

# CBRNE EVENTS CAPABILITIES OF THE SPIEZ NBC CENTRE





### THE SPIEZ NBC CENTRE

The Spiez NBC Centre comprises of Spiez Laboratory (operated by the Federal Office for Civil Protection, FOCP) and the NBC EOD¹ Centre of Excellence, operated by the Army's Training and Education Command, Engineer/Rescue/NBC Training Unit.

In case of CBRNE² incidents, Spiez contributes its capabilities in a subsidiary role in support of cantonal units. An exception is in cases of increased radioactivity levels, when the federal authorities are directly responsible. Services from the Spiez NBC centre are provided by civilian staff from Spiez Laboratory, by professional personnel from the NBC EOD Centre of Excellence, and by members of conscript formations of the NBC defence troops.

The Emergency Response Teams of the Federal Department of Defence, Civil Protection and Sport (EEVBS) at Spiez Laboratory are currently the only responders immediately available to the federal authorities who can support the cantons in responding to incidents involving radiological, biological or chemical hazards.

The NBC EOD Centre of Excellence has well-trained professional military and conscript formations with state-of-the-art equipment at its disposal. These can be called up and deployed in a staggered manner in case of CBRNE events. As first responder unit, the EOD Command is on permanent standby for incidents involving hazardous munitions or explosive ordnance. The unit has acquired great operational experience from missions in Switzerland and abroad.

In the event of an incident, the EEVBS can be requested by regional emergency services via the National Emergency Operations Centre (NEOC). The civilian authorities may request the support of the Army via the responsible territorial divisions or the Joint Operations Command in Bern. Special service agreements apply in exceptional cases that allow no delay (e.g., the deployment of radiometry teams).

<sup>1</sup> EOD: Explosive Ordnance Disposal.

<sup>2</sup> CBRN: Chemical, biological, radiological, nuclear. CBRNE: Use of explosives to disperse CBRN agents.



### SPIEZ LABORATORY

Spiez Laboratory is the Swiss Federal Institute for NBC Protection. As a division of the Federal Office for Civil Protection (FOCP), it deals from a scientific-technical perspective with the threat of NBC events and their potential consequences.

To this end, Spiez Laboratory operates the requisite laboratories and measuring equipment. With its professional expertise, it supports Switzerland's activities in the areas of arms control and peacekeeping.

#### Our vision

A world without weapons of mass destruction

#### Our mission

We develop and ensure fundamental knowledge for conceptual and technical aspects of NBC protection.

We support national authorities and international organisations in implementing and developing arms control and non-proliferation agreements.

We support the partner organisations of the FOCP in NBC preparedness and incident management, and we advise the national authorities and the armed forces on the procurement of NBC protection material.

Thus, we make a significant contribution to peacebuilding and to the safety of humanity and the environment.



# THE DDPS EMERGENCY RESPONSE TEAMS (EEVBS)

To respond to NBC incidents, Spiez Laboratory has specialised DDPS Emergency Response Teams (EEVBS): A-EEVBS (radiological/nuclear), B-EEVBS (biological), and C-EEVBS (chemical). The federal administration thus has at its disposal three specialised civilian units that are purposely equipped to deal with incidents involving radioactivity, dangerous biological agents, and toxic chemicals. These emergency response teams support cantonal forces and other federal units when needed. Their operational area encompasses the whole of Switzerland and the Principality of Liechtenstein.

In case of an incident, the emergency response teams are activated by the National Emergency Operations Centre (NEOC); they can be called out on a 24/7 basis. Immediately following an alarm, the EEVBS will contact the officer in charge on the scene; thus ensuring rapid technical guidance from Spiez Laboratory. During this first contact, the incident is evaluated preliminarily and the scope of an EEVBS deployment is assessed. Within an hour following the alarm, an EEVBS team will depart from Spiez for the scene. Transport is provided by EEVBS emergency vehicles or Swiss Army helicopters.

The emergency vehicles of the three EEVBS teams are equipped with modern measuring devices and other mission-critical material, to allow the teams to protect themselves and to perform initial measurements. They also carry the necessary equipment for the collection of different types of samples according to recognised standards. Samples can be rapidly transported to Spiez Laboratory for an in depth laboratory analysis. The chain of custody of the samples is fully maintained during collection and transport. The EEVBS teams on-site provide subject matter expertise to the first responders; they can also relay questions back to Spiez Laboratory. In case of complex or large-scale events, the military's NBC defence units (in particular the NBC Defence Intervention Company, NBC Defence Laboratory 1, and the 10th NBC Defence Battalion) as well as specialists of the NBC EOD Centre of Excellence can be called upon.

The three EEVBS teams each consist of between 15 and 20 volunteers who are specialised civilian experts at Spiez Laboratory, complemented by a few select experts from the NBC EOD Centre of Excellence. Work in the EEVBS is voluntary and, as a rule, a part-time engagement. However, all EEVBS members have years of professional experience working at the laboratory and receive special training for missions in the field. Moreover, all three units hone their mission-readiness and expertise in regular field exercises with national and international partners.

For general enquiries about NBC hazards, Spiez Laboratory can provide professional guidance (tel. +41 58 468 14 01).



# **A-EEVBS**

The A-EEVBS of Spiez Laboratory is deployed in incidents involving potential radiological hazards.

The A-EEVBS supports other federal and cantonal incident response units in particular in the following scenarios:

- In incidents with confirmed or suspected release of radioactivity, e.g., a nuclear accident, terrorist use of a radiological ("dirty") bomb, or an accident during transport of radioactive material; or when searching for missing radioactive material.
- With targeted controls at border crossings, airports, container terminals, roads, and other transport hubs, and during major national events to prevent the smuggling or non-compliant transportation of radioactive material.

In the first scenario, support consists particularly of on-site measuring of radioactivity using various detection methods. In the second scenario, the support consists of discreetly monitoring certain traffic infrastructures for possible transports of radioactive material. The EEVBS team is specialised in radiological measurements and the safe handling of radioactive material.



### **B-EEVBS**

The B-EEVBS of Spiez Laboratory is deployed at the request of the respective bio expert of the canton in the event of an incident involving possible biological hazards.

The focus is on highly pathogenic disease agents of Risk Groups (RG) 3 (e.g. anthrax, plague, and tularaemia bacteria) and 4 (e.g. Ebola, Marburg, Lassa, and Smallpox viruses), as well as biological toxins (e.g. ricin).

Specifically, the B-EEVBS supports the cantonal emergency response organisations in particular with the following services:

- Advising the emergency services.
- Identification and selection of possible samples as well as the collection of such samples for specific biological analyses in Spiez Laboratory.

The team of the B-EEVBS consists of microbiologists and laboratory technicians who are specialised in the investigation of highly pathogenic disease agents. They are experienced in the safe handling of dangerous organisms.



### **C-EEVBS**

The C-EEVBS of Spiez Laboratory is deployed in incidents involving potential threats from toxic chemicals.

The focus is on substances known to be chemical warfare agents as well as select toxic industrial chemicals (TIC). The concept of operation of the C-EEVBS is geared towards an expeditious and efficient support of local emergency services, in particular chemical HAZMAT teams, fire brigades, police units, and paramedics.

Specifically, the C-EEVBS supports the cantonal emergency units with the following services:

- Measurements to assess the spreading of contamination in cases of a suspected release of toxic chemicals.
- Identifying and selecting potential samples, and collecting such samples for specific chemical analyses at Spiez Laboratory.

The C-EEVBS has limited supplies of antidotes for nerve agents, to be administered by medical professionals' onsite. However, it does not have medical professionals as part of its team. In case of an incident, toxicological expertise is provided by Tox Info Suisse, Switzerland's official agency for all issues related to poisoning.



# THE SAMPLE RECEIPT FACILITY (SRF)

At the Sample Receipt Facility (SRF), samples containing unidentified potential CBRN hazards can be professionally processed by experts and prepared for laboratory analysis.

If large numbers of samples require processing, the NBC Defence Laboratory 1 operates the SRF. The SRF ensures that the samples are correctly received and registered in the laboratory's information management system, and it controls the transfer of samples to the respective analytical and diagnostic laboratories of Spiez Laboratory.

The "cold triage" process is applied to samples with a clearly defined mandate and known hazard. The SRF platoon of NBC Defence Laboratory 1 is capable of processing up to 1000 samples a day safely and professionally. Each sample is correctly received. First, the integrity of the exterior packaging is checked, then the sample is properly registered, placed in temporary storage if necessary, and finally transferred to the analytical laboratories.

The "hot triage" process is carried out by the SRF staff team of Spiez Laboratory, which is comprised of experienced specialists from the four divisions: nuclear chemistry, biology, chemistry, and CBRNE protection systems. The team is capable of receiving, assessing, and preparing samples containing unknown or combined NBC materials in a professional and safe manner for further investigation in the various specialised laboratories.

Unlike the cold triage process, a single hot triage can take several hours. If explosives or improvised explosive devices (IED) cannot be excluded in either of the two sample handling processes, the NBC Defence Laboratory 1 or the Spiez Laboratory SRF staff team are supported by the EOD Command.



### THE NBC EOD CENTRE OF EXCELLENCE

The NBC EOD Centre of Excellence is the Swiss Armed Forces centre of expertise for all NBC issues as well as for the removal of unexploded ordnance and demining. As part of the Centre, the EOD Command maintains a reporting hotline for discoveries of unexploded ordnance. It ensures a timely and safe recovery and disposal of discovered items throughout Switzerland.

The services provided by Centre and its professional and conscript formations are based on tiered capabilities to support the Swiss Armed Forces, to provide subsidiary support to civilian emergency services and to support peace operations.

Deploying specialists and formations for domestic and overseas missions are their primary tasks. Furthermore, the NBC EOD Centre of Excellence is responsible for developing doctrine and standards regarding all aspects of NBC defence as well as the Army's unexploded ordnance removal and demining operations.

All of the Swiss Army's NBC specialists as well as the conscript units of the NBC defence formations complete their basic and advanced training at the Centre's NBC Defence School 77. Specialists of the EOD Command complete basic and advanced training programs in-house as well as abroad. In cooperation with the Armed Forces Staff, the environmental officers of the military units are also trained in Spiez.

On behalf of the Organisation for the Prohibition of Chemical Weapons (OPCW), the Centre conducts NBC protection courses onsite and internationally. The EOD Command also offers courses on ammunition technology, storage, and management as well as training in EOD clearance for all the troops.



### THE NBC DEFENCE OF THE ARMED FORCES

The NBC defence capabilities of the Swiss Armed Forces comprises of basic protection and alerting/alarm measures that are part of all troops' capabilities (NBC defence of all troops) as well as advanced CBRN capabilities that only the NBC defence units can offer.

The NBC defense troops are the only deployment force in Switzerland with available robust means, i.e., anti-mine and shrapnel protection, and equipped with a self-defense armament. These troops could be deployed in any NBC exploration domain, NBC mobile detection, or terrestrial radiometry. In collaboration with Labor Spiez, stationary NBC detection is provided with an enhanced degree of protection.

In the following, we offer a brief description of each individual formation.



### THE NBC OPERATIONAL STAFF

NBC Operational Staff personnel are recruited from NBC specialists of the NBC defence units in all branches of the Army, as well as from Army personnel with professional civilian experience in the field. The NBC Operational Staff is a high-readiness conscript formation. It supports and reinforces regular personnel of the NBC EOD Centre of Excellence in CBRN-related technical questions and staff responsibilities.

### THE NBC INTERVENTION DETACHEMENT 104/204

The NBC intervention detachment is a military structure with a long-term service and professional component, which intervenes within 6 hours of an alarm. As a flexible means of first response, it is particularly well suited to subsidiary support services within the national security network, and can provide the following services:

- Ground and airborne radiological reconnaissance/monitoring
- NBC reconnaissance and sampling
- Extensive NBC decontamination of patients
- Reduced NBC decontamination of people, equipment and vehicles
- Reduced medical service under NBC conditions.

The special organizational concept of the NBC intervention detachment enables it to provide a wide range of capabilities with a reduced personnel complement, since only one service can be engaged at a time. The capacity to operate is designed to last from a few days to a few weeks, depending on the system used and the rotation rhythm. In the case of support or active service, long-service personnel from the last four years can also be called up.







### THE NBC DEFENCE BATTAILLONS 10 AND 20

The NBC 10 and 20 defense battalions each have

- 1 NBC defense staff company
- 2 NBC defense companies
- 1 NBC defense laboratory company.

NBC Defense Battalion 10 is part of the high readiness militia. Its readiness target is of 24 to 96 hours from alarm.

#### **NBC Defense Staff Company**

The NBC Defense Staff Company performs logistics and command support tasks for the benefit of the entire battalion.

#### **NBC Defense Companies**

Each of the two NBC defense companies consists of an NBC reconnaissance platoon, a detection platoon and two NBC decontamination platoons.

- The NBC reconnaissance platoons each have one command vehicle and three Piranha III C 8×8 NBC reconnaissance vehicles.
- The detection platoons each have two NBC sampling teams and one A, B and C detection vehicle each (DURO IIIP).
- The NBC decontamination trains can thoroughly decontaminate patients and other people, equipment and vehicles and treat pure water.

The material for the decontamination vehicles is loaded onto several interchangeable rolloff containers. This enables autonomous operation over long periods of time, even at locations that are not connected to the drinking water or power supply.



#### **NBC Defense Laboratory Company**

The NBC defense laboratory company supports the Spiez laboratory with personnel and equipment during events with large sample throughput and can provide the following services:

- Operate the sample collection point for the support of Spiez Laboratory
- Analysis of a large number of samples: from R-/N-, B- or C- analyses up to the forensic level in Labor Spiez
- NBC sampling and in-situ gamma spectrometry

Some specialists from the NBC Defense Laboratory Company have in-depth knowledge that enables them to work immediately alongside civilian specialists for measurement and analysis tasks inside Spiez Laboratory – for example, in the analysis of SARS-CoV-2 during the COVID-19 pandemic.

The main task of the NBC defense battalions is to support military task forces in the event of suspected or actual CBRN/CBRNE attacks or incidents. In addition, services can be provided on a subsidiary basis to civilian authorities at home and abroad or in the context of peacebuilding.



#### Capabilities and technical specifications of the NBC reconnaissance vehicles

The mission of NBC reconnaissance units is to monitor the area of operation and to verify the type and extent of any contamination. They provide a rapid overview of the NBC situation and predict the spread of a contamination.

This allows the deployed units to take fast, targeted, protective measures with the aim of regaining freedom of action. In particular, the NBC detection vehicle can provide the following capabilities:

#### Nuclear/radiological reconnaissance:

 Measurement of gamma dose rate, measurement of radioactive soil and air contamination (alpha/beta).

#### Biological reconnaissance (stationary)

Detection of increased concentrations of bioaerosols in the air.

#### Chemical reconnaissance:

- Detection and verification of chemical warfare agents and toxic industrial chemicals.
- Warning from external and internal contamination.

#### Other properties:

- NBC sample collection from inside of the vehicle, collection of environmental and wipe samples.
- Sample processing and delivery capabilities.
- Marking of contaminated areas while driving.



#### Capabilities and technical specifications of mobile detection vehicles

Mobile NBC detection allows CBRN agents to be rapidly analysed in close proximity to the incident site. Each NBC defence company has one vehicle each for N, B, and C detection.

#### Vehicle type A for R/N analytics

- Measurement of ionising alpha, beta, and gamma radiation.
- Identification of radionuclides.
- Semiqualitative and semiquantitative verification of alpha and beta emitters (Uranium, Plutonium).
- Qualitative and quantitative verification of gamma emitters and tritium.
- Detection of radioactive particles suspended in the air.

#### Vehicle type B for bioanalytics

- Work on biological pathogens up to RG 3 and biotoxins.
- Measurement of biological contamination in samples from the operations area (e.g., water analysis).
- Verification of toxic industrial biological (TIB) material, biotoxins, and B-weapons agents.
- Detection of bio-particles suspended in the air.

#### Vehicle type C for chemical analytics

- Measurement of chemical contamination in the area of operation.
- Detection of chemical substances.
- Detection of chemical warfare agents.
- Detection of chemical substances in the air using air collection analysis.

#### Technical specifications (identical for all mobile detection vehicles)

- NBC-protected cabin with negative pressure, airlock system for entry and exit.
- Data registration for the laboratory information management system.
- Measurement of meteorological data.
- Documentation of measurement results and transmission through the command system.



#### **NBC** decontamination capabilities

"Thorough" decontamination complements and improves the immediate individual decontamination as well as the operational decontamination available in all units. It serves to restore full freedom of action by allowing the receiving units to continue their work safely.

The following figures serve as a rough guide, though parameters may vary depending on the nature of the contamination and pollution (time for system readiness and restore not included):

- Decontamination of individuals: 50 contaminated persons per hour.
- Decontamination of patients: 6–10 contaminated patients lying down per hour (depending on the degree of injury).
- Decontamination of vehicles and large items of equipment: 15 contaminated chassis per hour or 3–4 vehicles including interior decontamination.

#### Other capabilities

- Water treatment vehicles with a capacity for processing 1600 l of pure water from surface water.
- Water transport when water is sourced from surface waters (max. 1500 m distance and max. 10 m altitude difference).
- Autonomous power generation, heating, and lighting.

#### Terrain requirements

- Must be accessible for heavy trucks with trailers.
- As even as possible, max. 1500 m distance from water sources (hydrants or suitable body of surface water).
- Space required for all modules (main decontamination site): approx. 20000 m<sup>2</sup>.

#### Modularity

- Systems may be deployed separate or in combination (main decontamination site).
- Material is stored on several interchangeable roller containers.



### THE EOD COMMAND

The Explosive Ordnance Disposal and Mine Action Command (EOD Command) is the Swiss armed forces expert centre and principal authority for ordnance disposal and demining.

As such, it is responsible for capacity development and maintenance, trains ordnance disposal specialists to different authorisation levels, raises soldiers' awareness in the handling of ordnance, develops operating procedures, and maintains an information and documentation office.

The EOD Command supports the armed forces and civilian authorities with technical advice and expert assessments in cases such as clean-up of suspect sites or monitoring of munitions dumps.

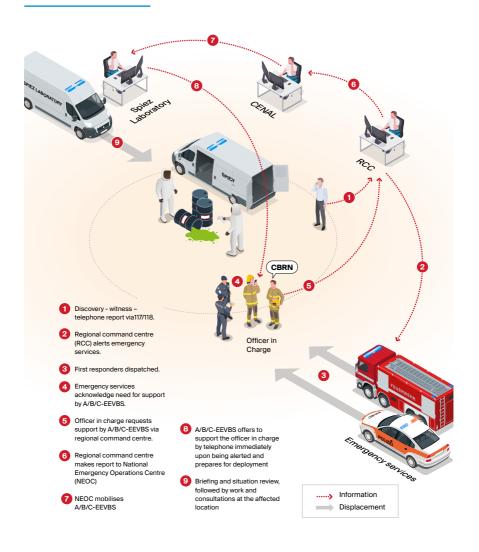
As an operational element, the Swiss EOD Command operates the National Unexploded Ordnance Recording Centre (BMZ), disposes of ordnance on land and at sea, and supports the troops in clearing target areas. Ensuring operational readiness in the area of handling IEDs completes the mission spectrum of ordnance disposal in Switzerland.

The EOD Command also provides personnel for peace support missions. Operating as fully equipped teams, the specialists support military forces upon discovery of ordnance and IEDs. They may also serve as civilian observers and trainers in humanitarian demining programmes.

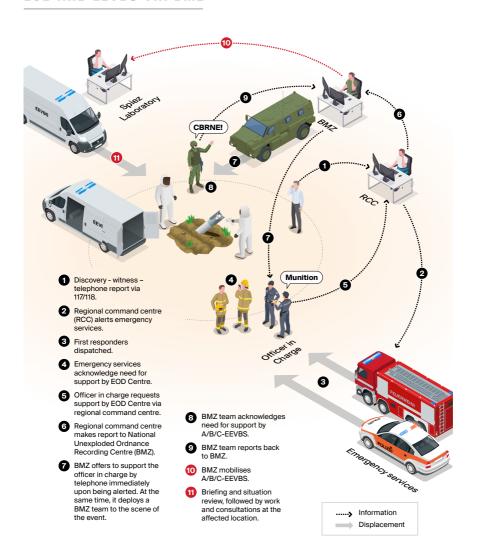
In complex incidents involving CBRN material and explosives (e.g. dirty bomb scenarios), the EOD Command provides professional expertise on ordnance with the aim of preventing the release of CBRN agents. The EOD Command can provide support to the EEVBS, military NBC defence units, or other emergency services.

# ALERT/ALARM SPIEZ NBC CENTRE

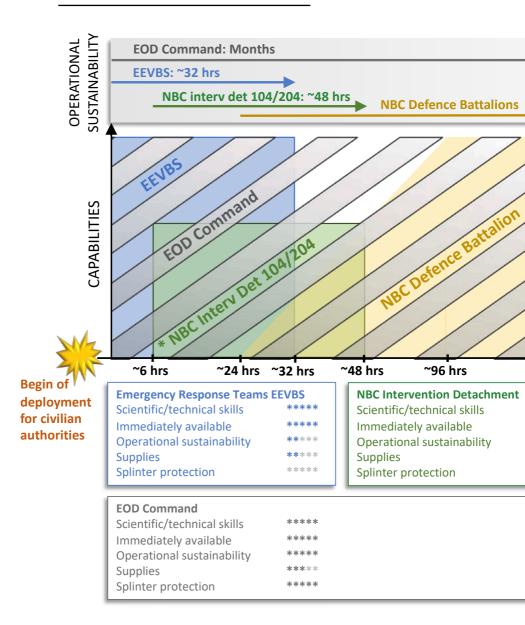
### **EEVBS VIA CENAL**

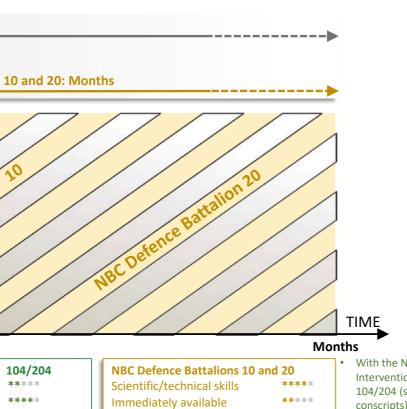


### EOD AND EEVBS VIA BMZ



# OPERATIONAL PROCEDURE





Operational sustainability

Splinter protection

**Supplies** 

With the NBC
 Intervention Detachment
 104/204 (single-term
 conscripts), the
 replacement of
 the EEVBS can be ensured
 until the NBC Defense
 Battalions are able to
 provide its services.

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### CAPABILITIES OF THE SPIEZ NBC CENTRE

#### **EEVBS** capabilities

#### Team Capability A-EEVBS Rapid professional expertise in events involving increased radioactivity (by telephone and on site) On-site detection and identification of radioactivity Sample collection Sample measurements on site (Gamma Object Measurement) Recovery of radioactive material Scans of individuals (full-body and thyroid) Operation of federal resources and professional support for the Radioactivity Information Centre Nuclear forensics/nuclear safety (on site) Transporting Class 7 hazardous materials (radioactive substances) Analysis of samples (soil, water, grass, and air) in an accredited laboratory at Spiez Laboratory Targeted checks for radioactivity Missions in the framework of the IAEA's Response and Assistance Network (RANET) Measurement devices Operational sustainability Various detectors and field 32h identification kits for radioactive substances NADAM mobile 2 portal monitors Supplies for sample collection

Team	Capability	
B-EEVBS	<ul> <li>Pathogen-specific professional advice in case of suspected release of novel or highly pathogenic disease agents in RG 3 and 4 as well as toxins (by telephone and on site)</li> <li>Sample collection</li> <li>Delivery of samples to Spiez Laboratory</li> <li>Analysis of samples (solid, liquid, gaseous) in accredited laboratory of Spiez Laboratory</li> </ul>	
	Measurement devices	Operational sustainability
	<ul><li>Sample collection for RG 3 and 4 pathogens</li><li>Supplies for sample collection</li></ul>	32h
C-EEVBS	<ul> <li>Professional advice in events of suspected release of chemical weapons agents and highly toxic chemicals (by telephone and on site)</li> <li>Detection/identification of chemical agents and toxic industrial chemicals on site</li> <li>Collection of samples (solid, liquid, gaseous) within and outside the hazard zone</li> <li>Delivery of samples to Spiez Laboratory</li> <li>Analysis of samples (solid, liquid, gaseous) in an accredited laboratory of Spiez Laboratory</li> </ul>	
	Measurement devices	Operational sustainability
	<ul> <li>Various detectors and field identification kits for chemical agents and various hazardous industrial chemicals</li> <li>Supplies for sample collection</li> </ul>	32h

(solid, liquid, gaseous)

#### Services provided by the army

Configuration	Capability		
NBC interv det 104/204	<ul> <li>Airborne radiometry (1 system within 8h on-site)*</li> <li>Field radiometry (2 systems within 6h on-site)**</li> <li>Outside the vehicle ABC reconnaissance and ABC sampling (1 team)**</li> <li>In depth decontamination for patients**</li> <li>Limited capacity for ABC decontamination for people, equipment, and vehicles**</li> <li>Reduced medical service under NBC conditions</li> <li>**Professional staff Comp Zen ABC-KAMIR</li> <li>** or services**</li> </ul>		
	Instruments / Equipment	Operability	
	<ul><li>Gamma spectrometry</li><li>Various measurements and analyses</li></ul>	48h	
NBC def bat 10 and 20	<ul> <li>ABC reconnaissance</li> <li>ABC mobile detection and sampling</li> <li>In depth ABC decontamination, including water treatment</li> <li>Various laboratory analyses</li> </ul>		
	Instruments / Equipment	Operability	
	<ul> <li>Various measurements and analyses</li> <li>Modular structure (Roll-off container)</li> <li>Various devices for measurement and analysis</li> </ul>	Months	
Kdo KAMIR	Explosive Ordinance Disposal (EOD) detachments (multiple detachments, all consisting of military professionals with several years of training)		
	Instruments / Equipment	Operability	
	<ul> <li>Various instruments, robots, and protective equipment</li> </ul>	Months	



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