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DEU needs on ammunition storage in missions abroad

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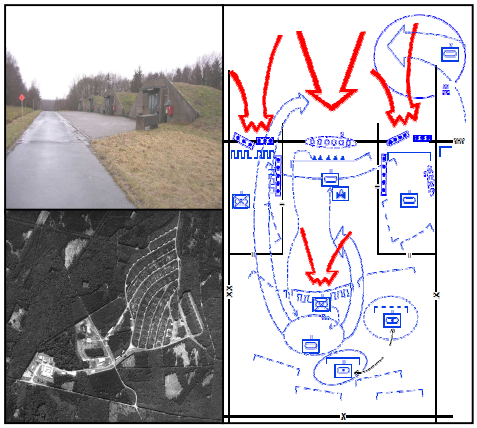
1. Introduction

Since being established in 1955, alliance and national defense has been the central mission of the Bundeswehr until the 1990s. Personnel and equipment, training and exercises and tactics and operational planning were geared to a conventional war on German territory.

Back then all the logistics was prepared to supply major units with large quantities of consumables, including ammunition, for the conduct of delaying or high-intensity defense operations at the inner-German border. For this purpose, a dense network of fixed logistic facilities was established that were capable of providing, for example, large amounts of most different but planned packages of ammunition within a short period of time. This was an indispensable prerequisite for the Bundeswehr's, and hence NATO's defense capability.



Picture 1. – Ammunition storage in Germany to support major operations in Central Europe

Since the beginning of the 1990s and the end of the Cold War era, German armed forces became involved in different missions abroad under the mandate of the United Nations, NATO and/or the European Union and will continue to do so also in the future. Depending on the mandate, German force contingents are assigned most different missions that may require operational command and control to change rapidly in type and intensity. Highest, medium and low intensity of actual or expected combat operations may change erratically or occur simultaneously, but locally separated. For that purpose, different types of ammunition must be stored over periods of time difficult to forecast, and the ammunition must be kept ready in a way that it is available in due time and sufficient quantity to units organized heterogeneously, widely dispersed and equipped in part with different arms. In other words, ammunition must be kept directly with the units at storages sites that can be built quickly and/or operated for limited periods of time, as appropriate. This is an indispensable prerequisite for both mission accomplishment and ensuring the survivability of the troops.

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This fundamentally changed situation regarding the supply with and storage of ammunition has resulted in issues and tasks related to the design safety of ammunition having shifted to the military commander's area of responsibility and gained in importance for the own conduct of operations. Within the Bundeswehr the expertise necessary for the aspect of physical protection is provided by the Infrastructure Division at the German Armed Forces Office.

This paper deals with the changes in the demands on physical protection in the context of ammunition storage since 1990 and describes the resulting need for development. This is followed by a brief description of the derived military requirement [6.5.], and the paper concludes with a summary and an outlook on the way ahead.

2. Ammunition storage on operations until 2009

2.1. Parameters

DEU considers the demands on the design safety of ammunition both during routine and on operations to be basically identical. Aside from national legislation and regulations[1] a number of international treaties, particularly NATO agreements, EU and WEU treaties, and status-of-forces and transit agreements, must be taken into consideration. In situations having the international status of "war" other simplified requirements will apply [6.10.]. However, for the foreseeable future these requirements will not be applicable and, therefore, cannot be used for answering the subsequent questions.

For routine duty and, thus, largely for the design safety of ammunition in Germany the Bundeswehr, in the form of national joint service regulations [6.6.-6.10.], has developed a safety concept aimed either at avoiding or minimizing unintentional effects of incidents involving ammunition. In this way, it is ensured that the Bundeswehr performs sovereign duties, while at the same time a safety standard is provided that is almost equivalent to civilian regulations. The national service regulations governing the design safety of ammunition[2] are mainly based on NATO AASTP-1[3] [6.12.] which, in turn, is based on the working results of AC/326 [6.11.] and, thus, represents a NATO standard.

However, already during the first Bundeswehr missions abroad it turned out very quickly that neither the solutions found nor the standards set could be adhered to under the existing framework conditions.

NATO AASTP-1 [6.12.] and national service regulations (ZDv) [6.6.-6.10.] start out from fixed infrastructure facilities and envisage the storage of very large quantities of explosives to be such that the latter are protected, above all, from any incidents occurring outside the storage sites. The security of the surrounding area[4] is granted in any case. Ammunition storage sites or ammunition depots are mostly operated as independent facilities and remote from other installations.

However, Bundeswehr peacetime operations abroad required and still require ammunition to be stored under complex and in part quickly changing framework conditions that can be influenced only to a certain extent. These conditions include

- extreme climatic conditions

[1] e.g. the German Basic Law (particularly Article 87 a/b, Article 24, para 2, Article 35 and Article 91), the German Weapons Law and the German law on explosive substances (Explosives Act)
[2] German Joint Service Regulations of series 34
[3] AASTP – Allied Ammunition Storage and Transportation Publication
[4] civilian neighborhood (inhabitant buildings) or important operational areas

- different and varying threats
- rapid changes in contingent strength and with it in the quantities of ammunition to be stored
- storage of ammunition inside camps
- limited options to choose camp sites and with it also ammunition field storage sites and/or ammunition field depots
- storage of keep-ready ammunition and parking of armed combat vehicles in the immediate vicinity of accommodation areas
- compliance with the regulations and legislation of a host nation
- earthquake threat to infrastructure.

Aside from these framework conditions specified already by area of operations and mission, it was also necessary to define the scope of an additional but acceptable risk caused by the storage of ammunition.

In general, the risk acceptance of both the military and political leadership in issues related to the design safety of ammunition was very low, not to say an increased risk was completely unacceptable. In operations involving a medium-level threat situation, but mostly in operations involving a low-level threat situation, where the danger to life and limb of the soldiers outside the camps was very small, an increased risk caused by operational procedures, organization or inadequate infrastructure was unacceptable. In case of an incident this could have impossibly been communicated to the German public.

To ensure the design safety of ammunition in this environment in a way that is politically and operationally acceptable to Germany, it was necessary to define a framework for ammunition storage. Subsequently, this framework had to be filled with both physical protection and organizational measures.

2.2. Available policy documents

For Bundeswehr peacetime operations, the concept "Design Safety of Ammunition of the Bundeswehr" [6.1.] constitutes the framework described above. Against the background of operational realities and lessons learned until 2009, this concept describes the design safety of ammunition during routine duty and on operations. In doing so, protection objectives are prioritized, legal requirements described, available risk analysis procedures named and pertinent responsibilities determined. On the time schedule, this document came into existence relatively late; as a result, it puts up an umbrella over the documents described below without calling their contents into question (bottom-up principle).

Under the proponency of the specialist office for the design safety of ammunition at the Joint Support Command (JSC), the Directive on the Design Safety of Ammunition Storage on Deployment [6.2.] was prepared and issued as an instruction for action to all agencies responsible for ammunition storage. Here a parallelism with another product of AC/326 [6.11.] can be seen, i.e. AASTP-5 [6.13.]. The objectives and the basic structure of both documents are quite similar, with the safety distances laid down in the German paper being more conservative.

In the German Directive on the Design Safety of Ammunition Storage on Deployment [6.2.], safety distances are given depending on the distance of exposed sites from the net explosive quantity (NEQ) at the explosion site. Depending on the type of ammunition storage site, differentiated details are given about maximum storage quantity and resulting safety distance.

To cover the special circumstances at airfields and standardize them for the Bundeswehr, the German Air Force issued the "Directive on Safety Requirements for the Storage of Conventional Ammunition Associated with Aerial Weapon Systems" [6.3.]. This directive regulates the storage and handling use of ammunition. It is to be applied at all Bundeswehr airfields at home and abroad but will not be dealt with in more detail in this paper.

2.3. Physical protection measures and assets

Using the Protective Construction Catalog for Ammunition Storage on Deployment[5] [6.4.], issued by the German Armed Forces Office, in combination with the above-mentioned directive [6.2.], standardized planning, construction and operation of ammunition field storage sites and ammunition field depots is possible while accepting a calculable residual risk.

Characteristic features of all German ammunition field storage sites and ammunition field depots on operations abroad include the predominant storage of ammunition in ISO containers or wooden containers surrounded by concertainer walls and the observance of an adequate safety distance (FD[6]) from any facility within reach of the storage sites. In case of extended periods of use, also earth-covered reinforced concrete structures are built for selected types of ammunition, especially for hazard division (HD) 1.2 ammunition [6.8.], to allow large quantities of HD 1.2 ammunition to be stored in such a way that in case of an incident structural failure does not result in an uncontrollable EOD incident[7]. It is also possible to prevent ammunition components already charged energetically from being expelled from the stack to detonate in the vicinity of adjacent stacks and thus cause the detonation to be transferred to these stacks.

Picture 2. – Ammunition storage in AFG to support troops operating in the vicinity of the field camps

Moreover, structural solutions are available for both the storage of ammunition in the immediate vicinity of accommodation areas and the parking of armed combat vehicles and/or aircraft.

All solutions stated or offered in the Handbook for Physical Protection for Ammunition Storage in Operations [6.4.] have been tested with and without barricades to prove their efficiency in case of an incident. These are the answers of physical protection to issues about the design safety of ammunition that result from the parameters and types of operations described above.

[5] The German Armed Forces Office presented this document at the 34th U.S. Department of Defense Explosives Safety Seminar.
[6] FD = Field Distance
[7] e.g. large quantities of ammunition in an unknown condition buried under rubble and excavated material in the middle of a camp

2.4. Advice to the force commander

The Joint Support Command (JSC) specialist office for the design safety of ammunition is responsible for all matters regarding the design safety of ammunition in the context of ammunition storage.

Advice on issues of physical protection is given by the German Armed Forces Office. Here officers with university studies in the field of civil engineering are employed and receive further specialist training. In close cooperation and coordination with the Bundeswehr technical centers, the Bundeswehr University in Munich and other institutes such as the Ernst Mach Institute of the Fraunhofer Society, the subject of physical protection is developed further and topical problems arising from operations and routine duty dealt with. Advice for the force commander by specialist personnel from the German Armed Forces Office is mainly based on two pillars.

On the one hand the situation in ammunition field storage sites and ammunition field depots is assessed by duty trips for the purpose of functional supervision, e.g. to AFG, together with expert personnel from the Joint Support Command. The lessons learned in this context are evaluated and then presented as recommendations to the force commander to support him in the accomplishment of his mission. The goal is to continuously improve the situation in terms of security, accessibility and stability against the background of the respective operational requirements and the prevailing exterior framework conditions.

On the other hand, when planning new or restructuring existing camps advice for the force commander is given through the military infrastructure organization. To this end, physical protection experts are integrated into the planning process mainly by the Bundeswehr Operations Command to carry out a risk analysis about the design safety of ammunition in the light of the given planning parameters (e.g. space, time, assets, military mission); the results of this analysis are then implemented in a proposal for physical protection and, stating the remaining residual risk, presented to the force commander for decision.

2.5. Assessment and conclusions

The above-mentioned combination of regulations with available structural solutions for the storage of ammunition on operations is the result of an optimization process of several years done on the basis of relatively constant operational realities and the resulting opportunities and requirements. In connection with the aforementioned two-pillar system of advice for the force commander, we are able to ensure proper storage of ammunition for operations mounted from stationary camps with at least a medium-term planning horizon and an almost constant contingent strength and/or structure. The protection of friendly forces and noninvolved third parties from the effects of an unintentional ammunition incident will be ensured.

The protection of friendly ammunition against weapons effects from outside, aiming to keep this ammunition available as mission-relevant material even after hits in the close or very close range has not been the subject of considerations about physical protection so far. The loss of individual stacks of ammunition was accepted, as follow-on supply could be assumed to take place within reasonable periods of time. And supply bottlenecks could be responded to by making alterations in the operational planning.

3. Ammunition storage on operations today (war-like conditions)

3.1. Parameters

The status described under para 2 above mirrored the situation in Bundeswehr operations abroad from the point of view of ammunition safety and physical protection during the storage of ammunition on operations, as it turned out to be until the year 2009.

The security situation in the Bundeswehr area or responsibility in AFGHANISTAN, i.e. RC NORTH, had continuously deteriorated much earlier. However, adapting the conduct of operations successively to this situation had no consequences for the storage of ammunition on operations insofar as adequate capacity reserves were available or had been created in the ammunition field storage sites and ammunition field depots, and German forces continued to operate from the existing fixed bases of the German camps.

Only the altered NATO strategy for AFGHANISTAN [6.15.], envisioning a higher presence of forces throughout the country and the deployment of training and protection battalions from Forward Operating Bases (FOB), will bring about a significant change in the situation for the storage of ammunition on operations.

Picture 3. – Examples for handling, storing and using ammunition in FOBs

Forward Operating Bases are to be operational within an extremely short period of time to enable, for example, unrestricted battalion operations. Irrespective of many other logistic challenges, this will also result in entirely new requirements to be met by ammunition storage on deployment.

Ammunition must be available right from the start with adequate logistic reach, and permanent access by the forces must be possible at any time. However, this precludes both the construction of complex protective infrastructure and a remote storage site and will, therefore, result in falling short of adequate safety distances[8]. Moreover, in case of an increased threat to a Forward Operating Base by enemy weapons effects even the loss of individual stacks of ammunition is to be considered serious for both maintenance of friendly freedom of operation and survivability of friendly forces and, therefore, to be avoided, if possible.

3.2. Available policy documents

The general intensification of the threat to friendly forces inside and outside of camps or FOB will always result in a higher risk acceptance where availability of ammunition, situation-adapted though involving a risk, is capable of increasing survivability and protection or operational effectiveness to an extent that in comparison the increase in a risk of storage is relatively small.

[8] This refers to safety distances resulting from the Directive on the Design Safety of Ammunition Storage on Deployment (see reference document).

It is essential that this finding be implemented in the pertinent national policy documents which due to the short time elapsed have not or not yet been changed. A comparative look at the German Directive on the Design Safety of Ammunition Storage on Deployment [6.2.] and NATO AASTP-5 [6.13.] will be an initial step in this direction. In this context it needs to be reviewed how a necessarily growing risk acceptance can be met by taking over the smaller safety distances recommended in AASTP-5 [6.13.]. However, this will only result in a new standard which on a case-by-case basis will continue to be inapplicable from an operational point of view.

It is rather to be expected that a detailed risk analysis will have to be carried out for a growing number of individual cases, the results of which will have to be compared with a level of risk acceptance to be defined by the force commander. Case-by-case decisions will have to be taken on the basis of the specifically developed and already successfully employed expert tools for risk analysis, ESQRA-GE[9].

3.3. Physical protection measures and assets

The storage facilities stated in the Protective Construction Catalog for Ammunition Storage on Deployment [6.4.] are characterized by their proven efficiency, in part large capacities and, when set up correctly, longevity. These capabilities will be needed also in the future where space and time are available to a sufficient amount.

However, the employment of artillery, ordered at relatively short notice, in combination with a rapid increase in the contingent strength at PRT KUNDUZ have shown the limitations of existing possibilities of and procedures for ammunition storage on deployment and resulted in the permissible capacities of the local ammunition field storage site being exceeded.

Picture 4. – DEU armoured howitzer in Northern- AFG June 2010

Due to lack of reserves in terms of space and physical protection, it is no longer possible to ensure the higher risk for friendly forces and third parties accepted until then and laid down in the directive on ammunition storage on deployment. Extensions to the camp already initiated will not take effect early enough. It became clear that from the point of view of ammunition safety it was structurally impossible in the German camps to swiftly relocate or establish a new point of main effort of operational command and control in the German area of responsibility. The consumption of floor space of previously available storage facilities with prescribed safety distances to be observed and too great an effort in terms of time and material to set up these storage facilities constitute the limiting factors here.

[9] ESQRA-GE: Explosive-Safety-Quantity-Risk-Analysis - Germany

Consequently, any noteworthy increase in capacity in ammunition field storage sites and ammunition field depots already in existence will only be possible where either additional space or solutions are found that will do with varying safety distances in the 360° range. This is the only way to achieve an increase in capacity on the same floor space adjusted to existing built-up areas inside and outside of camps without increasing the risk for friendly forces or third parties.

For the employment of friendly forces from Forward Operating Bases it is also particularly important to ensure ammunition storage with a defined standard within a few days. With the exception of a few storage facilities described in the Handbook for Physical Protection for Ammunition Storage in Operations, such as the keep-ready ammunition container (KRAC), there are currently no adequate means available. Aside from the great effort in terms of personnel, logistics and time necessary for setting up previously available facilities this is, above all, due to the safety distances that are measured too great. The forces deployed at a Forward Operating Base must be enabled to continue to focus on conducting operations over wide areas. Setting up an ammunition field storage site involving great safety distances between accommodation and ammunition stacks will entail enormous requirements in floor space. These, in turn, will result, among other things, in a great guarding and/or monitoring effort and large distances for the forces to reach their ammunition.

Moreover, except for the field-type ammunition magazine described in the Handbook for Physical Protection for Ammunition Storage in Operations none of our storage facilities provides any protection from indirect fire (rocket, artillery, mortar). In addition the field-type ammunition magazine is a reinforced concrete structure not eligible for use in Forward Operating Bases. But particularly here the availability of ammunition is an essential prerequisite for mission accomplishment and survivability.

3.4. Advice to the force commander

Basically, the procedure described under para 2.4. above for advising the force commander on all issues of physical protection during ammunition storage will also apply under the changed framework conditions.

However, the intervals between giving advice will become shorter, the time available for preparing decisions will be curtailed and the need for detailed expert knowledge about planned conduct of operations, terrain and ammunition to be stored will increase considerably. The expert tool ESQRA-GE will have to be used more frequently.

All in all, this will require experts to be integrated closely into the operational planning process to find timely and appropriate solutions that will help the force commander to accomplish his mission and that will result in a balance between acceptable and existing risk and, thus, best possible protection.

3.5. Assessment and conclusions

As the dynamics of operations increases, the currently valid documents containing the provisions governing implementation and compliance with the design safety of ammunition storage will to an ever-decreasing extent be capable of reflecting the operational reality. This will be true independent of date and frequency of their being updated. It will therefore be rather more important to organize the processes and procedures for case-by-case studies and decisions in such a way that an individual risk analysis carried out by experts is made available to the force commander to help him make decisions.

Moreover, it will be necessary to develop and certify storage facilities that meet the particularities involved in the establishment and operation of a Forward Operating Base. Ac-

tivities in this context will focus on establishing a facility with own resources within a short period of time, diminishing required safety distances and providing a basic protection against enemy weapons effects.

With regard to the aspect of ammunition storage, the processes and procedures for giving advice to the force commander will have to be optimized even further. However, in doing so it will be more important than ever before that this advice is given by experts, as the operational relevance of this advice will increase and the error tolerance decrease.

4. Conclusions for the field of physical protection

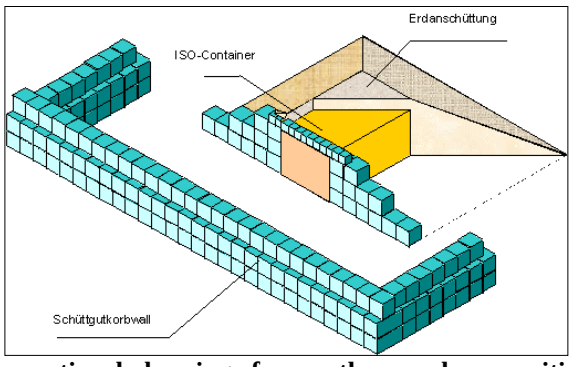
4.1. Capabilities to be developed

As a result, the Bundeswehr will need new assets and procedures to store ammunition in varying quantities on the floor space available today. This will be the only way to extend existing field storage sites/depots temporarily and/or permanently in terms of material and personnel. The risk for both friendly forces and neighboring civilian population to be affected by the effects of an unintentional ammunition incident must be avoided in this context.

Likewise, the loss of even individual ammunition stacks will in future be unacceptable particularly in locations where the availability of adequate quantities of ammunition does not only limit the operational freedom of action, but also puts the survivability of the forces at risk. This is the case, above all, at Forward Operating Base. Protection from indirect fire (OHP[10]) previously not available to German ammunition field storage sites should be provided preferably with organic resources.

4.2. Current fields of action

As early as in 2003 joint studies with the Bundeswehr Technical Center (WTD) 52 were initiated to investigate whether there are possibilities based on the use of ISO containers to store ammunition in larger quantities than before. The testing of earth-covered ammunition containers done so far clearly indicates that, as a system, earth-covered ISO containers are eligible for the safe storage of HD 1.1 to HD 1.6 ammunition [6.8.] during Bundeswehr operations abroad and capable of meeting the requirements described above.



Picture 5. – Conceptionel drawing of an earth-coverd ammunition container

The earth cover is meant to reduce the blast load for the direct environment of the potential explosion site and the debris throw from the container structure. Furthermore, the system as a whole is meant to provide a basic protection against weapons effects from outside, especially from rocket, mortar and artillery fire.

[10] OHP = Over Head Protection

Due to the organizational separation of armed forces and the civilian component of the Bundeswehr, among other things responsible for armaments and procurement, the Federal Office of Defense Technology and Procurement (BWB) was tasked with the development of the system described above. In this context the following military requirements must be met.

The ISO containers to be used should be commercially available and/or easy to convert. Static proof of stability and a description of related preparatory measures, such as ground preparation, drainage, etc., must be given. All other building materials required should either be obtainable from the environment of a potential installation site or already been introduced into in-service use in the Bundeswehr.

The soils and materials eligible for use as earth cover must be described in a way that they can be approached with organic resources. If the material used results in different performance parameters the latter must be described. The required safety distances must be given on the basis of the explosive quantity to be stored and, where necessary, the earth cover material available. In this connection a distinction should be made between front, rear and side parts. In addition, possibilities should be pointed out as to how, for example, the use of geotextiles for manipulating the slope angles can help reduce the requirements in floor space for the earth cover even further.

The overall system is to be capable of suppressing the effects of a detonation inside a container in a way that the ammunition stored in adjacent containers continues to be ready for use or at least safe to handle.

Earth-covered ISO containers are to be capable of providing protection from enemy weapons effects. For this purpose, a C4 threat is assumed to exist in accordance with STANAG 2280 [6.14.].

It is intended to optimize the overall system in such a way that with minimum requirements in floor space a maximum amount of explosive material can be stored as close as possible to exposed sites. The second priority is to ensure the operational readiness of the ammunition stored in the containers close to a site of detonation.

For deployed forces to make effective use of the system, preparations should be made for its integration into the Handbook for Physical Protection for Ammunition Storage in Operations. With a view to reviewing and/or amending German regulations, the findings to be derived from tests and experiments conducted with this system should be summarized in a report to be submitted to the German Armed Forces Office.

5. Summary - outlook

ISO containers and wooden containers are mainly used for storing ammunition at field facilities of the Bundeswehr. These containers are concentrated in ammunition field depots and ammunition field storage sites outside or on the perimeter of the field facilities. The individual ammunition containers are surrounded by barricades (usually concertainer walls). These walls are meant to limit the effects of an ammunition incident and avoid, in particular, the detonation to be transferred to adjacent containers and prevent fast-flying fragments with flat angles of departure from spreading. Over the past fifteen years, this form of ammunition storage has been adapted to both ammunition safety and operational requirements.

Within a relatively short period of time, the changed parameters in the Bundeswehr area of responsibility in northern Afghanistan have also shown the limitations of the German concept for ammunition storage on deployment.

Due to the large danger areas, the resulting safety distances to be kept and the resulting requirements in floor space, it is hardly possibly to extend existing ammunition field depots or ammunition field storage sites. At Forward Operating Bases the existing structural solutions are too complex, area organization cannot be implemented or too many assets are bound by performing security tasks, if existing procedures are to be retained unchanged. Moreover, ammunition will turn into an indispensable prerequisite for mission accomplishment and survivability within a Forward Operating Base. This fact is currently not adequately taken into account.

The efforts aimed to eliminate these deficiencies are therefore focused on the enforced development and/or establishment of the operational readiness of earth-covered ISO containers. It is to be expected that these containers are capable of reducing risk, space requirements and costs, while at the same time increasing the amount of ammunition to be stored and the level of protection from enemy indirect fire (OHP).

In this way physical protection can adequately contribute to increasing the level of force protection and, thus, to mission accomplishment. It is essential that in combination with technical safety, organizational and space planning measures this contribution is used in the best possible way during a process of responsible risk management. Physical protection alone can achieve quite a lot – but not everything!

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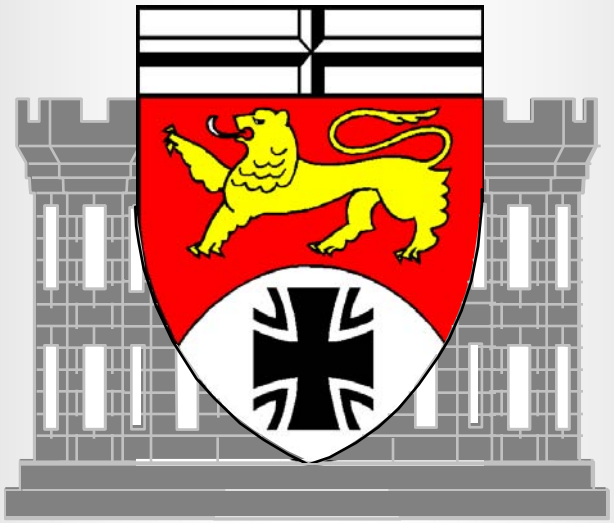

Armed Forces Office

Division V - Infrastructure

Branch 6 – physical protection against weapon effects

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AGENDA

Thoughts about physical protection aspects

of ammunition storage

1. Ammunition storage in the past – where do we come from?
2. What is the current challenge?
3. How to support ongoing operations e.g. in AFG?
4. Questions to be answered on the long run?

Ammunition storage during cold war

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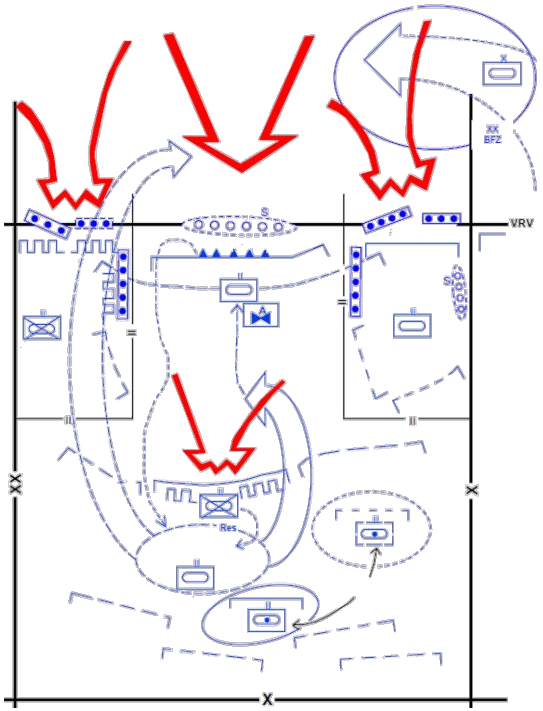


major tasks/aims

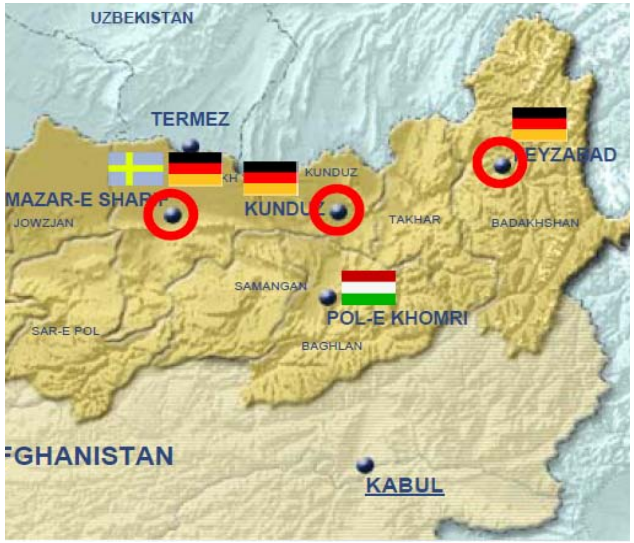
- ammunitions caused risks/threats close to zero
- minimized aging effects on ammunition to stay ready on low costs

Ammunition storage during cold war

Well regulated, organized and published!

- extreme climatic conditions
- different and varying threats
- rapid changes in contingent strength and with it in the quantities of ammunition to be stored
- storage of ammunition inside camps
- limited options to choose camp sites and with it also ammunition field storage sites and/or ammunition field depots
- storage of keep-ready ammunition and parking of armed combat vehicles in the immediate vicinity of accommodation areas
- compliance with the regulations and legislation of a host nation
- earthquake threat to infrastructure

Ammunition storage till "yesterday"
(1990 – 2009 "post cold war era")



major tasks/aims

- provide acceptable level of risk
- avoid ammunition caused threats to own troops
- guarantee operational capability

We fixed it!

Bundeswehr

Handbook for the Physical Protection for Ammunition Storage in Operations

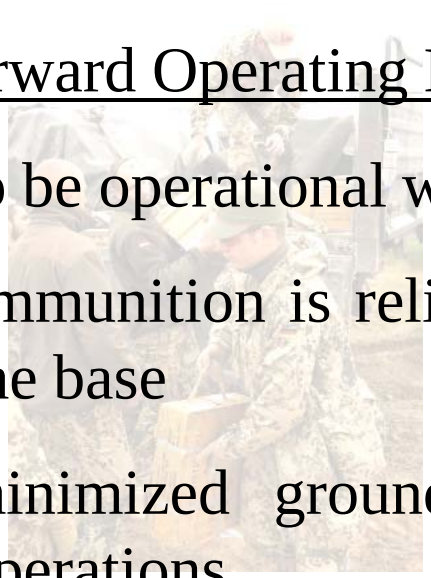
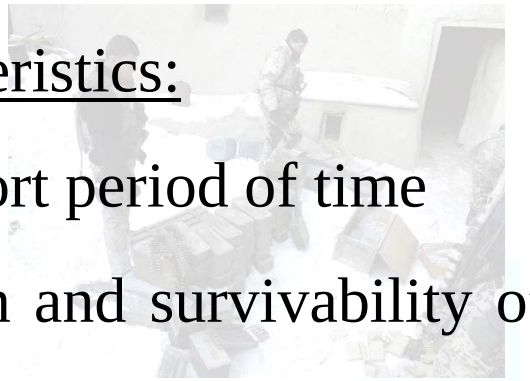
Date of Issue: November 2007

Issued by:	Armed Forces Office Division V Infrastructure
Prepared by:	Bundeswehr Technical Center for Protective and Special Teschnologies (WTD 52) Area of Activity 210

Mission has changed its face – the reason for improvement

Forward Operating Bases

(FOB)

Forward Operating Bases (FOB)* characteristics:

- to be operational within an extremely short period of time
- ammunition is reliable for both, mission and survivability of the base
- minimized ground space available due to the focus on operations
- potentially raised risk of enemy attacks
- use of light but less protective structures in general
- need of fighting positions close to e.g. accommodations

DEU-FOB* = temporary, improvised base to support troops within the operational area

What has to be thought about?

(from the physical protection point of view)

	Cold War	Post cold war era	FOB
possible infrastructure effort	+++	+/++	-/+ (lack of time and capacities)
advice for the Force Commander	mostly not necessary / sufficient	within a process of continuously improvement → sufficient	important part of operational planning process → faster and with more accuracy
accepted risk/hazard	none	loss of a stock, eliminate hazards to personnel	loss of a stock can't be accepted, risk for personnel has to be defined
existing risk/hazard	none	during progress of mission, accepted risk can be matched	disposable structures→ unsuitable capabilities

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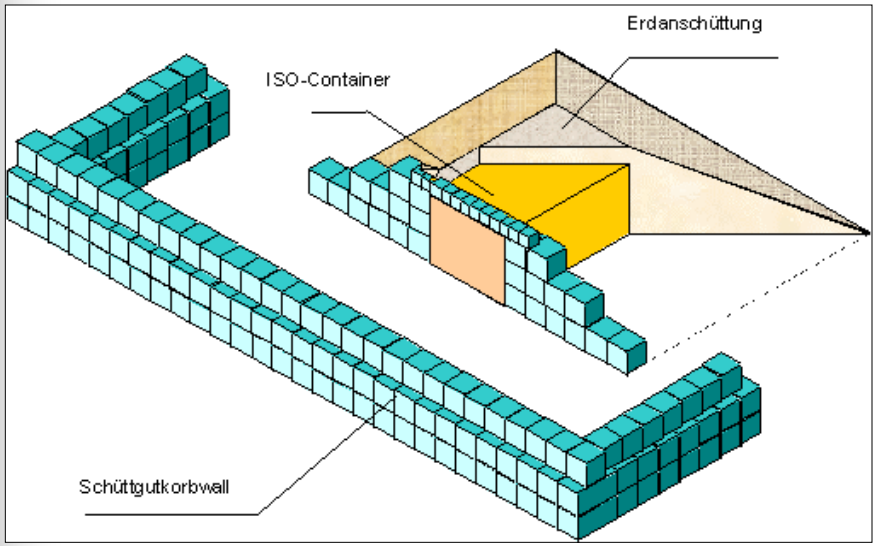
What has to be developed for that explicit situation



Priorities are:

I. As less consumption of floor space while storing maximum NEQ as possible.

II. OHP – C4

What we need is something:

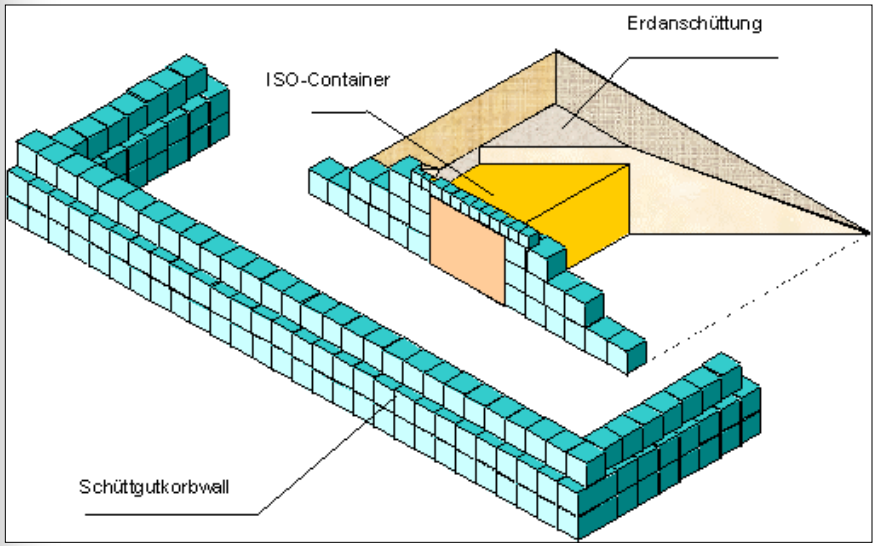
-ISO-container based

-easy to buy or construct

-static and dynamic proof of stability

-certified QD's for NEQ > 500kg (HD 1.1)

What has to be developed for that explicit situation



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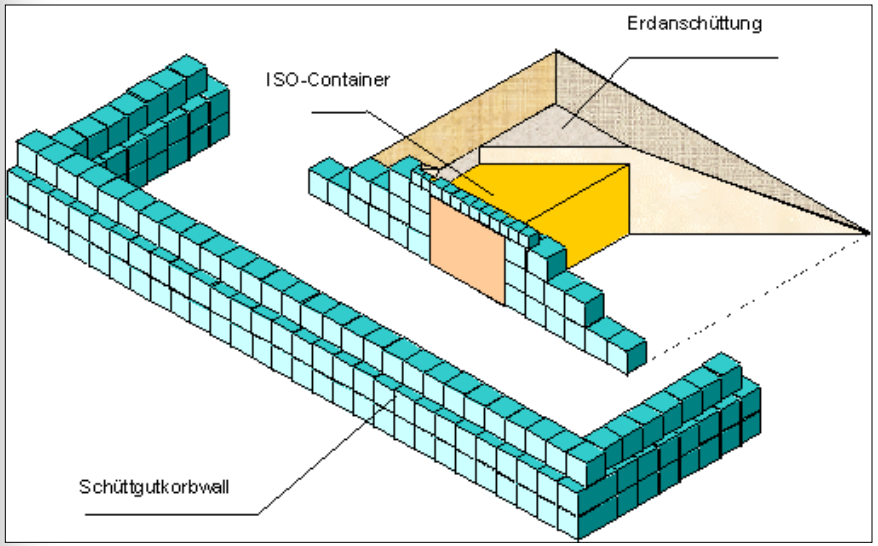

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Task to WTD 52!

What are the general questions physical protection has to deal with from now?

Mobile Operations in Incompliant Environment

short duration	increase of risks/threats
•cost – benefit – balance is dominated by factor time	•ammunition as asset
•light / modular structures	•own ammunition as threat to exposed sites
•reusable	

Advanced deployable structures and risk-assessment capabilities for better advice to Force Commanders.

Thanks for your attention!

Questions?!