

# 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 Competence, 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 Competence, 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 Competence 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 Competence 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 Competence. 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 COMPETENCE

The NBC EOD Centre of Competence 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 Competence 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.

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 defence troops are the only NBC units in Switzerland to operate armoured vehicles (i.e., protected against mines and shrapnel and armed for self-defence), which can be deployed in all circumstances for NBC reconnaissance and detection.

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

### THE NBC DETACHMENT

Like the EEVBS and the units of the EOD Command, the NBC Detachment is rapidly deployable. Today, it is an ad hoc formation constituted of elements from the staff of the NBC EOD Centre of Competence, reinforced by individual specialists of the EOD Command and the NBC Defence School 77. It is deployed only in case of a CBRN incident.

This formation can bring the command centre into operation within an hour and deploy a team to measure levels of radiation from a vehicle or from the air in order to establish the radiological situation. The formation's capabilities are due to expand in the following years and to be reinforced with professional staff as well as long-term conscripts.



### THE NBC EXPERT STAFF

NBC Expert 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 Expert Staff is a high-readiness conscript formation. It supports and reinforces regular personnel of the NBC EOD Centre of Competence in CBRN-related technical questions and staff responsibilities.

### THE NBC DEFENCE INTERVENTION COMPANY

The NBC Defence Intervention Company is a conscript formation with two identical NBC defence platoons. As a high-readiness conscript formation (deployment-ready within 12 hours of alert), it provides the following services:

- Radiological measurements on the ground and in the air.
- NBC sample collection and in-situ gamma-ray spectrometry.
- Thorough NBC decontamination of patients or individuals.

The NBC Defence Intervention Company is deployed in a subsidiary function in support of civilian or military emergency units and can sustain operations for several days and weeks.







### THE NBC DEFENCE LABORATORY 1

The NBC Defence Laboratory 1 is a specialised conscript battalion with three identical NBC Defence Laboratory companies, one of which is a high-readiness conscript company (deployment-ready within 24 hours of alert). The companies support Spiez Laboratory with work force and resources in situations, where large numbers of samples need to be processed. Only one laboratory company is deployed at any time.

An NBC Defence Laboratory company is able to provide the following services:

- Operate the Sample Receipt Facility on behalf of Spiez Laboratory.
- Analyse a large number of R/N, B, or C samples to forensic-level at Spiez Laboratory.
- Collet NBC samples and perform in-situ gamma ray spectrometry.

Some specialists of the NBC Defence Laboratory 1 have in-depth knowledge that allows them to be immediately deployed in support of measurement and analytical activities a t Spiez Laboratory, working side by side with civilian experts, as was the case during the outbreak of the COVID-19 pandemic, for the analysis of SARS-CoV-2 samples.

Because of the staggered deployment of up to three companies, the laboratory operations at Spiez Laboratory can be sustained around the clock, for long durations.



### THE NBC DEFENCE BATTALION 10

The NBC Defence Battalion 10 has four NBC defence companies, two of which are high-readiness conscript companies (deployment-ready within 24 hours of alert). Each NBC defence company consists of one NBC reconnaissance platoon, one detection platoon, and two NBC decontamination platoons. The NBC reconnaissance platoons are equipped with a command vehicle and three Piranha III C 8×8 NBC reconnaissance vehicles. The detection platoons each have two NBC sampling teams and are equipped with three DURO IIIP detection vehicles for N, B, and C detection, respectively. The NBC decontamination platoons can thoroughly decontaminate patients and persons as well as equipment and vehicles and provide treatment for pure water. The equipment for the decontamination platoons is stored on several interchangeable roller containers. This facilitates autonomous operations over extended periods of time even in locations that have no water or power supply.

The main mission of this formation is to support deployed military units in cases of suspected or confirmed CBRN/CBRNE attacks or incidents. Additionally, subsidiary services can be provided in support of civilian authorities in Switzerland and abroad, or within the framework 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 rapid 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.
- Ability for sample processing and sample delivery.
- 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

- Analysis.
- Receipt of samples.
- Decontamination of waste.

#### 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.



#### **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: 30 contaminated patients per hour (10 supine, 20 walking).
- Decontamination of vehicles and large items of equipment: 15 contaminated vehicles per hour.

#### Other capabilities

- Water treatment vehicles with a capacity for processing 1,600 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.

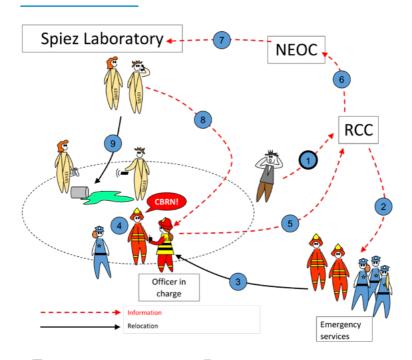
As an operational element, the Swiss EOD Command operates the National Unexploded Ordnance Recording Centre (BMZ), disposes of ordnance on land and at sea, and supports the troops in clearing target areas. Ensuring operational readiness in the area of handling IEDs completes the mission spectrum of ordnance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

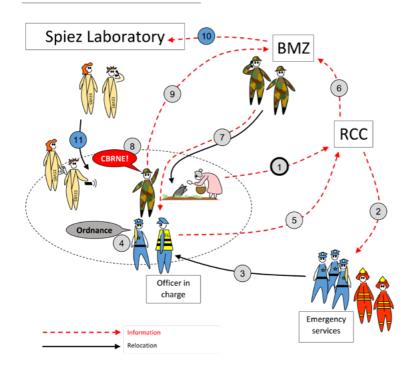
### **EEVBS VIA NEOC**



- Discovery witness telephone report via 117/118
- Regional command centre (RCC) alerts emergency services
- First responders dispatched
- Emergency services acknowledge need for support by A/B/C-EEVBS
- Officer in charge requests support by A/B/C-EEVBS via regional command centre

- Regional command centre reports to
  National Emergency Operations Centre (NEOC)
- NEOC mobilises A/B/C-EEVBS
- Immediately after being alerted A/B/C-EEVBS offers to support the officer in charge by telephone and prepares for deployment
- Briefing and situation review, followed by work and consultations at the affected location

### **EOD AND EEVBS VIA BMZ**



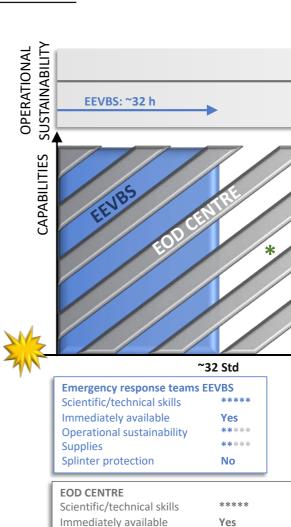
- Discovery witness telephone report via
- Regional command centre (RCC) alerts emergency services
- First responders dispatched
- Emergency services acknowledge need for support by EOD Centre
- Officer in charge requests support by EOD
  Centre via regional command centre
- Regional command centre makes report to National Unexploded Ordnance Recording Centre (BMZ)

- Immediately after being alerted BMZ offers to support the officer in charge by telephone. At the same time, it deploys a BMZ team to the scene of the incident.
- 8 BMZ team acknowledges need for support by A/ B/C-EEVBS
- 9 BMZ team reports back to BMZ
- BMZ mobilises A/B/C-EEVBS
  - Briefing and situation review, followed by work and consultations at the affected location

# OPERATIONAL PROCEDURE

As of 2021

Begin of deployment for civilian authorities



Operational sustainability

Splinter protection

Supplies

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Yes



<sup>\*</sup> The planned build-up of a long-service formation into an NBC detachment, deployment-ready from 2023 on, will close the current time-based "replacement gap".

### 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>	32 h	
C-EEVBS	Professional advice in events of suspected release of chemical weapons agents and highly toxic chemicals (by telephone and on site) Detection/identification of chemical agents and toxic industrial chemicals on site Collection of samples (solid, liquid, gaseous) within and outside the hazard zone Delivery of samples to Spiez Laboratory Analysis of samples (solid, liquid, gaseous) in an accredited laboratory of Spiez Laboratory		
	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>	32 h	

(solid, liquid, gaseous)

#### Army capabilities

Formation	Capability		
ABC Ei Det	Radiometry (land or air, 1 team)		
	Measurement devices	Operational sustainability	
	Gamma spectrometry	48h	
ABC Abw Ei Kp (Conscript)	<ul> <li>Radiometry (land and air, 4 teams)</li> <li>NBC sample collection, insitu gamma spectrometry</li> <li>Thorough decontamination of patients and other persons</li> </ul>		
	Measurement devices	Operational sustainability	
	<ul> <li>Gamma spectrometry</li> <li>Various devices for measurement and analysis</li> </ul>	Weeks	
ABC Abw	Various laboratory analyses		
Lab 1 (Conscript)	Measurement devices	Operational sustainability	
	<ul> <li>Various measurement and analysis methods up to forensic level</li> </ul>	Months	
ABC Abw Bat 10 (Conscript)	<ul> <li>NBC reconnaissance</li> <li>NBC detection (mobile) and sample collection</li> <li>Thorough NBC decontamination including water treatment</li> </ul>		
	Measurement devices	Operational sustainability	
	<ul> <li>Various devices for measurement and analysis</li> <li>Modular design (interchangeable roller containers)</li> </ul>	Months	
Kdo KAMIR	EOD detachment (multiple detachments, all consisting of military professionals with several years of training)		
	Measurement devices	Operational sustainability	
	<ul> <li>Various measurement devices, robots, protective equipment</li> </ul>	Months	



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