SPACE DEBRIS: A REVIEW OF THE CURRENT REGULATORY STRUCTURE

By Dr. Vladimír Kopal [x]

Introduction

From the reports and studies, which have been published during the last decade, it has become evident that a thorough exploration of the problems relating to the protection of space environment against pollution by space debris has been a recognized subject of a deep concern of the world community. [1]

A visible, though rather slow progress in the discussions on this issue in the United Nations Committee on the Peaceful Uses of Outer Space /COPUOS/ was also reached and by a consensus decision taken in 1993, the Scientific and Technical Subcommittee of the COPUOS was entrusted to begin the consideration of this issue as a separate point of its agenda. In 1995 and 1996 the Subcommittee continued its consideration of "Space Debris" on a priority basis and adopted a work plan for the time span 1996-98 in order to advance this consideration. The up-to-date results of the deliberations of the Subcommittee on this point have been reflected in its reports. [2]

Present Legal Basis for Keeping Outer Space Clean and Safe, and the Need for Its Further Development

Whatever conclusions may come out from the discussions in the scientific and technical area, when pondering the ways to keep outer space clean and safe, it is also necessary to consider the availability and possible development of adequate legal means for this purpose. A realistic approach to the study of legal aspects of the space debris issue should start by the following question: Is the present international law of outer space as developed in the United Nations sufficient for this endeavour, does it offer a solid basis for this kind of cooperation ? Or do such efforts require strengthening and supplementing of the existing rules, or even the elaboration of a new, special instrument ?

It should be recognized that the principles and provisions of the international law in force offer a certain guidance in this regard. The 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, encouraged international cooperation in the peaceful exploration and use of outer space and according to its Article I, space activities should be carried out for the benefit and in the interest of all countries. The exploration and use of outer space shall be the province of all mankind. At the same time, the Outer Space Treaty enshrined in Article VI the principle of international responsibility for national activities in outer space as well as for space activities of international organizations. It should be emphasized that by national activities in outer space are meant not only activities carried

---

[x] Professor of Law, Doctor of Sciences, Prague, Czech Republic.

out by governmental agencies but also the activities performed by non-governmental entities, i.e. by private persons, physical or juridical, and the groups thereof. States Parties to the Outer Space Treaty are responsible for assuring that national activities are carried out in conformity with the provisions set forth in the Treaty, and the activities of non-governmental entities require authorization and continuing supervision by the appropriate State Party to the Treaty./Article VI./

Of a particular interest, in relation to the issue of space debris, may be the provision of para. 3, Article V of the Outer Space Treaty according to which States Parties to the Treaty shall immediately inform the other States Parties and the UN Secretary-General of any phenomena they discover in outer space, including the moon and other celestial bodies, which could constitute a danger to the life or health of astronauts.

Moreover, Article IX of the Outer Space Treaty, which enshrined the principle of cooperation and mutual assistance of the States Parties to the Treaty, and also stipulated due regard to corresponding interests of all other States Parties in all activities in outer space, spelled out a general principle for protection of the space environment. According to it "States Parties to the Treaty shall pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose." When analyzing this particuler text, can we conclude that by "harmful contamination" and "adverse changes in the environment of the earth resulting from the introduction of extraterrestrial matter" the drafters of this provision intended to also cover the effects caused by space debris ? Can we also assume that by adopting "appropriate measures" adequate steps for prevention and mitigation of space debris could be understood including some legal tools to be elaborated and applied in order to attain this goal ?

In this context, it should be recalled that Article IX of the Outer Space Treaty also provided for "appropriate international consultations" which might be offered or requested by States Parties to the Treaty for avoiding a potentially harmful interference with their space activities. Needless to say that such interferences might generate, or be caused by, space debris. Such consultations, however, are not obligatory.

The principles of international liability for damage caused by space objects or their component parts on the earth, in air or in outer space was also included in the 1967 Outer Space Treaty. This principle was further elaborated in the 1972 Convention on International Liability for Damage Caused by Space Objects which includes a number of provisions that may be considered as relevant to space debris. As explicitly stated in Article I of the Convention, the term "space object" includes component parts of a space object as well as its launch vehicle and parts thereof. Apparently, by an extensive interpretation of this provision, space debris which originate from space objects, their launch vehicles or the parts thereof, should be covered by this de-

finition. However, is it possible to go in this interpretation so far as to qualify as component parts of a space object or parts of its launch vehicle the smallest fragments or even flakes of paint peeled off from such objects ? Moreover, will such small pieces of material be always identifiable as to their origin ? It is obvious that without an exact identification of a piece of space debris, it would be impossible to impute any liability for damage caused by such particals to anybody.

As is known, the 1972 Liability Convention, in its Articles II - IV, deals with two categories of damage, one caused by space objects on the surface of the earth or to aircraft in flight, the other caused elsewhere than on the surface of the earth to a space object of the launching State or to persons or property on board such a space object by a space object of another launching State. According to some authors, these provisions should also apply to damage caused by space debris. [3] However, according to the 1972 Convention, the liability provided for damage effected elsewhere than on the surface of the earth or to aircraft in flight shall only be applied in case of fault on the part of the launching State or the fault of persons for whom this State is responsible. But in most cases of damage caused by smaller space debris it will be very difficult or even impossible to identify the origin of the debris concerned and thus to ascertain who is at fault. Furthermore, the term "fault" has not been specified in the Convention. May it be assumed that both "intention" and "negligence" are supposed to be considered as a basis of fault? Or is it possible to go even further and apply in this regard the "objective" approach which has prevailed in the codification work of the UN International Law Commission on State responsibility ? [4]

On the other hand it should be observed that the term "damage", as defined in Article I of the 1972 Liability Convention, means only "loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations". It must be concluded from this definition that the term "damage" in the Liability Convention does not include damage caused by space activities to the space environment and to the environments of other areas, which lie beyond the limits of national sovereignty, such as Antarctica and the oceans. [5]

Some guidance for dealing with space debris can also be found in other UN space law instruments. The 1975 Convention on Registration of Objects launched into Outer Space, which established the duty of the launching State to register space objects both nationally and internationally /with the United Nations/, allows the State of registry to provide the Secretary-General of the United Nations with additional information concerning space objects carried on its registry. This State is even obliged to notify the Secretary-General "to the greatest extent feasible and as soon as practicable, of space objects concerning which it has previously transmitted information, and which have been but no longer are in earth orbit." In this connection it is to be recalled that the term "space object" is specified in the Registration Convention in the same way as in the Liability Convention, i. e. that it includes component parts of a space object as well as its

launch vehicle and parts thereof. This provision of the Registration Convention might offer a certain basis for developing a practice of providing more detailed information about space debris remaining in outer space in connection with the decay of space objects. In this regard, however, the same question arises which was already mentioned with regard to the Liability Convention, namely what should be still qualified as space object or its part, and what lies beyond the reasonable limits of this notion.

Finally, attention should be also drawn to the last of the United Nations space treaties, the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, in spite of the fact that thus far, this instrument has collected but a limited number of adhesions. In relation to the moon, Article 7 of the Agreement goes further than the 1967 Outer Space Treaty went generally, for the States Parties to the 1979 Agreement, in exploring and using the moon, are obliged to take measures to prevent the disruption of the existing balance of its environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extraenvironmental matter or otherwise. The word "otherwise" may include the pollution of the moon environment or some of its areas by generation of space debris. But will such pollution be that big to be qualified as "disruption of the existing balance" of the moon environment ?

In the same Article, the 1979 Moon Agreement also involves some other elements which are necessary for establishing an effective protection of the moon environment. It is, e.g., the duty to inform the Secretary General of the United Nations of the measures being adopted in connection with the above obligation, as well as the special duty to notify him in advance of all placements of radioactive materials on the moon and of the purpose of such placements. Moreover, as provided in para. 3 of the same Article 7, the idea of reporting to other States Parties and to the Secretary-General concerning areas of the moon having special scientific interest in order that consideration may be given to the designation of such areas as international scientific preserves for which special protective arrangements are to be agreed upon, also deserves our attention. [6]

As a whole, it is obvious that for the solution of all legal problems relating to the protection of outer space against space debris the provisions of the present international law of outer space are too general, raise a number of questions and are far from being satisfactory.

On the other hand, a certain step forward has been marked in the specific field of the use of nuclear power sources in outer space. Though the 1992 Principles dealing with this subject [7] are applicable only to a particular kind of instrumentalities /namely to"nuclear power sources in outer space devoted to the generation of electric power on board space objects for nonpropulsive purposes, which have characteristics generally comparable to those of systems used and missions performed at the time of the adoption of the Principles", some important innovations have been introduced by these Principles in comparison with the earlier space law instru-

ments. They include, inter alia, the establishment of general goals for radiation protection and nuclear safety, the idea of storing of nuclear reactors and radioisotope generators in a disposal orbit after the conclusion of the operational part of their missions, and also a certain specification of the general principle of liability for damage as far as the determination of compensation for damage is concerned.

The problems relating to the use of nuclear power sources in outer space have several common points with problems of protection of the space environment against space debris, as was clearly demonstrated during the discussions of the Working Group on Nuclear Power Sources in the Scientific and Technical Subcommittee of the COPUOS. [8] A successful conclusion of these efforts in the form of a set of internationally agreed Principles Relevant to the Use of Nuclear Power Sources in Outer Space in 1992 offers an example for a similar approach to the problems of protection of the space environment against space debris.

Question of a Legal Definition of Space Debris

As already said, the up-to-date space legislation has known only the term "space object" which, according to Article I /d/ of the 1972 Liability Convention and the identical provision of Article I /b/ of the 1975 Registration Convention, includes "component parts of a space object as well as its launch vehicle and parts thereof". This term has been used as a fundamental element for establishing the principles and rules governing space activities and has also become one of the basic notions in the space law doctrine. The underlying philosophy of all present international law instruments relating to outer space has been based on a conviction that launching of space objects has been opening great prospects before mankind. For this reason, space activities should be promoted and guided by broad international cooperation in the scientific as well as the legal aspects of the exploration and use of outer space for peaceful purposes. /Preamble of the 1967 Outer Space Treaty./

In recent years, however, attention has been drawn to a growing population of remains of these objects which, having ended their missions, become useless "space debris" unless they perish during their descent, are boosted to a disposal orbit or are brought back to the earth. The present space treaties and other instruments of space law do not explicitly address this particular problem. Neither the space treaties concluded under the auspices of the United Nations, nor any other international agreements, nor the domestic law of individual space-faring nations provide a definition of this notion and establish specific legal rules that should be applied to the ever increasing number of these objects which are not only of any use but may even cause harmful effects.

Fortunately, the scientific and technical community, both at national and international levels, has already investigated this problem in greater detail and produced a number of reports and studies that can be used as a basis for consideration of its legal aspects. [9] In some of these papers, the term "space debris" /which is sometimes also called "orbital debris"/ has been defined. Thus e.g. in the IAA Position Paper on Orbital Debris, this kind of

objects includes "any man-made Earth-orbiting object which is non-functional with no reasonable expectation of assuming or resuming its intended function or any other function for which it is or can be expected to be authorized, including fragments and parts thereof. Orbital debris includes non-operational spacecraft, spent rocket bodies, material released during planned space operations, and fragments generated by satellites and upper stage break-up due to explosions and collisions." A similar definition has been used in the considerations of the Scientific and Technical Subcommittee of the COPUOS which understood that "space debris are inactive man-made objects, such as spent upper stages, spent satellites, fragments or parts generated during launch or mission operations, or fragments from explosions and other break-ups." [11]

Such an approach was also adopted by the Space Law Committee of the International Law Association /ILA/ when this important non-governmental organization was preparing a Draft International Instrument on the Protection of the Environment from Damage Caused by Space Debris. According to the final version of this document, which was adopted by the 66th Conference of the ILA at Buenos Aires in August 1994, the meaning of "space debris" includes "man-made objects in outer space, other than active or otherwise usefull satellites, when no change can reasonably be expected in these conditions in the foreseeable future". The scope of application of the ILA's Draft has been also adjusted to this definition, for the Instrument "shall be applicable to space debris which causes or is likely to cause direct or indirect, instant or delayed damage to the environment or to persons and objects. [12]

In light of this definition of space debris, Article VIII of the 1967 Outer Space Treaty, which guarantees the retaining of jurisdiction and control of States over space objects carried on their registry as well as the continuing ownership of space objects and of their component parts, must be carefully analysed and should be probably limited in its application with regard to the need for protecting outer space against space debris. Other United Nations Space Treaties /the 1968 Rescue Agreement, the 1972 Liability Convention, the 1975 Registration Convention/ as well should be reviewed in the same direction.

Conclusion

For these and other reasons, a special legal document on space debris is desirable, be it a comprehensive instrument that would deal with all aspects of space debris, or only an interpretative protocol to the existing space treaties with regard to their application to space debris. Inter alia, such a legal document should clearly establish from which moment a space object or its parts become non-functional and useless, and may be treated by anybody as space debris.

The elaboration and adoption of an exact legal definition of "space debris", which would be in harmony with the best scientific and technical knowledge, should then be accompanied by the formulation and adoption of new rules that would govern liability for damage caused by an inactive object or its parts and exclude space debris from the general protection guaranteed by the pre-

sent international law of outer space to space objects and their parts.

The ILA Buenos Aires International Instrument on the Protection of the Environment from Demage Caused by Space Debris offers a good example how a legal document on the issue of space debris could be drafted.

References

1. See, e.g., Nicholas L. Johnson and Darren S. McKnight, Artificial Space Debris, Malabar, Florida, 1987; Space Debris. A Report From the ESA Space Debris Working Group, ESA SP-1109 /November 1988/; Report on Orbital Debris by Interagency Group /Space/ for National Security Council, Washington, D.C., February 1989; U.S. Congress, Office of Technology Assessment, Orbiting Debris: A Space Environmental Problem - Background Paper, OTA-BP-ISC-72, Washington, DC, September 1990; Proceedings of the First European Conference on Space Debris, Darmstadt, Germany, 5 - 7 April 1993, ESA SD-01, July 1993; International Academy of Astronautics, Position Paper on Orbital Debris, Prepared by an Ad Hoc Expert Group of the IAA Committee on Safety, Rescue and Quality, November 1993; David S.F. Portree, Joseph P. Loftus, Jr., Orbital Debris and Near-Earth Environmental Management: A Chronology, NASA Reference Publication 1320, December 1993; Orbital Debris. A Technical Assessment, Committee on Space Debris, Aeronautics and Space Engineering Board, Commission on Engineering and Technical Systems, National Research Council, Washington, D.C. 1995; Interagency Report on Orbital Debris by Office of Science and Technology Policy, November 1995.

2. Cf., in particular, Reports of the Scientific and Technical Subcommittee on the Work of Its Thirty-second and Thirty-third Sessions, UN doc. A/AC. 105/605, 24 February 1995, pp. 15-18, and UN doc. A/AC. 105/637, 4 March 1996, pp. 15-25.

3. See, e.g., S. Gorove, Definitional Issues Pertaining to "Space Object", Proceedings of the Thirty-seventh Colloquium on the Law of Outer Space, International Institute of Space Law of the IAF, October 9 - 14, 1994, Jerusalem, Israel, AIAA, p. 90.

4. In this context it is interesting to note the suggestion of Professor Bing Cheng to establish absolute liability, or at least a régime of presumed fault, for damage caused by space debris. /See "Space Objects","Astronauts" and Related Expressions, Proceedings of the Thirty-Fourth Colloquium on the Law of Outer Space, International Institute of Space Law of the IAF, October 5 - 11, 1991, Montreal, Canada, AIAA, p. 25. - As to the problem of fault see also Interagency Report on Orbital Debris by Office of Science and Technology Policy, November 1995, p. 46.

5. See Nandasiri Jasentuliyana, Environmental Impact of Space Activities: An International Law Perspective, Proceedings of the Twenty-seventh Colloquium on the Law of Outer Space, International Institute of Space Law of the IAF, October 7 - 13, 1984, Lausanne, Switzerland, AIAA, p. 395.

6. For the texts of all space treaties referred to in this paper as well the status of Parties to these instruments cf. United Nations Treaties and Principles on Outer Space, UN doc. A/AC. 105/572, United Nations, 1994.

7. See Principles Relevant to the Use of Nuclear Power Sources in Outer Space, in UN doc. A/AC. 105/592 quoted supra, note 6, pp. 47 s.

8. Cf., e.g., Report of the Scientific and Technical Subcommittee on the Work of Its Twenty-fifth Session, UN doc. A/AC. 105/409, 29 February 1988, Annex III, paras. 8-10 at p. 30; Report of the Scientific and Technical Subcommittee on the Work of Its Twenty-sixth Session, UN doc. A/AC. 105/429, 6 March 1989, Annex III, paras. 10-12, p. 33.

9. A substantive contribution to these efforts was made by convening, under the auspices of ESA, by its ESOC the First European Conference on Space Debris held in Darmstadt, Germany, 5 - 7 April 1993. See the voluminous Proceedings of this Conference /741 pp./, doc. ESA SD-01, July 1993. The second conference of this kind, organized by ESA/ESOC, is to be held again in Darmstadt, Germany, 17 - 19 March 1997. - First International Workshop on Space Debris was also held from October 8 to 11, 1995 in the building of the Space Research Institute of the Russian Academy of Sciences.

10. See International Academy of Astronautics, Position Paper on Orbital Debris. Prepared by an Ad Hoc Expert Group of the IAA Committee on Safety, Rescue and Quality, November 1993, p. 3.

11. Cf. Report of the Scientific and Technical Subcommittee on the Work of Its Thirty-third Session, UN doc. A/AC. 195/637, 4 March 1996, para. 15 at p. 17.

12. Cf. the text of Resolution No. 5 of the Conference of the International Law Association adopted in August 1994 and the final text of the International Instrument on the Protection of the Environment from Damage Caused by Space Debris. See also Statement by Prof. Dr. K. H. Böckstiegel as representative of the International Law Association /ILA/ at the 39th Session of the COPUOS, Vienna, June 1996.