REI
Jägerstraße 23–27, 26121 Oldenburg

Postal address: LUFA Nord-West
Postfach 25 49, 26015 Oldenburg

Tel. switchboard (04 41) 8 01-8 21
Fax (04 41) 8 01-8 99

**North Rhine-Westphalia measuring laboratory – LMst 1 Düsseldorf**

Office building/delivery address: Landesamt für Natur, Umwelt und Verbraucherschutz NRW, state measuring laboratory in line with StrVG and REI
Auf dem Draap 25, 40221 Düsseldorf

Postal address: Landesamt für Natur, Umwelt und Verbraucherschutz NRW, state measuring laboratory in line with StrVG and REI
Leibnizstraße 10, 45659 Recklinghausen

Tel. switchboard (0 23 61) 3 05-0
Fax (02 11) 15 90-23 39

**North Rhine-Westphalia measuring laboratory – LMst 2 Düsseldorf**

Office building/delivery address: Landesinstitut für Gesundheit und Arbeit des Landes NRW, state measuring laboratory in line with StrVG and REI, Fachgruppe 1.3
Gurlittstraße 55, 40223 Düsseldorf

Postal address: Landesinstitut für Gesundheit und Arbeit des Landes NRW
Ulenbergstraße 127–13, 40225 Düsseldorf

Tel. switchboard (02 11) 31 01-0
Fax (02 11) 31 01-11 89/-24 54

**North Rhine-Westphalia measuring laboratory – LMst 3 Dortmund**

Office building/delivery address: Landesbetrieb Mess- und Eichwesen Nordrhein-Westfalen, Betriebsstelle für Sonderaufgaben, Eichamt Dortmund, state measuring laboratory in line with StrVG
Marsbruchstraße 186, 44287 Dortmund

Postal address: Landesbetrieb Mess- und Eichwesen Nordrhein-Westfalen, Betriebsstelle für Sonderaufgaben, Eichamt Dortmund
Kronprinzenstraße 51, 44135 Dortmund

Tel. switchboard (02 31) 45 02-0 or 95 20 41-0
Fax (02 31) 45 02-5 84 and 95 20 41-44

**North Rhine-Westphalia measuring laboratory – LMst 4 Detmold**

Office building/delivery address: Chemisches und Veterinäruntersuchungsamt Ostwestfalen-Lippe, Standort Detmold, state measuring laboratory in line with StrVG
Westerfeldstraße 1, 32758 Detmold

Postal address: Chemisches und Veterinäruntersuchungsamt Ostwestfalen-Lippe, Standort Detmold
Postfach 27, 54 32717 Detmold

Tel. switchboard (0 52 31) 9 11-9
Fax (0 52 31) 9 11-503/-504

**North Rhine-Westphalia measuring laboratory – LMst 5 Münster**

Office building/delivery address: Chemisches und Veterinäruntersuchungsamt Münsterland-Emscher-Lippe AÖR, state measuring laboratory in line with StrVG
Joseph-König-Straße 40, 48147 Münster

Postal address: Chemisches und Veterinäruntersuchungsamt Münsterland-Emscher-Lippe AÖR
Postfach 1980, 48007 Münster

Tel. switchboard (02 51) 98 21-0
Fax (02 51) 98 21-2 50

**Rhineland-Palatinate measuring laboratory – LMst 1 Mainz**

Office building/delivery address: Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht, state measuring laboratory in line with StrVG and REI
Kaiser-Friedrich-Straße 7, 55118 Mainz

Postal address: Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht

Tel. switchboard (0 61 31) 60 33-0

**Rhineland-Palatinate measuring laboratory – LMst 2 Speyer**

Office building/delivery address: Landesuntersuchungsamt, Institut für Lebensmittelchemie, state measuring laboratory in line with StrVG and REI
Nikolaus-von-Weis-Straße 1, 67346 Speyer

Postal address: Landesuntersuchungsamt, Institut für Lebensmittelchemie
Postfach 12 06, 67322 Speyer

**Rhineland-Palatinate measuring laboratory – LMst 4 Mainz**

Office building/delivery address: Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (Abt. 6, Ref. 68), state measuring laboratory in line with StrVG and REI
Wallstraße 1, 55122 Mainz

Postal address: Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (Abt. 6, Ref. 68)

**Rhineland-Palatinate measuring laboratory – LMst 5 Speyer**

Office building/delivery address: Landwirtschaftliche Untersuchungs- und Forschungsanstalt, state measuring laboratory in line with StrVG and REI
Obere Langgasse 40, 67346 Speyer

Postal address: Landwirtschaftliche Untersuchungs- und Forschungsanstalt
Postfach 16 29, 67326 Speyer

Tel. switchboard (0 62 32) 136-0
Fax (0 62 32) 136-110

**Saarland measuring laboratory – LMst 1 Saarbrücken**

Office building/delivery address: Landesamt für Umweltschutz SB 4.4 – Strahlenschutz IMIS, state measuring laboratory in line with StrVG and REI
Don-Bosco-Straße 1, 66119 Saarbrücken

Postal address: Landesamt für Umweltschutz
Postfach 10 24 61, 66024 Saarbrücken

Tel. switchboard (06 81) 30 00-0
Fax (06 81) 30 00-920

**Saarland measuring laboratory – LMst 2 Homburg/Saar**

Office building/delivery address: Radioaktivitätsmessstelle der Universität des Saarlandes, state measuring laboratory in line with StrVG
Gebäude 76, Universitätsgelände, 66421 Homburg/Saar

Postal address: Radioaktivitätsmessstelle der Universität des Saarlandes
Gebäude 76, Universitätsgelände, 66421 Homburg/Saar

Tel. switchboard (0 68 41) 162-0
Fax (0 68 41) 162-65 25

**Saxony measuring laboratory – LMst 1 Radebeul**

Office building/delivery address: Staatliche Betriebsgesellschaft für Umwelt und Landwirtschaft (BfUL), state measuring laboratory in line with StrVG and REI
Altwahnsdorf 12, 01445 Radebeul

Postal address: Staatliche Betriebsgesellschaft für Umwelt und Landwirtschaft (BfUL)
Dresdner Straße 78 c, 01445 Radebeul

Tel. switchboard (03 51) 83 12-6 33
Fax (03 51) 83 12-6 23

**Saxony measuring laboratory – LMst 2 Chemnitz**

Office building/delivery address: Staatliche Betriebsgesellschaft für Umwelt und Landwirtschaft (BfUL), 2. Landesmessstelle für Umweltradioaktivität Sachsen, state measuring laboratory in line with StrVG
Dresdner Straße 183, 09131 Chemnitz

Postal address: Staatliche Betriebsgesellschaft für Umwelt und Landwirtschaft (BfUL)
Dresdner Straße 78 c, 01445 Radebeul

Fax (03 71) 4 61 24-22

**Saxony-Anhalt measuring laboratory – LMst 1 Halle/Saale**

Office building/delivery address: Landesamt für Umweltschutz Sachsen-Anhalt, Fachbereich Medienübergreifender Umweltschutz, Fachgebiet Umweltradioaktivität/Landesmessstellen, state measuring laboratory in line with StrVG
Reideburger Straße 47, 06116 Halle/Saale

Postal address: Landesamt für Umweltschutz

Tel. switchboard (03 45) 57 04-0
Fax (03 45) 57 04-3 86

**Saxony-Anhalt measuring laboratory – LMst 2 Osterburg**

Office building/delivery address: Landesamt für Umweltschutz Sachsen-Anhalt, Abt. Umweltplanung/Umweltanalytik, Dezernat Umweltradioaktivität, state measuring laboratory in line with StrVG
Ballerstedter Straße 11, 39606 Osterburg

Postal address: Landesamt für Umweltschutz Sachsen-Anhalt, Abt. Umweltplanung/Umweltanalytik, Dezernat Umweltradioaktivität

Tel. switchboard (0 39 37) 21 09 80
Fax (0 39 37) 21 09 85

**Schleswig-Holstein measuring laboratory – LMst 1 Kiel**

Office building/delivery address: Landwirtschaftliche Untersuchungs- und Forschungsanstalt Schleswig-Holstein, state measuring laboratory in line with StrVG and REI
Dr.-Hell-Straße 6, 24107 Kiel

Postal address: Landwirtschaftliche Untersuchungs- und Forschungsanstalt Schleswig-Holstein
Postfach 3067, 24029 Kiel

Tel. switchboard (04 31) 12 28-0
Fax (04 31) 12 28-2 09/-4 98

**Schleswig-Holstein measuring laboratory – LMst 2 Geesthacht**

Office building/delivery address: GKSS, Forschungszentrum GmbH,
Abteilung Strahlenschutz, state measuring laboratory in line with StrVG and REI
Max-Planck-Straße, 21502 Geesthacht/Tesperhude

Postal address: GKSS, Forschungszentrum GmbH, Abteilung Strahlenschutz
Postfach 1160 21494 Geesthacht

Tel. switchboard (0 41 52) 87-0
Fax (0 41 52) 87-24 66

**Landesmessstelle Thüringen – LMst 1 Jena**

Office building/delivery address: Thüringer Landesanstalt für Umwelt und Geologie, state measuring laboratory in line with StrVG
Göschwitzer Straße 41, 07745 Jena

Postal address: Thüringer Landesanstalt für Umwelt und Geologie

Tel. switchboard (0 36 41) 6 84-0
Fax (0 36 41) 6 84-2 77

**Landesmessstelle Thüringen – LMst 2 Gera**

Office building/delivery address: Thüringer Landesanstalt für Umwelt, state measuring laboratory in line with StrVG
Hermann-Drechsler-Straße 1, 07548 Gera

Postal address: Thüringer Landesanstalt für Umwelt