

FEDERAL REPUBLIC OF GERMANY

Working Paper

Issues Relating to a Prohibition of Attacks
Against Nuclear Facilities in the framework
of a Radiological Weapons Treaty

I

General remarks

1. In its proposal of 30 June 1980 and its memorandum of 13 March 1981 Sweden expressed the view that there is a very real danger of mass destruction posed by the dissemination of radioactive substances in war. With this it had in mind the danger of military attacks on nuclear installations containing large amounts of radioactive materials. Consequently, it demanded that a treaty banning radiological weapons must also provide for the prohibition of radiological warfare so as to cover not only the development, production, stockpiling and use of radiological weapons but also attacks on civilian nuclear installations. Sweden therefore proposed "that the main source of radiological warfare, i.e. attacks on nuclear installations, should be mentioned explicitly" in Article III.

In this context, Sweden also contended that the protection of nuclear installations provided for in the additional protocols to the Geneva Conventions of 1949 (Article 56 of Protocol I and Article 15 of Protocol II) is not sufficient for two reasons: firstly, these protocols cover only nuclear electrical generating stations, thus omitting other installations containing large quantities of radioactive materials. Secondly, the purpose of the protocols is limited to providing protection for the civilian population in the vicinity of these installations and they permit military considerations to take precedence over humanitarian ones, thus allowing exceptions from the protective provisions. For the purpose of a comprehensive ban on radiological warfare, a radiological weapons treaty must, so as to "cover all important risks and have no loopholes", also ensure comprehensive protection for nuclear installations.

2. The present paper deals in section II with the main substantive questions relating to a comprehensive ban on military attacks on civilian nuclear installations. This section is a rough summary of the remarks made by two experts from the Federal Republic of Germany at the 1982 spring session of the Ad Hoc Working Group on Radiological Weapons. Section III then looks at the question of how such installations can be protected in practice and comes to the conclusion that one should examine how to improve the protection afforded by international customary law and by the first additional protocol to the Geneva Convention of 1949. Section IV then deals with the question of whether protective provisions should be drawn up within the framework of a treaty banning the development, production, stockpiling and use of radiological weapons (radiological weapons treaty) or elaborated in separate negotiations. It comes to the conclusion that the latter solution appears better and proposes that the link between the subject-matter of the radiological weapons treaty and improved protection for nuclear installations be underscored by including an obligation in the treaty for the early commencement of negotiations on the latter.

3. In the present paper the term "nuclear installations" covers the following nuclear power stations and other civilian installations containing a correspondingly high amount of radioactive materials, the release of which would lead to an unquantifiable loss of civilian life and/or render large areas of land unusable:

- power-generating and research reactors, even if they are temporarily or permanently shut down,
- intermediate stores for spent fuel elements,
- plants for reprocessing spent fuel elements,
- plants for producing mixed oxide fuel elements,
- containers for transporting radioactive material between the aforementioned plants.

Specifically military nuclear installations, which pose problems of their own, are not dealt with here.

II

Aspects of military attacks on nuclear installations

1. Significance of national safety regulations for nuclear installations

A decisive factor in assessing the effects of military attacks on nuclear installations are the safety standards which relate to the design and operation

of such installations and are, owing to the latter's dangerous potential, the prerequisite for the granting of planning permission by national authorities. These standards are aimed -- as in the case of industrial plants -- at protection against natural and civilian influences and not against military influences, but they also afford some limited protection against the latter. Of key importance in this respect are the design features for withstanding static and dynamic loads as a result of, for instance, earthquakes, aircraft crashes and lateral gas blast waves, for example from chemical explosions, as well as redundant and protective design features performing containment and filtering functions and thus preventing the escape of radionuclides in such cases.

Other nuclear installations might be designed in such a way that they are no more vulnerable to military attacks than nuclear power stations.

National safety standards relating to nuclear installations differ greatly. Moreover, in the course of time they have undergone substantial changes within individual countries so that various standards may apply in a single country, as a result of which older installations are less well protected against external effects than more recent ones. Obviously, in the case of low security standards nuclear power installations are much more susceptible to military influences than installations built in compliance with high safety requirements.

2. Effects of military attacks on nuclear installations

It must be assumed that there are still nuclear power installations in existence from which some of the radioactive substances would escape in the event of an attack with conventional weapons (for instance, 1,000 kg TNT in a high-explosive bomb). This applies all the more to attacks with nuclear weapons. The effects in the individual case depend on a number of factors, such as

- distance from the installation and point of impact of the weapon
- type and power of the weapon
- type of installation and its design features
- chemical and physical nature of the nuclear substances contained in the installation

- type and extent of the destruction of the installation
- meteorological conditions at the time of the attack
- possibility of short-term measures to limit the damage sustained by the installation.

The effects of a nuclear explosive device on the decisive concrete structures, i.e. containment, of a nuclear power station are confined to the blast wave. (Thermal and radioactive radiation do not yield any perceptible effects). If the explosive device impacts at a short distance from the installation, damage to the containment can no longer be ruled out, which can under certain circumstances lead to a core meltdown. This would, however, have effects only hours later. (Only if a sufficiently powerful nuclear explosive device directly hits the containment or impacts in its immediate vicinity is it likely that the containment will be immediately destroyed and that, in particularly unfavourable circumstances, the radioactive core will partly evaporate. Even in such a case the effects of the weapon's radionuclides predominate for the first few weeks.) Other nuclear installations, in so far as they have a containment similar to that of a reactor, behave more favourably in the event of an attack with nuclear weapons since, as a rule, all systems pass into a safe state (emergency cooling unnecessary) even without auxiliary energy supplies (electricity, water) and the effects of the evaporation of nuclides, which is to be expected in the event of a direct hit and may possibly exceed the effects of the nuclear weapon, are felt several weeks later.

Generally speaking, it can be said that the escape of radioactive substances from nuclear power installations produces barely calculable radiological effects which render large areas of land unusable to man for many decades.

3. Probability of military attacks on nuclear installations

The destruction of nuclear installations might in theory serve as a goal for military force since in this way, with only a limited use of special-purpose weapons, great damage can be achieved by releasing the radioactive material in an installation. For instance, the impairment of energy supplies and the resultant impact on industry, infrastructure and defence might be considered a feasible goal.

However, the escape of radioactive substances in such installations can have effects on the attacker's military operations, the nature and extent of which cannot be precisely determined. In other words, an attack on a nuclear installation would lead to uncertain and scarcely calculable factors in the attacker's operational planning. Furthermore, the deliberate destruction of such installations in conventional warfare would mean the start of an "indirect nuclear war" and could lead to unpredictable reactions by the other side. As it is, the adversary's energy supplies can be impaired without this risk by destroying conventional power stations, transformers, etc.

The use of nuclear weapons against a nuclear installation would, by destroying the installation, increase the radiological effects of the weapons used. However, nuclear-weapon States are not dependent on this effect. This effect would, moreover, be to their disadvantage owing to the above-stated results.

On the whole, the destruction of a nuclear installation entails a considerable element of uncertainty for the destroyer owing to the incalculable radioactive contamination. Moreover, the attacker is likely to be greatly interested in taking control of the valuable installations intact.

It can therefore be deduced from all these aspects that there are stronger arguments against a deliberate military attack on a nuclear installation. Furthermore, it would run counter to the trend in weapons technology towards precision weapons which permit targets to be eliminated by means of precision strikes with limited and precisely calculable effects if one were at the same time to plan to cause unquantifiable effects by destroying nuclear installations.

Destruction of such installations by accidental strikes is therefore more probable than deliberate destruction. Accidental strikes will depend primarily on the type and extent of battles and their distance from the installations. They will, of course, become all the more probable if there are military targets in the vicinity of the installations. Considerable importance therefore attaches to the question of whether there are national safety regulations stipulating that military facilities and other military targets must be located at a minimum distance from nuclear installations for reasons of safety.

4. National regulations on safe distances between military targets and nuclear installations

A number of countries have regulations stipulating safe distances between potential military targets and nuclear installations. They are designed to ensure that, when military targets are attacked, neighbouring nuclear installations are not affected by accidental strikes or collateral damage. These distances are laid down in the licensing procedure for such installations. The military authorities have to ensure that the area around a nuclear power installation is kept free from all kinds of military targets. The distance is calculated by taking into account the weapons that are likely to be used against a military target, their potential area of dispersion, and the design of the installation.

III

Improved international protection for nuclear installations

1. Protective zones for nuclear installations

The only way of fully protecting nuclear installations against military attacks is to establish protective zones. These zones would serve to ensure that everyone is acquainted with the location of all potentially dangerous installations. They would thus help to make the prohibition of direct attacks on such installations more effective and also cause adversaries engaged in military action within the protective zone to take into account the proximity of the installation so as to avoid accidental strikes or collateral damage. The latter would require that the protective zones be kept free from military installations and other targets. In this connection, an inner and an outer circle within a protective zone are conceivable: the inner circle would be kept free from all targets, and the outer one free from particular types of targets (e.g. hardened ones). The protective zones and the location of nuclear power installations would have to be made known on acceding to the relevant treaty, for instance by exchanging lists. This would be necessary not least because nuclear installations are not always identifiable as such. Conspicuous markings visible from afar both in the air and on the ground would also make for effective protection.

However, the establishment of protective zones for nuclear installations poses considerable problems. As already mentioned, the safety standards for such installations differ between States and, in some cases, even within an individual country. If protective zones were to be confined to the minimum requirements,

zones of different sizes would have to be established. Alternatively, zones of a single size could be established worldwide in line with (assumed) low safety standards. In this case the zones would have to be fairly large.

Another problem is posed by the fact that some countries have a high density of nuclear installations, whilst in others they lie scattered far apart or exist only in small numbers. In the former countries, there would thus be a correspondingly large number of protective zones which, depending on the size of the countries and the zones, would cover a substantial part of the territory. As a result, sanctuaries would exist in these countries.

For these reasons it is a moot point whether protective zones can in fact be established in the near future.

2. Alternative solution

An alternative solution would be to lay down a general ban on attacks on nuclear installations, as already envisaged for international conflicts in Article 56 of Additional Protocol I to the Geneva Conventions. Although a general ban would not afford the same comprehensive protection for nuclear installations as would the establishment of protective zones, it would none the less provide desirable additional protection for such installations against military attacks. In other words, this solution amounts to the proposal that one should examine how to improve the protection afforded by international customary law and Additional Protocol I to the Geneva Conventions of 1949, specifically Article 56. In Article 56 (6) of the latter the High Contracting Parties are urged "to conclude further agreements among themselves to provide additional protection for objects containing dangerous forces".

Improved protection for nuclear installations under international law would be desirable for various reasons. For instance, by including only nuclear power stations and not other nuclear installations in Article 56 of Additional Protocol I — even if it is assumed that the latter are covered by the protection afforded by general international law and other provisions of the Protocol — one has not taken into account the fact that the escape of radioactive substances from nuclear installations has the same hazardous effects as the escape of such substances from nuclear power stations. The protection afforded by Article 56 of the Protocol could also be improved by other means: for example, by stipulating that certain types of military activity are not permitted within a specific area around nuclear installations or by agreeing on the international exchange of lists of protected installations.

IV

Dealing with the protection of nuclear installations in a radiological weapons treaty

1. When drawing up provisions designed to improve the protection of nuclear installations, one would have to proceed from the existing legal situation and both reaffirm and define more closely the prohibition of attacks on such installations which already exists under international law.

International law already contains the principle that military attacks must be directed primarily against military targets. Furthermore, in an armed conflict the right of the parties to the conflict to choose methods or means of warfare is not unlimited. The principle of commensurability has to be respected at all times.

This protection is expanded and defined in Additional Protocol I to the Geneva Conventions of 1949 relating to the Protection of Victims of International Armed Conflicts.

However, the elaboration of such provisions would greatly transcend the framework initially envisaged for a radiological weapons treaty and probably necessitate a considerable amount of additional time. It therefore appears best to deal with the improved protection of nuclear installations in a separate agreement.

2. Another reason why it is preferable to deal with the improved protection of nuclear installations in a separate agreement is the fact that there are major differences in subject-matter:

A ban on radiological weapons is designed to prevent the use of radioactive substances as weapons which, on decomposition, release corpuscular and/or electromagnetic radiation and thus constitute weapons of mass destruction as defined in the 1948 United Nations Resolution. The establishment of nuclear installations, on the other hand, is of course not designed to produce the effect of weapons. Instead, these installations would be used as weapons by another country, not responsible for their establishment, when it destroys them. The principle military effect of attacks on nuclear installations would be a "multiplier effect" sparked off by the weapon itself. This is in principle comparable to the destruction of a dam by conventional weapons and the resultant devastating tidal wave.

A radiological weapons treaty, one of its purposes being — as proposed by Sweden — the prohibition of radiological warfare, would thus cover two highly different subject-matters: one of them would be the military use of ionizing radiation by employing devices, weapons or equipment specifically manufactured or designed for radiological warfare. The other would be ionizing radiation and its harmful effects caused by the unspecified impact of weapons when nuclear installations are damaged or destroyed during military attacks. The only common denominator would be the use of ionizing radiation for military purposes. Furthermore, the actual content of a ban on radiological warfare would — in so far as it went beyond the prohibition of attacks on civilian nuclear installations — be hard to determine.

3. In view of the great interest in improved protection for nuclear installations shown by numerous countries at the Geneva talks on a radiological weapons treaty; it would appear advisable to include an article in this treaty which underscores the link between the subject-matter of the treaty and improved protection for nuclear installations and thus leads to an early commencement of work on a specific agreement providing protection for such installations. In other words, the article should be worded to the effect that the Contracting Parties undertake to start negotiations as soon as possible on this subject.