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CHAPTER V

THE LEGAL REGIME OF SATELLITE COMMUNICATIONS

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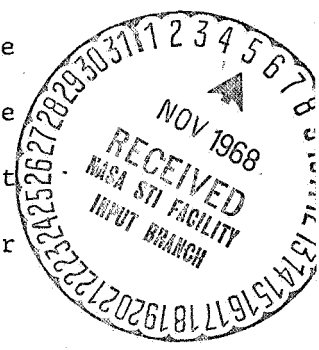
Introduction

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The launching of the Early Bird satellite in 1965, officially renamed Intelsat I, heralded a major step toward achievement of an international communications satellite system and foretold the early commercial use of space facilities by man. Communications systems utilizing satellites have a tremendous growth potential^{1/} and will almost certainly result in substantially modifying the pattern of long-distance communications over land and water. The technological advances bring to the fore many old and new problems of law and legal relationships. The International Telecommunications Satellite Consortium,^{2/} the members of which are responsible for perhaps ninety per cent of all present international telecommunications traffic,^{3/} and its manager, the Communications Satellite Corporation (ComSat),^{4/} are well known in the United States and throughout the world. In addition to Intelsat and the United States Military Communications System based on American technology,^{5/} there also exists the Soviet Union's Molniya satellite system, which in some form is a potential competitor for international telecommunications business.

Many other countries and private and public organizations are devoting much time and effort to the complex problems of communications satellites, although they have not matched the technological progress of the United States.^{6/} If communications satellites of the projected capacity are developed there will probably be no technical need for more than one system.^{7/} But the technology of the industry gives no assurance that competing systems will not be established for nationalistic or other



reasons, just as the United States Department of Defense system has been established. Also, if one system has a complete monopoly it is certain that it will, as an alternative to competition, be subjected to very close regulation by individual nations as well as internationally. The Soviet Union, France, England, Germany, Japan, and other nations have the capacity, individually or collectively, to develop regional or global communications satellite systems if they have the desire and are willing to pay the cost in manpower and resources, which may prove difficult to justify on economic grounds alone.

Electromagnetic waves in the radio frequency range continue to receive primary attention, but the use of masers and of the much higher frequency ^{8/} laser, for communications are among the subjects of scientific research and development and may affect the course of communications satellite technology. A high level of technological and political activity will doubtless continue as capabilities are improved, and this will, if any major nation deems it advisable to develop the equipment and techniques, include satellite-to-home receiver transmissions. A brief description of radio communication is necessary to understand the nature and complexity of the legal-political and economic problems of communications utilizing satellites for relay.

Basics of Radio Communication

Radio waves, x-rays, gamma rays, and light waves are all electromagnetic waves controlled by the same natural laws relating to frequency, velocity, intensity, direction of travel, and polarization, but they vary enormously in penetrating power, carrying distance, reflectivity, freedom from interference, frequency or number of cycles per second, wave length, and

the extent to which directionality may be controlled. The waves tend to go equally in all directions from the point of origin. Electromagnetic radiation is considered to travel at a uniform velocity of approximately 186,300 miles per second regardless of wave length or frequency,^{9/} and may be generated by natural phenomena or by man-made equipment. Reliable transmissions over interplanetary distances remain a serious technological problem and over interstellar distances an impossibility. There is presently no known method to reduce the time element.^{10/} A system for electromagnetic communication between two stations at any distance apart consists of three primary elements: (1) a controlled source of electromagnetic wave emission or transmission, including an antenna for radiation; (2) a receiver to intercept and convert the signals to intelligible form; and (3) the transfer mechanism through which the energy is propagated from the transmitter to the receiver. A relay station such as a communications satellite may be required.

Although frequencies from a fraction of a cycle per second to billions of cycles per second can be produced, the usable spectrum is overcrowded and will probably continue to be for the foreseeable future. Frequencies from about 500 kcs to 1,600 kcs are adaptable for standard broadcasting because, with careful engineering, both local and rural service may be provided effectively without serious long-distance interference. The 5-to-25 megacycle range is most suitable for communications over distances of 1,000 to 12,000 miles via sky wave, but these frequencies must serve all nations of the world and must be restricted to services for which they are uniquely suitable. Frequencies from about 50 megacycles and upward to several hundred megacycles are best for television as they are relatively

free from long-distance interference, and the necessary wide channel of about 6 megacycles can be satisfactorily transmitted and received. For many applications of radar, frequencies of hundreds to thousands of megacycles are required so that highly directive antennas of moderate size can be used and satisfactory detail still be obtained. Use of frequencies in the gigacycle range is in the development stage.^{11/} Because of the extreme ranges at which interference may be caused for some frequencies, frequency sharing is limited for several of the frequencies. Frequencies above 30 megacycles are generally useful only for line-of-sight transmissions. There are some exceptions, however, in that microwaves will reflect if "aimed" at the appropriate layer of the troposphere or upper ionosphere at the proper angle.^{12/} Satellites are useful in relaying radio frequencies from 100 to 20,000 megacycles over extended distances, and 1965 U S Air Force tests showed that given the proper aim and transmission power some microwaves could be transmitted from a satellite around the world to another satellite between layers of the ionosphere.^{13/}

Activities in space, as might be anticipated, require a large number of frequencies for operational and experimental activities.^{14/} In transmitting intelligence by electromagnetic waves, amplitude, frequency, phase, and pulse modulations are used either individually or in combinations as the circumstances and use require, which means that a single communications channel utilizes a substantial frequency spread.^{15/}

The Radio Spectrum: A Limited Resource

The number of frequencies of electromagnetic waves that can be generated is virtually unlimited, but the number of radio channels of

varying widths available for efficient communications is limited.^{16/} A message should be transmitted on a channel of frequencies which no other user within the geographical carrying range of that frequency will try to use at the same time,^{17/} but compromises have had to be made between optimum high fidelity transmission and reception and the number of channels available for use.^{18/} A shift from one frequency to another may require such expensive changes in equipment, including a new antenna system, that a considerable amount of interference and crowding would be accepted rather than a shift to a new, comparatively clear channel.^{19/} Thus, technological and other pressures must be heavy to bring about any substantial shifting in uses of frequency ranges, and this has contributed to the problem of making frequencies available for communications utilizing space.

Technological advances have steadily increased the number of radio frequencies available for communications^{20/} and at the same time have continued to narrow the channels required for transmission of information. Nevertheless the rapidly growing demand for the use of radio frequencies continues to outpace technology and leaves only limited promise of eliminating the congestion of the radio waves and the competition for frequencies.^{21/}

Space research and development programs have brought their own new demands for radio frequencies: tracking, command of spacecraft, and communications with men in space require that channels be available on a worldwide basis. Navigation and weather satellites must have channels available for transmission of intelligence. Radio telescopes used in space exploration and astronomy require that the weak extraterrestrial

signals be receivable without interference from man-made transmissions.

Lasers and Masers for Communications

Lasers utilize the infrared range of electromagnetic waves, and experimental work has been underway for some time.^{22/} Lasers, being highly directional, give promise for point-to-point transmissions rather than for general broadcast use. They are, as is true of visible light, interrupted or blocked by water vapor or any solid matter and thus require an unimpeded line of sight between transmitter and receiver. They apparently require less energy than radio transmissions except for reserve power for attenuated circumstances.^{23/} A laser beam is very narrow and if satisfactorily developed should provide a comparatively secure means of almost jam-proof communications.^{24/} Recent experiments give promise of being able to place 100 million bits of information per second on a visible laser beam,^{25/} and a recently patented device may ultimately make it possible to carry 50,000 telephone messages on a laser beam by using frequency modulation.^{26/}

The extent of and results of research work in the use of masers operating in the microwave range of frequencies have not been publicized sufficiently to judge whether or not they have a practical potential for communications.^{27/}

Communications Satellite Technology

A radio wave travels outward in all directions from a transmitting antenna, but varying amounts of directionality of transmissions on many frequencies can be accomplished by configuration of the antenna, reflectors, and shields. Depending on such factors as the electromagnetic frequency involved, the direction and power of antennas, transmitters, and receivers,

the earth's configuration, the weather, the time of day or night, and the state of radiations from the sun or other sources, the transmission may arrive at its destination via one or more of several propagation paths.^{28/}

The radio waves may go directly from transmitter to receiver; via reflection down from the troposphere or the ionosphere; via scattering from one of these layers; via reflection from the ground; or via ducts formed in part by the surface of the earth, low clouds, or other atmospheric layers.

Frequencies higher than 30 megacycles may be aimed to penetrate the ionosphere, which is said to be transparent to waves at these frequencies.

The higher the frequency, however, the greater the attenuation of the transmission from intervening moisture and other substances, with the consequence that frequencies above 20,000 mc/s have not previously been very satisfactory for space communications,^{29/} and it is not known how useful they can be in the future. The frequencies in the higher ranges have little surface "duct" propagation, and communication using such frequencies must ordinarily rely primarily on line-of-sight transmission using relay stations. In some circumstances, however, it is possible to use signals reflected from the ground or from layers of upper atmosphere.

For the frequencies between 100 and 20,000 mc/s, which can be made to penetrate the reflective layers surrounding the earth fairly easily, satellites provide very good relay stations, thereby extending line-of-sight transmission up to approximately halfway around the earth.

Techniques for using much higher frequencies are being perfected. Other frequencies including the range from about 10 to 30 kc/s can, at certain angles of incidence, also be used to penetrate the reflective layers.^{30/}

Satellites are in practical commercial use as a means of long-^{31/} distance communications in addition to cables and regular high frequency radio transmissions with ranges up to 12,000 miles. Present satellites, especially the American ones, utilize low power, transmitting comparatively weak signals on wide frequency bands which give usable signals at powerful earth receiving and sending stations. Using low power lessens interference with reception by less sensitive receivers on the same frequencies.^{32/} The use of highly directional antennas and special amplifiers coupled with isolation of ground station transmitters contribute to minimizing interference with conventional radio operations.^{33/} Satellites offer alternative methods of communications not only for long distances over water, formerly limited to high frequency and cable transmissions, but also for land relay networks.^{34/}

Proposals for overland communications, insofar as the United States is concerned, raise questions of domestic law and policy, but international questions are also involved. Does Intelsat, assuming it retains a monopoly of international communications via satellites, control all communications satellites, even if used for national domestic communications only? Overland satellite communications in Western Europe will obviously be international and if the United States elects to have a separate domestic system spanning three thousand or more miles, the European countries can very well argue that they should have their own regional system. This problem is discussed in some detail later in this chapter and in Appendix 30.

Passive and Active Relay Satellites

There are two basic types of satellites for communication purposes.^{35/}

Echo II is an example of an experimental passive satellite which reflects signals transmitted toward it. Very high-powered transmitters and sensitive receivers are required on the ground to utilize the weak reflected signal. It is doubtful that any regular operational systems using passive satellites will be established since active satellites have proved to be much more satisfactory.

Active satellites, such as (Intelsat I), differ from the passive in that they receive a signal, amplify it, and then transmit it on a different frequency to a receiver on the ground. ^{36/} Such satellites must have a built-in power source, transmitters, and receivers. Transmitters and receivers on the ground do not require as much power to utilize the signals from active satellites as ^{from)} passive ones. In addition to differences stemming from active versus passive satellites, there are also substantial operating differences depending on the altitude and orientation of orbit of the satellites.

Low[#] and Medium-Altitude Satellites

The plane of the ellipse of a satellite must pass through the center of the earth. Subject to this limitation the orbit of a satellite may have any orientation with reference to the earth and may be quite elliptical or almost a perfect circle. A medium[#] or low-altitude system, orbiting at six to twelve-thousand miles, requires the use of several satellites for global coverage, plus elaborate scanning, tracking, and high-powered receiving equipment. Each satellite is only within the line of sight or "view" of a particular pair of transmitting and receiving stations for a comparatively short time before it is hidden by the curvature of the earth. To maintain continuous communication, a second satellite must be in "view" by the pair of stations before the first satellite passes from "view" below the horizon. Thus, a medium-altitude system may require a

dozen or more satellites to insure "visibility" between pairs of stations most of the time. Launching costs may be reduced by launching several satellites from one booster, but this requires maneuvering the satellites apart in their orbits. Orbits for low-[#] and medium-altitude satellites may be "phased" so that a satellite's position relative to that of other satellites in the system will remain constant; they may also be "random." Random orbits require sophisticated scanning equipment and entail some risk that there will be occasional periods when service to any given point on earth will fail temporarily because no satellite will be in view of the ground station.

Synchronous Satellites

An alternative to the low-[#] and medium-altitude satellite system is the high-orbiting synchronous equatorial satellite. A synchronous satellite is placed approximately 22,300 miles above the equator and revolves around the earth at a speed synchronized with the rotation of the earth. Thus the satellite appears to be in a stationary position above a point on the earth, making it possible to utilize slightly less expensive but nonetheless complicated scanning and tracking equipment. ^{37/} Since a perfect synchronous orbit can seldom be attained, however, some drift does occur and occasional "station-keeping" adjustments are required. In the synchronous system one satellite is able to cover about 160° of the globe but cannot cover either of the polar caps, a limiting condition if complete communication coverage is required for any specific use. The system requires only three satellites to provide satisfactory worldwide commercial coverage, but each requires a precise separate launch by a more powerful booster than that required for the lower altitude satellites.

ComSat, manager of Intelsat, has indicated a desire to place four or more synchronous satellites in orbit as part of a permanent operational global system; ^{38/} more may be required if traffic increases as expected. The extra satellites would be used for special communications requirements of the United States, and some would be held in reserve for quick launchings if one of the satellites in orbit ceased to function. ^{39/}

Active satellites, presently relying on solar power and storage cells, are limited in power for onboard signal reception, amplification, and transmission. ^{40/} The low-power levels aboard the satellites must be compensated for with high-powered, sophisticated, and consequently expensive ground equipment in order that signals of sufficient fidelity and magnitude for reliable communications may be obtained. Earth stations must also be isolated from areas of heavy electromagnetic traffic to transmit and receive signals without interference. ^{41/}

The Outlook for Technological Development

The outlook for the 1970's and beyond is very impressive. Methods of increasing effective radiated power (ERP) from the satellites are under intense study, and developments include improvements in the power source, in increased antenna gain, and in spacecraft stabilization. ^{42/} Color television ^{43/} and facsimile and computer data ^{44/} have been successfully transmitted. The feasibility of using satellites as navigational aids for ships and aircraft, for air traffic control, for air-sea rescue coordination, and for satellite tracking is being researched. ^{45/} One of the far-reaching potentialities of space satellites is their use for direct broadcasting to home receivers. ^{46/} FM broadcast is presently possible, and television and AM broadcasts will be feasible when satellites have engineered into them greatly increased power supplies, especially for television.

Engineers are satisfied that facilities can be developed within a few years. The possibility of direct broadcast to home receivers raises important legal, political, and policy questions of ownership and control which will be discussed subsequently in this chapter. It is recognized that technological information is subject to early obsolescence as scientific advances are made, and thus decisions appropriate at the time made may be unrealistic soon thereafter.

Potential Conflicts and Cooperation

Development of telecommunication systems has required nations to elect between private and public or mixed ownership with the United States being one of the few to opt primarily[#] for private ownership except for some government requirements. It has also required extensive international arrangements. The first International Telegraph Convention was signed in Paris in 1865, and from the beginning the International Telecommunications Union (ITU) has developed with extensive responsibilities in the field of international telecommunications.

The development of communications satellites and the increasing demand for communications utilizing electromagnetic waves presents steadily increasing problems of allocation and control of frequencies for the International Telecommunication Union.^{47/} The problems of frequency allocation are not peculiar to satellite communications although they are more acute. These problems are beyond the scope of this study, except for a brief summary to be found commencing at page 000. The problems are further complicated by the apparent and promised economics of communications by satellites which, if borne out, will transform the economic structure of communications systems, make obsolete costly equipment, and create a threat to many vested interests.^{48/}

Nations may, for security reasons or for nationalistic prestige or for political reasons, be concerned about a single worldwide communications system over which they would have little control and which might be under the control or domination of an unsympathetic power or an international organization not amenable to their direction, with the possibility that access to the system might be interrupted.^{49/} This factor is significant in the context of Intelsat, which is substantially influenced by the United States; the potential Soviet Molniya system; and the proposed French system. There has also been some discussion, perhaps primarily by would-be suppliers, of a possible Latin American system and of other regional systems. Although there may be no technological justification for more than one system, such suggestions have a strong nationalistic appeal. Presumably all systems will compete for the same frequencies, subject to such alleviation of the overcrowding as may be brought about by technical developments, including directionality and the use of gigacycle frequencies giving many more circuits.^{50/}

The organization and structure of Intelsat is scheduled to be renegotiated by 1970, and it is almost certain that some European countries will demand a greater voice in Intelsat matters.^{51/} France has announced her intention of launching a system, Saros, in 1970 which will be "open to European cooperation,"^{52/} but the problems of NATO caused by French withdrawal has added to the attractiveness for its other members of the United States suggestion of a separate system for NATO.^{53/}

If all the systems which have been mentioned or suggested are established, the problems of competition, coordination, interchange, and frequency

assignment will be aggravated, and the impact on cables is difficult to foresee.^{54/} Lack of adequate experience with and proof of reliability of satellite communications, as well as cost and problems of suitable locations for earth stations, has led some spokesmen for the communications industry^{55/} to suggest that cables will still be essential in the satellite era. For example, ComSat, on April 25, 1966, requested and received authority to construct an earth station on St. Croix, Virgin Islands, but this had to be changed to Puerto Rico on November 16, 1966, because of electronic interference.^{56/} During the same period a group of United States communications common carriers requested and received from the FCC authority to build a 720-circuit cable from Florida to the Virgin Islands.^{57/} The FCC is obviously concerned with the problem, but there is insufficient experience to enable the FCC to define precisely what place satellite communications can fill satisfactorily. There are also heavy economic and political implications.

Satellites will have a heavy impact on the communication centers of Europe such as Paris and London since, "virtually all international telephone calls from or to Asia, Africa, and the Middle East are routed through London or Paris, for which these cities collect substantial 'transit fees'--for example, a call from Abigjan, capital of Ivory Coast, to Lagos, Nigeria, five hundred miles or so down the coast, may be routed through both Paris and London."^{58/} A country with its own earth station could communicate directly by satellite with almost any other nation possessing an earth station. This fact may contribute to European reluctance to see rapid conversion to satellite communications.

Potential conflicts involving domestic law exist in many individual states, and probably more so in the United States than elsewhere because telecommunications is not a government monopoly there. These conflicts may have repercussions beyond national borders when more than one national communications entity wishes to participate directly in satellite communications operations or when a national agency attempts to control international activities through domestic regulation, such as establishing rates for using satellite channels. A somewhat analogous situation may develop in Europe, where the state communications monopolies have been troubled with private "pirate" broadcasts from the high seas. If and when direct satellite-to-home receiver transmission becomes a reality, any broadcaster with access to a satellite channel can reach almost any nation.

Allocation of Electromagnetic Wave Frequencies

The International Telecommunications Union, since 1947 a specialized agency of the United Nations, has played, and undoubtedly will continue to play, the leading role in the allocation of electromagnetic frequencies.^{59/} Basically, ITU allocates bands of frequencies for types of use rather than to specific users, and nations assign specific frequencies to their stations which are registered with the International Frequency Registration Board of the ITU on a "first come, first served" basis.^{60/} The ITU has not differentiated between military and nonmilitary uses, but in practice military users are likely to utilize, within the limits imposed by their equipment, the band which best meets their requirements at the moment, particularly if the band is not registered or not in use.^{61/}

The assignment and allocation of radio frequencies is at best an extremely complex technical problem made difficult by the overcrowding of a limited resource, and the advent of the space age has added many new demands for frequencies. Natural phenomena in air and space sometimes generate electromagnetic waves in a wide range of frequencies which interfere with man's efforts to transmit information, and man-made transmissions may interfere with efforts to receive information of natural origins coming in from space. ^{62/}

Although most nations of the world are members of the ITU, violations of frequency assignments are frequent. Interference is usually inadvertently caused by crowded spectrum and changing atmospheric conditions or by inadequate equipment, but it is sometimes the result of disregard for rules or of deliberate jamming. ^{63/} The need for the permanent allocation of bands for specific purposes was recognized by the ITU at its 1959 and 1963 meetings, and the table of frequency allocations now includes the entire spectrum between 3 kc/s and 300 gc/s. ^{64/}

ITU has neither the police power nor the ability to apply effective sanctions against nations for frequency violations; but recognition that if a substantial number of states disregard the rules, every state will suffer has prevented the situation from becoming chaotic. Although direct diplomatic representation and protests have been used, the most frequent recourse has been to the ITU and its consultative organs. In 1965 at Montreux an effort was made to strengthen the authoritative and legislative power of ITU and to provide more formal machinery for resolving disputes. ^{65/}

Intelsat must obtain authority to use radio frequencies through governments and the ITU in basically the same manner as other communications carriers using radio frequencies. ComSat's use of frequencies is subject to Federal Communications Commission controls, and Intelsat's use of frequencies available to it is controlled by its representative ruling body, the Interim Committee.^{66/}

The Organizations for Utilizing Space Satellites for Communications

Satellite communications facilities may be organized and owned on a national or international basis, and ownership may be public, private, or mixed. Political factors and national policies will continue to exercise at least as much influence on the communications structure as the legal, economic, and technological factors. Even satellite communications systems intended to meet the domestic requirements of only one country have international aspects because the satellites are in non-national space; because it is necessary to coordinate the use of frequencies to avoid or minimize radio interference; and because any system can be given the technical capacity to reach across national boundaries wherever there are ground stations to receive. Limitations to national uses represent political as well as technological decisions.

Nations representing a very high percentage of all international telecommunications traffic have joined Intelsat in a cooperative effort to provide facilities for international commercial communications, but it is not yet known what other systems, domestic or international, may be established or what national services Intelsat or some other international organization may provide. There may be political pressures for bilateral communications satellite arrangements, but economic and technological

factors will / ^{probably} exert a controlling pressure for multilateral arrangements sanctioned by governments. ^{67/} Earth stations will for the most part probably be subject to individual national ownership and control, although several small contiguous countries may jointly own, control, and use a single earth station. A nation with its own earth station will be freed from one form of dependency on other nations, which has been felt by those who did not have cable termini on their own land or who found it necessary for their cables to cross the territory of another. ^{68/}

Conventional radio and cable transmitting and receiving facilities present many of the same problems presented by satellite communications and, in most instances, are or will be in direct competition. The space segment consisting of satellites and necessary tracking and control facilities has no real counterpart in conventional or cable communications, however. Even in a cable system requiring a multilaterally owned relay station the legal problems and technology are quite different because the space segment involves a large number of nations and the satellite is not on one nation's territory. Radio and cable communications require essentially bilateral arrangements with possibly intermediary third-party relay stations, whereas satellite communications facilities are, because of costs and technology, better suited to multilateral arrangements even when the particular communication is only bilateral.

National, Regional, and International Systems

There are, in addition to Intelsat, at least three other satellite communications systems in operation. A United States military system is intended to serve national needs and to be available to allies under some circumstances. ^{69/} The Department of Defense assumed responsibility in April 1965, for the operation of NASA's synchronous satellite repeaters

Syncom II and III and for research and development of a military communications satellite system, which is now operational although still in the experimental stage. ^{70/} This system is for command and operational purposes and will be of limited capacity, partly because it uses small portable-type earth stations.

The United States ambassador to NATO proposed, on June 29, 1966, to the NATO council that NATO develop its own satellite communications system. ^{71/} The initial phase of the program was inaugurated in July 1967, and utilizes the U.S. military satellites already in orbit. The next phase requires a \$45 million budget and, when approved, involves the launching of NATO's own satellites over the Atlantic. The need for reliable communications with the southern members of NATO is obvious, especially with the present uncertainties about whether or not France will permit the continued operation of communications across her territory since her withdrawal from NATO. France will probably not participate in the NATO satellite system. ^{72/}

NASA operates communications systems of several different types for experimental purposes. As part of its own space activities, NASA provides support through the Space Tracking and Acquisition Network (STADAN) and the Smithsonian Astrophysical Observatory (SAO) optical tracking service. The NASA Communications Network (NASCOM) is the connecting link between the network stations and control centers. ^{73/} The newer Applications Technology Satellite (ATS) Program includes experimental work in satellite communications technology, as well as in meteorology and geophysics. ^{74/}

The Soviets have launched several Molniya communications satellites which are being used at least on an experimental basis for internal Soviet communications and for experimental work with other countries, especially France. The Soviets may also be using satellites for military communications, although their public statements place heavy emphasis on cultural exchanges.

A Molniya satellite was first launched on April 23, 1965, with other launches following: October 14, 1965; March 1966, October 1966; and May 25, 1967.^{75/} The 65° inclination orbits are elliptical with a perigee of about 310 miles over the southern hemisphere and an apogee of about 24,500 miles over the northern hemisphere. The orbital periods are about 12 hours of which between nine and ten hours can be used for transmitting in the Soviet Union. Molniya satellites transmit with a power of 40 watts compared with 6 for Early Bird and 18 for Intelsat II series satellites. The limited information released by the Soviets and other available information indicates the Molniya satellites have been used for all types of communication including an exchange of color television with France in November 1965, and of telephone service between Moscow and Vladivostok since June 1965,^{76 /} although it is not clear if service has been on a regular or experimental basis.

At the time ComSat was established as the United States entity to participate in international communications satellite development, it was uncertain to what extent other nations would participate. Intelsat was then quickly established and it took over much of what had been national United States satellite operations, although the United States has maintained a very strong cooperative program. Even before Intelsat the

United States participated very actively in cooperative international satellite experiments and development.^{77/} The Intelsat system is discussed in detail in subsequent sections of this chapter, but it should be noted that the other operating systems are in different stages of development, serve different purposes, and that only Intelsat is under international control. It may be argued that based on available evidence the Molniya satellites do not constitute an operational system. It is probable that additional "systems" will be established, although they may consist of only one or two satellites and may be of short duration. The factors which may lead to a multiplicity of systems are political rather than technical, economic, or geographic. In addition to the operational systems a number of other national and international systems have been under discussion or development, with three of them limited to the United States.^{78/}

There has been some discussion of the possibility of a Western European regional system and a British Commonwealth system, but whether these are intended seriously is difficult to assess.^{79/} France, Germany, Japan, and Canada have generated some publicity over the possibility of separate communications satellite systems.^{80/} Whether or not any of these systems materialize will depend on political rather than on technological and economic factors, since the nations concerned have or can develop the capacity if they are willing to meet the cost in priorities as well as money. Part of the publicity may be intended to improve prospects for obtaining contracts in connection with Intelsat and to improve bargaining positions in connection with the scheduled reconsideration of the Intelsat Interim Agreement by 1970. Suggestions for separate systems will doubtless recur from time to time partly because the prestige

rewards are so dazzling, although very expensive, and partly because national leaders are convinced that the best interests of their nations will best be served by having a system exclusively under their own control or under the control of a small number of nations with an identity of interests. The establishment and structure of national communications satellite systems will be determined primarily on the basis of national law and policy and, consequently, will not generally be discussed in detail in this chapter, although any such system does have distinct international implications.

There have been proposals for establishing an international communications satellite system under the aegis of the United Nations, ^{81/} but thus far no substantial progress has been made and neither of the major space powers has given or appears likely to give the proposals official support.

The problems of receiving radio and television programs across international boundaries may be aggravated by direct satellite transmissions to home radio and television receivers which would greatly increase the potential for international broadcasts, using national and international systems. ^{82/} The problem presently exists for standard and television broadcasts near international boundaries; these are frequently regulated to some extent by bilateral treaties relating primarily to interference. Short wave presents the problem on a worldwide basis, and if the countries concerned are not able to resolve differences by negotiations the unwilling recipient jams the undesired transmission. This situation will probably continue, for the space powers do not appear to be ready for the alternative, which would be to place international

telecommunications under the control of the United Nations, the International Telecommunications Union, or some other international organization. It is unlikely that any nation will voluntarily submit to censorship by another nation or by an international organization.

The implications of satellite-to-home transmission for domestic radio and television for domestic radio and television broadcasting are equally significant and will probably change the economic and operational structure of the industry. The subject requires a great amount of broad policy analysis to determine what structure will serve best the public interest. ^{83/} The fundamental question is whether a profit oriented private business heavily regulated by the government, is the most suitable entity to own and operate a communications system which can easily span the entire globe.

The Communications Satellite Legislation

Many nations have enacted legislation relating to communications satellites, but only the United States' domestic laws are examined here. It is apparent that ComSat's counterparts in other countries, for the most part government agencies, are subject to government controls and supervision comparable to or greater than those over ComSat. ^{84/}

The ComSat Act providing for a privately owned corporation was passed by a large majority over the opposition of a few vocal members of Congress who vigorously insisted that communications utilizing space should be a government operation. Arguments advanced were that the public, through a government operation, should receive the benefits of the enormous space research and development costs; that most other states treated communications as a government monopoly; that international negotiations might be

expedited if a government agency handled the matter for the United States; and that private ownership might lead to monopoly and would give rise to antitrust and regulatory problems. The United States, however, has ordinarily followed the rule that private enterprise should be favored except where national security is involved or where it is evident that private enterprise is incapable or unwilling to act. In this case it was argued that although much government financing had been used and would still be required, a private, profit-oriented, commercial system for United States participation in Intelsat offered substantial advantages, and that with increasing reliability of operations in space many of the necessary operating facilities could be put into the hands of private industry, resulting advantageously in greater efficiency and in greater private investment. Private industry insisted that the space program should not be a device for changing the American politico-economic structure by eliminating or substantially modifying the patent system, by establishing a major nationalized industry, or by increasing government and political control over the economic structure of the nation. The arguments covered the entire spectrum of private versus public ownership, sometimes heatedly and often repetitiously. The very extensive discussions also covered what private interest should be allowed to participate in the ownership of ComSat. ^{85/} For those who wish to explore in detail the considerations leading to the decision for private ownership, the documentation is extensive. ^{86/} At the time that it was decided ComSat should be privately owned, it was also decided that ownership should be broadly based and that ComSat would be subject to extensive government

controls because of the many interrelations with existing communications systems and because of the far-reaching repercussions in foreign relations.

Several major areas of domestic law and policy have not yet been resolved. An extremely controversial area is whether ComSat may offer service only to common carriers.^{87/} An equally controversial question is whether or not ComSat is to be the only entity in the United States which may have and operate a satellite communications system for domestic purposes.^{88/} The controversy over rates promises to be long continuing,^{89/} with ComSat seeking to have rates reduced for communications using satellites, and with the communications carriers generally endeavoring to spread the savings to all communications users and even resisting reductions to protect investments in conventional facilities. Foreign communications entities have shown the same reaction to the use of Intelsat facilities. Further legislative and judicial action may be required domestically and extensive international negotiations will doubtless take place before Intelsat is fully utilized. The decisions will inevitably be made on policy grounds rather than on technical, legal ones.

Policy of the ComSat Act

Only a general summary of the ComSat Act^{90/} and its relationship primarily to domestic law will be given. Several studies of the act already exist.^{91/}

Title I of the act expresses the broad "policy of the United States to establish in conjunction and in cooperation with other countries, as expeditiously as practicable, a commercial communications satellite system, as part of an improved global communications network, which will be responsive to public needs and national objectives, which will serve

the communication needs of the United States and other countries, and which will contribute to world peace and understanding." Economically less developed countries are to receive the benefits of the new technology.

"Authorized users" of ComSat facilities, an ambiguous term reflecting one of the unresolved problems previously noted, are to have nondiscriminatory access to the communications satellite system. ^{92/} Competition is to be maintained in the provision of equipment and services for the system. The corporation created under this act is to be so organized and operated as to maintain and strengthen competition in the provision of communications services to the public; ^{93/} United States antitrust laws are to be observed. The system may be utilized for domestic communications, and additional systems may be created if they are required to meet unique governmental needs or are otherwise in the national interest.

Federal Controls

Title II of the act provides for extensive supervision, guidance, aid to, and control of ComSat by the President, Congress, NASA, the Attorney General, the Federal Communications Commission, and the Department of State. Other agencies such as the Department of Defense are greatly concerned with ComSat operations.

The impact of a satellite communications system on international affairs is recognized, and the President is directed to:

- (4) Exercise such supervision over relationships of the corporation with foreign governments or entities or with international bodies as may be appropriate to assure that such relationships shall be consistent with the national interest and foreign policy of the United States;

- (5) insure that timely arrangements are made under which there can be foreign participation in the establishment and use of a communications satellite system;
- (7) so exercise his authority as to help attain coordinated and efficient use of the electromagnetic spectrum and the technical compatibility of the system with existing communication facilities both in the United States and abroad.

"The FCC, [#] shall, [#] in any case where the Secretary of State, after obtaining the advice of the Administration (NASA) as to technical feasibility, has advised that commercial communication to a particular foreign point by means of the communications satellite and satellite terminal stations should be established in the national interest, institute forthwith appropriate proceedings under Section 214(d) of the Communications Act of 1934, as amended, to require the establishment of such communication by the corporation and the appropriate common carrier or carriers...." This provision obviously infringes on the control of Intelsat by its Interim Committee, which is authorized to approve earth stations. ^{94/}

The role of NASA is defined primarily as that of technical advisor to the President, F.C.C., and the Department of State in addition to responsibilities to assist and advise ComSat. ^{95/} The Federal Communications Commission is charged with extensive regulatory responsibilities over ComSat activities. ComSat must keep the Department of State advised of any business negotiations with any international or foreign entity, and the Department of State is to give ComSat foreign policy guidance and assistance in negotiations as appropriate. ^{96/} It will take some years

to establish a set of procedures which will operate smoothly and without friction, for the technology has presented many new questions and there are powerful contenders for communications traffic.

Corporate Structure of ComSat

Congress extensively debated the structure of ComSat and the decisions made are fundamental in the context of the general economic structure of the United States. Consequently, a description of ComSat is pertinent, domestically and internationally. Title III of the ComSat Act authorizes the incorporation of ComSat in the District of Columbia, defines the corporate powers, and provides for its method of financing. Not over half the stock may be held by communications common carriers and the rest "shall be sold...in a manner to encourage the widest distribution to the American public."

ComSat, although subject to such extensive controls that it is a quasi-governmental or only a quasi-private operation,^{97 /} has displayed a considerable degree of aggressive independent business judgment and initiative. It has not hesitated to press its claim to be the only United States entity authorized to have communications satellites. It has vigorously asserted its right to make circuits directly available to the government and to others rather than go through the intermediary of a communications common carrier. Its officials have been forthright in expressing disagreement with rules proposed by the FCC considered adverse to ComSat, but nonetheless, the future alone will indicate whether or not an entity so encompassed with governmental controls can function in the tradition of private American industry. The law, at present, places

ownership in the private sector, but a determined administration could exercise very extensive influence over the business decisions of ComSat. A substantial part of the answer will depend on the restraint shown by the President and the FCC in the exercise of their statutory powers. In theory and, it is hoped, in substance there is reserved a role for private enterprise in an area where the scope of future development cannot easily be assessed.

International Communications Satellite Systems

The creation of ComSat and the negotiation of the Intelsat agreements are indicative of United States' commitment to establishing under its leadership an international communications satellite organization. Efforts to develop an international system have been carried out with some urgency in the stated hope that a communications satellite system would contribute to world peace and economic progress.^{98/} There is little doubt that a satellite system has many advantages^{99/} and that an international arrangement would facilitate its establishment.

Earth stations^{100/} owned and controlled by the countries where they are located will present comparatively few international problems. The United States is willing to share internationally the benefits of technological advances with nations participating in the costs of developing the system as well as in its management. "Technically, a single worldwide system provides the most effective use and management of the limited frequency spectrum; avoids duplication of and interference between competing systems; improves operating efficiency; and reduces the technical and operating problems of compatibility between different space systems and other services."^{101/} There is, as we have seen, no assurance that only a single system will be established.^{102/} Intelsat, which presently

includes no old traditional Communist countries, does include as members the nations responsible for a very high percentage, perhaps in excess of ^{103/} 90 per cent, of all telecommunications traffic.

Political and propaganda factors mitigate against Soviet or other Communist participation in a Western-controlled communications satellite system although the economics of the situation provide opposite inducements. The Communist nations cannot realistically hope to gain control of Intelsat, but the Soviets may hope to bargain for a disproportionate voice if they are able to establish an operational system capable of providing service on a worldwide basis. The orbit of the Molniya satellites is not so designed. Soviet failure to cooperate in Intelsat may prove to be solely a part of the cold war, and it can be anticipated that some of the "neutralist" members of Intelsat will wish to collaborate with the Soviets for political reasons.

The Soviet Union has been routinely very critical of United States' activities in space communications. ^{104/} Intelsat has shared in this ^{105/} criticism in terms so inaccurate and so obviously politically motivated as to require little comment. It will be interesting to see what terms Russia offers for participation in a Molniya system and to what extent it matches the internationalization of Intelsat. Soviet-Chinese relations may also influence the Soviet attitudes. The Soviet desire to maintain control of radio and television broadcasts into its own and satellite territories as evidenced from time to time by extensive jamming, doubtless plays a part in their attitude and undoubtedly is greatly strengthened by the potential capacity for direct home reception from communications satellites.

The Agreement Establishing Interim Arrangements for a Global Communications Satellite System speaks of a "single global commercial communications satellite system"^{106./} but, significantly, contains no express prohibition against a signatory participating in another communications satellite system. "Commercial" system is undefined and leaves the way entirely open for government purposes systems. The U.S. ComSat Act reserves the right to create additional systems "if required to meet unique governmental needs or if otherwise required in the national interest,"^{107/} which could be interpreted as encompassing all telecommunications traffic of Communist countries or other countries in which communications is a government monopoly.^{108/} There is no legally enforceable barrier to the establishment of any number of satellite communications systems and withdrawal from Intelsat is technically simple, although it would cost the investment and possibly additional sums. Economics and politics rather than law will determine the extent to which Intelsat fulfills its goal of being a single, global, commercial communications satellite system. The problem will become increasingly difficult when additional powers or organizations possess the technological ability to put satellites in orbit. While recognizing that other systems may be established to serve international and various national requirements,^{109/} Intelsat raises most of the anticipated legal, policy, and technical questions of space communications.

The Agreement for Interim Arrangements; the Special and Supplementary Agreements

An understanding of Intelsat requires a knowledge of the background of the basic documents which provide a structure of and methods for

control and operation of an international space communications system.

They are:

1. The Agreement Establishing Interim Arrangements for a Global Communications Satellite System. This is a permanent agreement contemplating revision--but also capable of being continued intact (herinafter referred to as Interim Agreement); 110/
2. Special Agreement; 111/
3. The Supplementary Agreement on Arbitration.

The documents are reproduced in Appendix 60.

The Interim Agreement objective of worldwide satellite communications coverage by 1967 112/ has been achieved. European members have not used all available satellite circuits, however, at least partly because of investments in unused cable circuits and because of uncertainties about the reliability of satellite communications.

Signatories to the Interim Agreement are states, but signatories to the Special and Supplementary agreements are about equally divided among governments and governmental communications entities. The signatories for Canada, Japan, and the United States, and possibly others are corporations, but the Canadian signatory is a crown corporation, and the Japanese signatory is a private corporation, the Kokusai Denshin Denwa Co., Ltd., under the supervision of the Japanese Ministry of Post and Telecommunication. 113/ The government may own shares in the company. Apparently, United States ComSat is the only wholly privately owned entity involved in Intelsat.

The real distinctions between private and public entities are at least as much political as financial and legal, since ComSat's operations

are almost as closely controlled by the United States as are most foreign governmental communications agencies. Private ownership of ComSat may have contributed to but has probably not been a major factor in the Soviet Union's decision not to participate in Intelsat. The Soviet Union has not yet been able to bring forth an alternate system capable of competing generally with Intelsat, and the first in the field has a distinct psychological and technical advantage. Indications are that Intelsat would welcome participation of the Soviet Union and other Communist countries on the same terms as for any other country; that is, voting power, etc., would correspond generally to the use made of the system and to the investment in the system. ^{114/}

Amendment, Withdrawal, and Renegotiation of the Agreements

Amendments to the Special Agreement require approval of two-thirds of the signatories, not in committee votes or investment quota value, and no amendment may impose any additional financial obligation upon any signatory without its consent. ^{115/}

The Interim Agreement contains no provision for amendment but includes provisions for negotiating a definitive agreement with a view to having it enter into force by January 1, 1970. ^{116/} The Interim Agreement contains several instructions for negotiating the definitive agreement, but such mandates will at most have only persuasive weight as the negotiators are no more likely to consider themselves bound than would a future legislature consider itself bound by a prior legislature.

Any party may withdraw from the Interim Agreement on giving three months notice ^{117/}, which act also constitutes withdrawal from the Special Agreement.

Accounts must be settled and the quota of the withdrawing member is distributed proportionately among the remaining signatories to the Special Agreement or as may otherwise be agreed; or, with the approval of the Interim Committee, the quota may be transferred to another party 118/ acceding to the Interim Agreement and the Special Agreement.

Designated Communications Entities

Each party to the Interim Agreement is required to sign, or to designate a public or private communications entity to sign, the Special Agreement; this must be accomplished before the Interim Agreement is considered in force for that signatory, and no signatures may be affixed 119/ to the Special Agreement without a prior signing of the Interim Agreement.

Domestic law controls relations between a party to the Interim Agreement and its designee for the Special Agreement. The parties to the Special Agreement negotiate and enter directly into appropriate traffic agreements for use of communications channels. 120/ Most of the signatories to the Special Agreement are subject to suit in the courts of the corresponding signatory to the Interim Agreement as they are either corporations, such as ComSat and a few others, or government agencies considered by their national authorities to be engaged in proprietary activities and thus subject to suit. Also, most modern nations permit some form of adjudication 121/ of claims against the government.

Since ComSat, as manager of Intelsat, and other signatories to the Special Agreement may sign contracts in their own names 122/ for the benefit of Intelsat, there would appear to be little doubt that they could sue in their own names for the same purposes in accordance with the law of the forum. The language apparently indicates that when a contract is to be let in the territory of a signatory to the Interim Agreement, the

corresponding signatory to the Special Agreement will usually but not mandatorily be the contracting party.^{123/} In practice, however, ComSat has signed all procurement contracts. Contracts are to be distributed in approximate proportion to the respective investment quotas of the signatories. Had the various signatories to Intelsat signed contracts in their own territories most of the contract problems would have been kept within the jurisdiction of the courts of the individual members. As the practice has in fact developed, presumably for purposes of operational uniformity and good administrative practice, the general rules of international law will apply except as modified by the Intelsat agreements.^{124/}

Legal Status of Intelsat

Intelsat cannot easily be categorized because it is hardly possible to distinguish in all cases between the signatories to the Interim and Special agreements.^{125/} In several instances signatories are the same, and where they are not, the signatories to the Special Agreement are in all instances the designees or even the agents of the states signatory to the Interim Agreement.^{126/} Consequently, there is considerable justification to say that the activities of Intelsat are the activities of the states signatory to the Interim Agreement, although all states may have access to the system.^{127/}

The Interim and Special agreements may be compared with a corporation's articles and by-laws, respectively, and the Interim Committee^{128/} may be likened to a corporate board of directors,^{129/} although a juridical entity was not created. But subsequent actions by individual states have extended to Intelsat at least some of the attributes and benefits of a juridical entity.^{130/} Intelsat may be described as a consortium, a joint

venture, or a partnership operation. By its own internal action it has adopted the name Intelsat. ^{131/}

The reasons for not having established a juridical person have not been set forth but are probably related in part to the time which would have been required to negotiate the necessary provisions; and it was doubtless felt that Intelsat would receive more general acceptance and support if most of the nations expected to participate were allowed a voice in the formulation of definitive arrangements. There was also hesitancy on the part of some about creating a corporate structure subject to American domination. The way is left open to establish a formal juridical entity, if this is considered desirable, ^{132/} when definitive arrangements are negotiated. But in the meantime states likely to participate in the negotiations have the opportunity to gain experience in Intelsat operations and to formulate policy.

In view of the ambiguity of Intelsat's status as a juridical entity it seems doubtful that it has the legal capacity to sue or be sued or to contract in its own name. Regardless, it has no standing in its own right before the International Court of Justice. ^{133/} But the traditional concepts of international law are being modified, and natural and juridical persons have standing before some international tribunals. ^{134/} Intelsat could easily be given unquestioned juridical personality in the territory of Intelsat members and, under some circumstances, the status would probably be recognized by other nations as well. ^{135/} Existence or lack of existence of a juridical personality will have little to do with Intelsat's internal power structure and operations but will have a technical bearing on its external contracting and other business procedures and liability.

The Interim Committee has responsibility for the design, development,
 construction, establishment, maintenance, and operation of the space
 segment,^{136/} but ComSat is designated the manager of Intelsat "in the
 design, development, construction, establishment, operation, and
 maintenance of the space segment pursuant to general policies of the Interim
 Committee and in accordance with specific determinations which may be
 made by the Interim Committee."^{137/} The space segment consists of the
 communications satellites and the tracking, control, command, and related
 facilities and equipment required to support the operation of the
 communications satellite. It is owned in undivided shares by the signatories
 to the Special Agreement in proportion to their respective contributions
 to the costs of the design, development, construction, and establishment
 of the space segment.^{138/}

Although the Interim Agreement indicates that Intelsat is owned by
 the signatories to the Special Agreement rather than by those to the
 Interim Agreement, it is not clear what significance in international
 law this may have in view of the identity of or close relationship between
 the signatories to the Interim Agreement and those to the Special Agreement,
 the lack of a juridical entity in Intelsat, and the concept of state
 liability for all activities in space as reflected in UN resolutions and
 in the space treaty.^{139/} In the absence of an insulating corporate
 structure, and unless there is specific language in contracts which
 would be binding at least for the parties, it would appear that the
 parties to the Interim Agreement as well as to the Special Agreement are
 liable for the contracts, actions, and torts of Intelsat, whether or

not the action complained of is specifically an activity in space or is 140.
only related to or preparatory for such activity. Contracts entered
into by ComSat as manager of Intelsat have specified that ComSat only is
liable under the contract, but such a provision could hardly control if 141./
a satellite caused damage in the territory of a stranger to the contract.
Participants in Intelsat may divide responsibilities among themselves as
they consider appropriate, but it is doubtful that injured third parties
not bound by contract will consider themselves obligated under either
the civil or common law to distinguish among or between signatories to
the Interim and Special 142./
agreements. Even in contract cases, if the
party signing the contract defaults and the other signatories to the
special agreement are enjoying the benefits of the contract without paying
their respective quota shares, a diplomatic claim would probably be made,
and possibly an equity or third-party beneficiary-type action might be
brought to force the defaulting party to exercise its rights under the
Special Agreement for reimbursement from other members of the consortium
143./
for the benefit of the claimant.

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Financing, Ownership and Costs

The estimated costs of establishing the international communications satellite system was set at \$200,000,000,^{144/} although provision was made for a possible cost of \$300,000,000 without the necessity of a new agreement.^{145 /}

The funds are to be paid in dollars or dollar-convertible currencies by the signatories to the Special Agreement^{146/} in accordance with quotas of investment or ownership based on anticipated use of the system.^{147 /} If these quotas reflect fairly accurately the usage of the system there is no real basis for complaint, but if they prove to be erroneous, strong arguments for revising the quota pattern are sure to be heard when negotiations of the definitive agreement get under way. Further, it seems probable that the Soviets will not participate in Intelsat unless they are given a voice much stronger than their usage would justify if the current policy is followed. Some of the smaller nations may ask for a one-nation, one-vote rule as in the UN General Assembly.^{148/}

Payments into the fund administered by ComSat as manager are to be made at such times and in such amounts as may be established by the Interim Committee.^{149/} Failure to make timely payment results in suspension of the rights of the defaulting signatory and may result in its exclusion ("deemed to have withdrawn") from the Interim and Special agreements, subject to adjustment of accounts.^{150 /} Costs cover the "design, development, construction and establishment of the space segment,^{151/} including those costs incurred by ComSat prior to the opening of the Interim Agreement for signature, subject to agreement between ComSat and the Interim Committee.^{152 /}

The space segment is "owned in undivided shares by the signatories to the

Special Agreement in proportion to their respective contributions..., "^{153/}
whereas the earth stations which receive and transmit the communications to
and from the communications satellites are owned by individual members of
the consortium.^{154/} Costs of earth stations, taxes, costs of design and
development of launchers and launching facilities-except costs for the
modification of launchers and launching facilities for the space segment-
and expenses of representation for members of the consortium on the Interim
Committee and its subcommittees cannot be included as charges to be shared
by the signatories as consortium expenditures.^{155/}

Earth stations are essential parts of the total system, but their owners
may not utilize the space segment without the approval of the Interim
Committee.^{156/} Applications for earth stations will be made by the signatory
to the Special Agreement "in whose area the station is or will be located
or, with respect to other areas, by a duly authorized communications
entity."^{157/} "Duly authorized communications entity" is inadequately
identified. In context, it does not refer to the communications entity
authorized by the concerned signatory to the Interim Agreement to sign
the Special Agreement as its designee in accordance with Article II of
the Interim Agreement. Neither does it refer to an "authorized carrier"
defined in the U S ComSat Act as a communications common carrier authorized
by the FCC to provide services by means of communications satellites, since
the ComSat Act is domestic legislation.^{158/} A number of nations interested
in having satellite communications lack technical and financial resources
with which to construct and operate earth stations. If they are to receive
the benefits of modern technology, they must be assisted from external
sources,^{159/} not only for earth stations but also for improving local
communications which in some large areas are almost nonexistent.

"Duly authorized communications entity" relative to an area not in the consortium appears to mean a communications entity authorized by a nonmember to apply for authorization for an earth station. Under this interpretation a nonmember of the consortium might authorize ComSat, A T & T , or some other communications entity, public or private, domestic or foreign, to apply to the Interim Committee for an authorization for an earth station in an area not included in the consortium.

An application for an earth station in the territory of a member of the consortium is to be made by the signatory to the Special Agreement for the area in question even though the earth station is to be owned or operated by a different organization.^{160/} Thus if the United States wished to locate an earth station in Canada, a member of Intelsat, the Canadian signatory of the Special Agreement would submit the application to the Interim Committee.

It is doubtful that these provisions will cause any difficulty, for the procedural interpretation placed on them by the Interim Committee will probably be accepted without argument since all earth stations must be approved by it. Considerations are technical rather than political. If more than one signatory to the Special Agreement and duly authorized communications entities are to use an earth station the application is to be submitted either individually or jointly on behalf of all. If an earth station within the territory of a state which has signed the Interim Agreement is to be operated by an organization other than that state's designated signatory of the Special Agreement, the application is nonetheless to be submitted by the signatory of the Special Agreement.^{161/}

Approval for earth stations to utilize the space segment will be based primarily on technical engineering, anticipated use, satellite capacity, geographical distribution, and use-efficiency factors. The recommended standards of the ITU's International Radio Consultative Committee and the International Telegraph and Telephone Consultative Committee are to be considered but are not controlling; the lack of established general standards does not preclude approval of an earth station. ^{162/}

Earth stations are to be available for use on an equitable, nondiscriminatory basis to all signatories or duly authorized communications entities with due consideration to the quotas of the signatories to be served by each earth station. ^{163/} Rates for the use of the space segment are controlled by the Interim Committee, and the income of Intelsat is, of course, from the use of the space segment. Individual members of Intelsat will receive on a pro rata basis any profits Intelsat may make and will also collect fees which they may establish for the use of their earth stations and local communications distribution systems.

Rates

The Interim Committee establishes rates for units of utilization of the space segment which are intended to cover amortization of the capital cost, compensation for the use of capital, and the estimated operating, maintenance, and administrative costs of the space segments. ^{164/} Intelsat intends its rates to be competitive with existing communications systems, to the extent that vigorous and protracted opposition may be encountered from other communications companies such as American Telephone and Telegraph and foreign communications entities seeking to protect investments in cables and other facilities. ^{165/} In informal private conversations with the authors,

representatives of NASA and ComSat have suggested that an ultimate goal of 10 cents a call through synchronous satellites, plus the earth station and terminal charges, is not unreasonable. This figure does not include charges for research and development.^{166/} Rates for the use of earth stations and relays from earth stations to local communications users, although being of obvious and substantial economic interest to Intelsat and having a direct impact on the ability of Intelsat to compete and provide worldwide communications facilities, are under the control of the owner-operator of the station rather than of Intelsat.^{167/} ComSat, as manager and part owner of earth stations, has considered it necessary to request the FCC's approval of rates for getting the message up to the satellite.^{168/}

The Interim Committee is given the authority to establish rates,^{169/} but the stakes are high. The economic viability of existing public and private communications entities with large investments in cables and other facilities may be at issue. Since many of the same entities are represented on the Interim Committee, it will not be surprising if they fight through political and economic channels. Any success at control of rates by individual members of the consortium would cause confusion and delay the full exploitation of communications satellite technology.^{170/}

Interim Committee Voting

Ratios of ownership, which represent investment in and anticipated utilization of the space segment and control voting power on the Interim Committee, are subject to adjustment to take into consideration the protection of the rights of new members of Intelsat,^{171/} But no member or group of members under the minimum 1.5 per cent quota rule will be deprived of its voting

rights on the Interim Committee because of a reduction of its quota to accommodate new participants.^{172/} Each signatory or group of signatories with an investment quota of 1.5 per cent or more has voting power on the Interim Committee equal to its quota,^{173 /} with the United States' quota to remain in excess of 50 per cent unless changed by the definitive agreement yet to be negotiated.^{174 /} The voting procedure, however, is established in such a way as to require the affirmative vote of three or more signatories on matters of substantial significance.^{175/}

The Supplementary Agreement on Arbitration

A supplementary agreement on arbitration^{176/} for the settlement of legal disputes within Intelsat was opened for signature June 4, 1965, and entered into force on November 21, 1966. The arrangements are fairly typical of international arbitration agreements, providing a three-man arbitral tribunal, with one member appointed by each of the parties^{177 /} and the third, to serve as president, selected by the first two from a seven-member panel of experts established by the Interim Committee, pursuant to the Supplemental Agreement.^{178/} The seven-member panel designates its own chairman^{179/} whose most important functions are to appoint the presidents of the three-member tribunals and to appoint other members to the tribunals when the parties to a controversy or their members of an arbitral tribunal have failed to take action.^{180 /}

The tribunals have competence to decide "whether an action or failure to act by the [Interim] Committee or by any signatory or signatories is authorized by or is in compliance with [Interim] Agreement and the Special Agreement,"^{181/} and to resolve "any legal dispute arising in connection with any other agreement relating to the arrangements established by the [Interim]

12/ Agreement and the Special Agreement where the signatories have agreed to confer such a competence."^{182/} Procurement, construction, and other contracts signed by ComSat as manager or by one of the other signatories to the Special Agreement will normally be subject to the domestic law of one of the signatories to the Interim Agreement, and thus are not likely to come within the purview of the Supplementary Agreement.

Procedures established by the Supplementary Agreement are simple and an arbitral tribunal may, consistent with the agreement, adopt additional rules of procedure as necessary.^{183/} Proceedings are private and are conducted in writing, but oral evidence may be heard. Only the Interim Committee and signatories to the Special Agreement may be parties before an arbitral tribunal established under the agreement.^{184/} When the Interim Committee is a party to the dispute, all parties to the Interim Agreement and all signatories to the Special Agreement may be present. When the Interim Committee is not a party to the dispute, only the parties to the dispute and their respective signatories to the Interim Agreement may be present and have access to the materials; but if any signatory to the Special Agreement or the Interim Committee believes it has a substantial interest in the case it may petition the tribunal to become a party to the case.^{185/} Deliberations of the tribunal are secret and findings must be supported by not less than two members.^{186/}

The undesirability of having Intelsat controversies tried in the press and in national legislatures probably justifies secrecy. Also, business secrets and classified patents may be involved. There are, however, strong arguments in favor of furnishing signatories to the Special Agreement with copies of findings for use as guidelines for future tribunal actions.

It is contemplated that the parties to a controversy submitted to a tribunal will continue efforts to resolve their dispute by direct negotiation. Agreed settlements are to be incorporated in consent decrees.^{187/} To avoid multiplicity of actions, it would be appropriate to include a provision prohibiting institution of proceedings in more than one forum at the same time. Decisions are to be based on interpretation of the three agreements and on "generally accepted principles of law,"^{188/} but an arbitral tribunal has no enforcement authority. Sanctions such as are applicable under the Special Agreement for nonpayment of amounts owed might be appropriate.^{189/}

The Supplementary Agreement does not appear to give the arbitral tribunals competence over tort claims arising in the course of operations of Intelsat. Since Intelsat is not at present a juridical entity and also in view of the concepts expressed in UN resolutions and negotiations for a general convention on liability for injuries resulting from activities in space,^{190/} states are severally liable, in solidarity as expressed in civil law, for damages resulting from activities in space. The terms of the general treaty on liability for damages resulting from space activities, when finally completed and brought into force, will probably be controlling for damages founded in tort connected with these activities. Any existing arbitration arrangements between the parties or an international court can be utilized. If such facilities are not available and diplomatic channels have not provided a solution, there would be no reason why parties to the Interim and Special agreements could not, on an ad hoc basis, utilize procedures similar to those provided by the Supplementary Agreement.^{191/} It would require a new protocol technically to utilize the Supplementary Agreement itself in such cases. Since parties to the Interim Agreement are all members of ITU,

it would appear that they could utilize the Optional Additional Protocol Concerning Compulsory Settlement of Disputes of the 1965 Montreux ITU Conference.

Conclusions

Communications using satellites are providing peoples and nations with a new facility for national and international communications at greatly reduced costs in areas which have previously been largely isolated from conventional radio and surface communications. ComSat and Intelsat have been established; Intelsat is operating successfully in international communications, although many difficult problems lie ahead. Domestic utilization of communications satellites has not yet commenced.

Domestically, the unresolved legal, political, social, and economic problems are very difficult and have delayed development of a national satellite communications facility. In March 1967, the Ford Foundation requested the FCC to withhold for at least a year authorization for development of a domestic satellite communications system to give the President and Congress adequate time to consider the problems presented. At the same time, the President also gave Congress a proposal, or rather a series of questions, concerning educational television, a subject which cannot now be considered separate from communications satellites. The President asked for studies but offered no final solutions. The FCC has been unable to give definitive answers on questions of domestic ownership of earth stations, authorized users, rates, ownership of special domestic purpose satellites, and so on.

Other nations in which all communications are a government monopoly do not have the problems of deciding ownership of different segments of the system but have many of the same problems of the proper use and control of the new technology.

Intelsat represents a remarkable example of the development of international legal, economic, and administrative arrangements and institutions by which the benefits of the new technology can be made available to any nation which wishes to participate, regardless of differences in politics or in the state of economic and social development. The many unresolved questions such as the determination of the relationships between Intelsat and national systems like the one the United States Department of Defense has established or the proposed French or the Soviet Molniya systems have not prevented Intelsat from becoming operational^a. There is no legal reason why competing or complimentary international systems cannot be established, although present technological knowledge indicates that a single integrated system would probably be considerably more efficient and economical, even if some of its satellites were used for special purposes.

There is no assurance that Intelsat will continue to exist in its present structure, for the Interim Agreement is scheduled to be reviewed by 1970. Although it can be made permanent in its present form, it can also be revised very extensively. Probably several countries may be insistent on changing the power structure of the controlling committee, which may be converted into a board of directors or governors if a decision is made to give Intelsat a formal juridical personality. The Soviet Union and its allies have chosen for political reasons not to participate in Intelsat in its present form and are endeavoring to establish an international system based on the Molniya satellites although they have only a limited amount of telecommunications traffic. France proposes to establish a separate system, and other nations have discussed the possibilities of national and regional systems. Justification for such systems would be basically political.

ITU has not been able to resolve fully questions of unintentional interference on either a scientific or a legal basis although nations, recognizing the chaos which might develop, have generally resolved most serious questions of interference on a bilateral cooperative basis. Very little progress has been made toward resolving politically charged questions relating to broadcasts to which some nations object and to the extensive jamming to which they have resorted. This is not a problem new with satellites, but it will become increasingly acute as direct satellite-to-home-receiver broadcasting is perfected.

In the first few years of communications satellite operations we have seen capacity per satellite develop from just a few weak circuits to several thousand. By 1978, capacities are expected to approximate the equivalent of 120,000 voice circuits. Equipment and techniques which will utilize frequencies into the billions of cycles per second (gigacycles) are now in the development stage and may provide many additional circuits with a very high degree of directionality. Other presently undeveloped techniques, such as the possibility of much greater use of cables for delivery of programs into homes, may bring about equally great changes. If this should come about, the pressure for circuits might become considerably less.

The usual rules relating to electromagnetic communications apply to the new technology, and the International Telecommunications Union has allocated frequencies for space communications in accordance with its customary procedures. These procedures will probably be inadequate within another few years and will require a substantial revision of the structure and authority of ITU just as the structure and authority of the FCC should be reviewed domestically. Both are in need of separate, extensive analysis.

The entire technical, economic, and political structure and law relating to communications is in the initial stage of enormous advances which give promise of great contributions to mankind. It is not presently possible to forecast the future with any degree of accuracy, but the changes will surely be as dramatic as those brought by the advent of radio itself. A single system under the auspices of the United Nations or some similar worldwide organization is unlikely in the foreseeable future and probably cannot be anticipated until some form of world government is acceptable to the great powers. But the area of communications has the potential to lead the way toward greater cooperation and understanding between nations. Technological progress should proceed as rapidly as possible and communications satellites should be used wherever technologically and economically feasible without artificial delays imposed for political reasons. "Permanent" decisions on matters of control, ownership, etc. may not come for many years, and it is quite probable that continuing technological changes will require frequent and sometimes major changes in the rules and regulations. Necessary interim dispositions can be made, subject to modification as experience and technology require, but efforts should be made to avoid changes unless there is justification other than the application of political pressures by first one interest and then another. On many points there is no assurance that agreement by a substantial concensus, let alone by unanimous consent, can be reached within the foreseeable future; there is neither justification nor need to delay the application of a beneficial new technology until all of the political, social, economic, moral, and legal implications are assessed and agreed to everyone's satisfaction.

CHAPTER 5 - FOOTNOTES

1
No effort will be made to include a complete citation of authorities in this field as the literature on the subject is very large, usually technical, and frequently repetitious. See e.g., Significant Achievements in Space Communications and Navigation 1958-64 (NASA SP-93; 1966). Communications Satellite Systems Technology (Vol. 19, Progress in Astronautics and Aeronautics, AIAA Series; R. B. Marsten ed. 1966). There is also much business and popular literature on the subject. See e.g., McDonald, "The ComSat. Compromise Starts a Revolution," 72 Fortune 128 (Oct. 1965). Every book on uses of outer space has a chapter on communications. See Peacetime Uses of Outer Space 35 (Ramo ed. 1961). The semiannual reports of NASA and the reports of COMSAT all cover activities and planning for satellite communications. The RAND Corp. has prepared a number of reports relating to space communications. The UN has taken a very active part in promoting development of a global communications satellite system available to all nations. See, for example, UN Docs. A/4141 (July 14, 1959); C. 1/L 220/Rev. 1; UN Res. 1348 (XIII) Dec. 13, 1958; UN Res. 1472 (XIV), Dec. 12, 1959; UNA/RES/1721 (XVI), Dec. 20, 1961; A/AC.105/PV.3, May 7, 1962; UN Res. 1963 (XVIII), Dec. 13, 1963; A/5783, Nov. 13, 1964. Extensive congressional hearings and reports are cited in subsequent notes. There will be many more hearings and reports since many aspects of communications utilizing satellites are very controversial, domestically and internationally. For a brief description of the subject see A Survey of Space Applications, Chap. 2 (NASA Sp-142; 1967).

2

Intelsat--International Telecommunications Satellite Consortium--established by "Agreement Establishing Interim Arrangements for A Global Commercial Communications Satellite System," Aug. 20, 1964, TIAS 5646; 15 UST 1705: Special Agreement, Aug. 20, 1964, TIAS 5646; 15 UST 1745: and Supplementary Agreement on Arbitration, June 4, 1965, IV International Legal Materials 735 (July, 1965).

3

See Appendix oo for list of members.

4

Communications Satellite Corporation, a U S corporation established pursuant to Act of Congress, P.L. 87-624, 87th Cong., 2d Sess. (Aug. 31, 1962); 47 USC 701-44 (1962) and the Corporation Law of the District of Columbia.

5

Other agencies of the United States Government also have one or more satellites for use in navigation, weather forecasting, crop study, geological studies, etc. These "systems" are so new that they should be considered experimental and are involved in communications to only a limited extent. NASA will use spacecraft to collect information and intelligence about the earth, plants, animals, resources, etc. See Chicago Tribune, June 26, 1967, at § 1A, at 12, quoting various NASA officials.

6
Among other countries or groups of countries which have considered the possibility of national or regional communications satellites are France and Canada. Among the organizations involved are the European Conference of Postal and Telecommunications Administration (CEPT) representing 23 European countries; Eurospace, a private association of about 150 industrial firms and professional bodies from 12 European countries; the Committee on Space Research of the International Council of Scientific Unions (Cospar, ICSU); International Radio and Television Organization (OIRT); Organization for Cooperation in the Field of Communications of the Council for Mutual Economic Aid (COMECOM); European Space Research Organization (ESRO); Preparatory Commission to Study the Possibilities of European Collaboration in the Field of Space Research (COPERS); European Launcher Development Organization (ELDO); and other organizations encompassing membership from private and public sectors from both sides of the Iron Curtain and of the Atlantic. Some of the discussion has probably been generated by private companies hoping for business, and this seems to have been the case in Latin America where there has been considerable talk but little action. France is the only Western European country which appears to be seriously considering the expenditures to establish a separate system and there the nationalistic motivation is obvious. Germany and France have signed an agreement for joint efforts but whether only for experimental work or also for operations is not known.

7
See infra n. 31 for statistics drawn from ComSat's 1966 annual report. In some instances there is little leeway for the placement of

tr
satellites for certain coverage, e.g., between Japan and England where there is only about a half degree, and the same is true for coverage of Mexico and Iran by the same satellite. Because of the distance between the earth and a synchronous satellite, the time lapse involved in two-way transmissions mitigates against transmitting messages successively via more than one satellite.

8

Laser, an acronym from "light amplification by stimulated emission of radiation" is a device for producing light by emission of energy stored in a molecular or atomic system stimulated by an input signal. Maser, an acronym deriving from an amplifier utilizing the principle of "microwave amplification by stimulated emission of radiation," emits energy stored in a molecular or atomic system by a microwave power supply stimulated by an input signal. Masers are normally within radio frequency range, whereas lasers, as indicated by the name, are or may be within the visible light range. National Aeronautics and Space Administration, Dictionary of Technical Terms for Aerospace Uses (1st ed. NASA SP-7; 1965).

[Hereinafter cited as Sourcebook]

⁹ See Glasstone, Sourcebook on the Space Sciences 309-12 (NASA; 1965)

When frequencies become high the units employed, all relating to cycles per second, are kilocycles (one thousand) megacycles (one million) and gigacycles (one billion), the last term probably first used at Geneva in 1959 insofar as the radio regulations were concerned. Wavelengths are normally stated in accordance with the metric system and, as indicated in the formula $W = V/f$, the higher the frequency, the shorter the wavelength. See Everitt, Fundamentals of Radio and Electronics, ^{Hereinafter cited as Fundamentals} ~~Chap. 19~~ (2d ed. 1958) for an extensive technical description of radio wave propagation. Radio Frequency Controls in Space Telecommunications, ^{Report} ~~Report~~ by Staff of Senate Comm. on Aero. and Space Sciences, 86th Cong., 2d Sess., 844 (1960).

See Seelig, Radio Electronics (1956) for a detailed discussion of the technical aspects of telecommunications and equipment used. A general schedule of wavelengths and their uses follows as a matter of general information. Communications engineers do not agree on any one set of tables and this one is no exception. (Insert Table)

¹⁰ "However, ^{at} the heart of the difficulty of extending this [accurate high speed transmission of information] capability to deep space lies in the fact that the data rate capability for a given system varies inversely with the square of the distance between transmitter and antenna. For example, the capability of the Mariner system transmitting from Mars is only of the order of one bit each five seconds." This may be raised by the early 1970's to some 2,000 to 5,000 bits per second, but television requires 10 to 100 million bits of information per second. Bisplinghoff, "Today's Research Sets Tomorrow's Capabilities in Space," Fifth National Conference on the Peaceful Uses of Space 107 (NASA, 1966).

CHAPTER V, TABLE A, N. 9

WAVE LENGTH	FREQUENCIES	SERVICES
10 Millimeters	300 gigacycles per second	Infra-red spectrum
Band 11	Extremely high frequencies (EHF)	Experimental Communications, telemetry
1 Centimeter	30 migacycles per second	Radio, Relay, Radar and Radio
Band 10	Super high frequencies (SHF)	Navigation ^{le} al aides ^{le}
10 Centimeters	3 gigacycles per second	Meteorological telemetry aids
Band 9	Ultra high frequencies (UHF)	TV channels 14-83
1 Meter	300 megacycles per second	TV channels 7-13
Band 8	Very high frequencies (VHF)	FM broadcasting TV channels 2-6
10 Meters	39 megacycles per second	International short wave
Band 7	High frequencies (HF)	Communications and broadcasting
100 Meters	3 megacycles per second	Radio navigational aids
Band 6	Medium frequencies (MF)	AM radio broadcasting
1 Kilometer	300 kilocycles per second	LF radio navigational aids
Band 5	Low frequencies (LF)	LF radio communications
10 Kilometers	30 kilocycles per second	Communications-frequencies
Band 4	Very low frequencies (VLF)	audible by the human ear.
100 Kilometers	3 kilocycles per second	

11

See Everett, Fundamentals at 282-337.

12

Ibid. High power is needed.

13

New York Times, May 8, 1965.

14

The Nov. 1963 Space Radio Communications Conference of the ITU, as reported
[hereinafter cited as T.J.],
in 50 Telecommunications Journal 367 (Dec. 1963) allocated for space use the
following frequency bands: (Insert Table B)

Frequency Bands

Service

15 762-15 768 kc/s	Space research (shared)
18 030-18 036 kc/s	Space research (shared)
30.005-30.010 Mc/s	Space research and space (satellite identification) (shared)
37.75-38.25 Mc/s	Radio astronomy (shared)
73-74.6 Mc/s	Radio Astronomy (exclusive)
36-137 Mc/s	Space research (telemetering and tracking) (shared in Regions 1 and 3, exclusive in Region 2)
137-138 Mc/s	Meteorological-satellite, space research (telemetering and tracking), Space (telemetering and tracking) (shared)
43.6-143.65 Mc/s	Space research (telemetering and tracking) (shared)
49.9-150.05 Mc/s	Radionavigation-satellites (exclusive)
267-273 Mc/s	Space (telemetering) (shared)
99.9-400.05 Mc/s	Radionavigation-satellites (exclusive)
00.05-401 Mc/s	Meteorological-satellites (maintenance telemetering), space research (telemetering and tracking) (shared)
401-402 Mc/s	Space (telemetering) (shared)
50-470 Mc/s	Meteorological-satellites (shared)
1400-1427 Mc/s	Radio Astronomy (exclusive)
427-1429 Mc/s	Space (telecommand) (shared)
1525-1535 Mc/s	Space (telemetering) (shared)
1535-1540 Mc/s	Space (telemetering) (exclusive)
560-1670 Mc/s	Meteorological-satellites (shared)
1664.4-1668.4 Mc/s	Radio astronomy
590-1700 Mc/s	Meteorological-satellites (shared)
1700-1710 Mc/s	Space research (telemetering and tracking) (shared)
1770-1790 Mc/s	Meteorological-satellites (shared)
190-2300 Mc/s	Space Research (telemetering and tracking in deep space) (shared)
190-2700 Mc/s	Radio astronomy (exclusive)
3400-4200 Mc/s	Communication-satellites (satellite-to-earth) (shared)

V-8

Frequency Bands

Service

4400-4700 Mc/s	Communication-satellites (satellite-to-earth) (shared)
4990-5000 Mc/s	Radio astronomy (shared in regions 1 and 3 exclusive in region 2)
5250-5255 Mc/s	Space research (shared)
5670-5725 Mc/s	Space research (deep space) (shared)
5725-5850 Mc/s	Communication-satellites (earth-to-satellite) (only in region 1 and shared)
5850-5925 Mc/s	Communication-satellites (earth-to-satellite) (only in regions 1 and 3 and shared)
5925-6425 Mc/s	Communication-satellites (earth-to-satellite) (shared in all regions)
7250-7300 Mc/s	Communication-satellites (satellite-to-earth) (exclusive)
7300-7750 Mc/s	Communication-satellites (shared)
7900-7975 Mc/s	Communication-satellites (earth-to-satellite) (shared)
7975-8025 Mc/s	Communication-satellites (earth-to-satellite) (shared)
8025-8400 Mc/s	Communication-satellites (earth-to-satellite) (shared)
8490-8500 Mc/s	Space research (shared in regions 1 and 3, exclusive in region 2)
10.68-10.7 Gc/s	Radio astronomy (exclusive)
14.3-14.4 Gc/s	Radionavigation-satellites (exclusive)
15.25-1535 Gc/s	Space Research (exclusive)
15.35-15.4 Gc/s	Radio Astronomy (exclusive)
19.3-19.4 Gc/s	Radio Astronomy (exclusive)
31-31.3 Gc/s	Space research (shared)
31.3-31.5 Gc/s	Radio astronomy (exclusive)
31.5-31.8 Gc/s	Space research (shared in regions 1 and 3, exclusive in region 2)
31.8-32.3 Gc/s	Space research (shared)
33-33.4 Gc/s	Radio astronomy (only in region 1 and shared)
34.2-35.2 Gc/s	Space research (shared)

15 See Everett, Fundamentals at 309-21, for an understandable discussion of the technical aspects of transmitting intelligence by electromagnetic waves. "When the carrier (electromagnetic frequency) is modulated for message transmission, frequencies higher and lower than the frequency of the carrier are produced. Since they are distributed over a finite portion of the spectrum on each side of the carrier frequency they are called side frequencies and are referred to collectively as sidebands. These sidebands contain all of the message information, and without them no message could be transmitted," although various devices permit the transmission and reception of only one sideband, thus substantially reducing the required transmission bandwidth and power. "It is apparent, then, that radio communications systems, to carry the message sideband frequencies as well as the carrier frequency, require an irreducible amount of frequency spread which depends upon the highest modulating frequency to be transmitted." See also Seely, Radio Electronics 1-14 (1958).

16 The radio spectrum "must be regarded as finite and similar in all respects to other natural resources" "Policy Planning for Space Telecommunications," Staff Report Before the Committee on Aeronautical & Space Sciences, 86th Cong., 2d Sess., at 33 (Comm. Print, 1960) [hereinafter cited as Staff Report]. Television channel 4 extends from 66 to 72 megacycles. Channel 3 extends from 60 to 66 megacycles. A conventional double sideband and carrier system for speech utilizes a radio frequency bandwidth of about 6,000 cycles while a single-sideband suppressed-carrier system requires a bandwidth of only 3,000 cycles, although in standard broadcasting a bandwidth of 15,000 cycles would be

16 (Continued)

desirable in place of the 10 kc/s used to permit more stations. Thus, a voice channel requires about as much spectrum space as 22 telegraph channels, and a black and white television channel requires about as much spectrum space as 600 two way voice channels. A color TV channel requires almost 3 times as much spectrum space as black and white TV. See also footnote 31 for an optimistic view of probable scientific developments to increase the number of usable channels. See Everett, Fundamentals at 302-26.

¹⁷ Many frequencies can be shared, that is, used in each of several geographical regions. Thus, in 1959 the band from 4 to 10 megacycles was used by 74,284 transmitters through the world. See Staff Report, supra n. 16.

See also Hughes Aircraft Company, Space System Division, Study for a Video Data Distribution Satellite System for the ABC Network 3-6 to 3-11 (July 1965; revised Sept. 1965) suggesting that the nature of stationary communications satellites permits the same frequency band to be used simultaneously by a great many ground stations and satellites.

¹⁸ Provision for the optimal bandwidths would sharply restrict the number of channels and, therefore, the number of radio stations. Thus, in the standard broadcast bands for AM radio there are no guard bands or unused frequencies between channels, and interference between stations may be observed:

¹⁹ For a description of some of the problems of shifting from one frequency range to another, see Coase, 13 U. of Chi. L. School Record No.2, 23 (1965). The first user rule for international allocation of frequencies has not contributed to a logical allocation of frequencies.

²⁰ International Telecommunications Regulations reflect this growth:

Washington Regulations (1927), from 10 kilocycles to 25,000 kilocycles.

Madrid Regulations (1932), from 10 Kilocycles to 60,000 kilocycles.

Cairo Regulations (1938), from 10 kilocycles to 200 megacycles.

Geneva Regulations (1959) from 10 kilocycles to 40 gigacycles.

Experimental work is being done in the 300 gigacycle or infrared range of frequencies. See chart, supra n. 9. See also Glazer, "The Law-Making Treaties of the I.T.U. Through Time in Space," 60 Mich. L. Rev. 269, 316 (1962).

Leonard Jaffe, Director of the Communications and Navigation Programs Division of NASA, indicated that the theoretical capacity of the radio frequencies allocated the space communications by the 1963 conference might be "over 500 television channels or 600 times that many telephone circuits but that the theoretical limits would have to be divided by 50 to give presently usable channels." Harris, "Report on Geneva Space Radio Communications Conference and Progress Made in Establishing Global Communications Satellite System," 110 Cong. Rec. 173, 178-9 (1964).

²¹ The telephone, with its broader band requirement tends to replace the telegraph. High-speed data transmissions utilize the equivalent of a voice channel. Government demands are steadily increasing. Facsimile transmission is a wide band requirement. See Slighton, The Market for

21 (Continued)

Overseas Telecommunications in 1970 (RAND Memo No. 3831-NASA; Sept. 1963).

Overseas telephone calls rose from slightly over one million in 1950

to nearly four million in 1960. AT&T expects one hundred million overseas

calls per year by 1980. Hearings on S.2650 and S.2814 Before the Senate

Committee on Aeronautical and Space Sciences, 87th Cong., 2d Sess., at

12-13 (1962).

²²The Washington Post, Dec. 9, 1965, at A-9, col. 1, contains a report of an unsuccessful attempt on Dec. 8, 1965, to communicate with a ground station via laser beams by the Gemini 7 crew. On Dec. 11, 1965, a laser contact was established, although attempted voice communications were unsuccessful. New York Times, Dec. 12, 1965. For some general discussion of laser communication experiments see 32 T. J. 108, 270 (1965), 4 Astro. & Aero. 64 (Apr. 1967) contains a technical description of possible laser communications development by Reinbolt & Randall who cite nine additional papers on the subject.

²³See New York Times, Dec. 12, 1965.

²⁴"Jamming" is accomplished by the transmission of a high volume signal on the same frequency as the signal being jammed. Estep & Kearse, "Space Communications and the Law: Adequate International Control After 1963?" 60 Mich. L. Rev. 876-77 (1962), refer to jamming and shifting frequencies to avoid jamming as the "hide and seek" game well illustrated by Soviet jamming of Voice of America Broadcasts.

²⁵Wall Street Journal, May 19, 1966, at 30.

²⁶Washington Post, Mar. 4, 1967, at A17.

²⁷For a discussion of the potentials of lasers and masers see "Lasers and Their Applications," Conference sponsored by I.E.E. Electronics and Science Division, The Institute of Electrical and Electronics Engineers (UK & Erie Section), The Institution of Electronic and Radio Engineers

(Sept. 1964); A. E. Siegman, Microwave Solid-State Masers (1964). Hughes Aircraft Company has been working with lasers which it thinks hold promise for deep space communications. 32 Telecommunications Reports 29 (July 11, 1966) [hereinafter cited as T.R.].

28

See Everett, Fundamentals at 615-39; and Buckheim, New Space Handbook 96-100 (rev. ed. 1963). As previously noted, lasers and masers are propagated in a very narrow, very highly directional beam suited for point-to-point transmission.

29

Plans for the 1970's include use of frequencies in the gigacycle range. See ComSat Report to the President and Congress for the Calendar Year 1966 at 12 and infra n. 31.

³⁰ See Dept. of Def., Annual Report for Fiscal Year 1961, 21, 210, 263 (1962). Wepler, "Intercontinental Television Relaying by Satellite: Mondiovision," 29 T.J. 247, 249 (1962) contains a full discussion in non-technical terms. Huszagh, The International Law Making Process: A Case Study on the International Regulations of Space Telecommunications 37-41 (J.S.D. dissertation 1964, U. of Chicago Law Library.)

³¹ The capacity of cables, even with modern transistors, appears to be limited in comparison to that of communications satellites. In May 1965, a vice-president of AT&T reported that the latest trans-Atlantic cable "has a capacity of 138 voice circuits, compared with 36 in the initial trans-Atlantic system." Hough, "Communications Progress and Problems," Fifth Nat. Conf. on the Peaceful Uses of Space 145-46 (NASA, 1966). It is also reported that a modern cable with 720 two-way voice circuits could be built. Cf. Segal, "Communications Satellites--Progress and Road Ahead," 17 Vand. L. Rev. 677, 679 (1966). ComSat's 1966 annual report at p. 11 suggests four 1970 satellites with combined capacity of up to 84,000 voice grade channels, four 1973 satellites with combined capacity of twice the 1970 capacity, four 1978 satellites with five times the 1970 capacity. A ComSat press release of Dec. 16, 1966, projected the capacity of the four 1978 satellites together as providing simultaneously 96 full-time color TV channels and 360,000 voice grade channels. Since the same release refers to the use of frequencies in the gigacycle range, it would seem that the 1978 satellites would use highly directional transmissions with relatively little interference. If these ComSat estimates

31 (Continued)

of technological advances are accurate, the overcrowding of the electromagnetic spectrum may become less acute. Although improvements in cable capacity are also anticipated, there is apparently a lower maximum capacity so far as present planning is concerned unless wave guides can be developed for practical and economic use.

³²The Soviet Molniya satellites are reported to use 40-watt power, and the Intelsat II satellites 18-watt power (compared with 6-watt power for Intelsat I) Chicago Tribune, Mar. 19, 1967, § 1, p. 4, citing W. F. Hilton in the British publication "Spaceflight."

³³See Weppler, op. cit. supra n. 30 and ComSat press release, "Earth Stations" of Oct. 19, 1966, for a description of ground station equipment for space communications. See also, FCC, "Second Notice of Inquiry into the Allocation of Frequency Bands for Space Communications," Docket No. 13522, attachment pp. 6-7 (May 17, 1961). "Some Principles for Allocating the Radio Frequency Spectrum and Formulating Plans for Various Radio Services," 19 Electrovyaz No. 3, 1, 8-12 (from Russian) (NASA Accession No. N65-32276; 1965).

³⁴Fiedler, "Television Service for Large Areas Using Satellites" (in German) 20 Frequency 222 (July 1966) suggests using a centralized antenna system similar to CATV in the U.S. In 1965, ABC requested FCC authorization to place a satellite in orbit to relay domestic TV programs to 200 affiliates from coast to coast. New York Times, May 14, 1965, at 1; id. at 23.

ComSat considered placing satellites in orbit for the purpose of leasing channels to the TV companies. Wall Street Journal, Sept. 22, 1965, at 2. The Ford Foundation proposal for orbiting several satellites to be utilized for nonprofit educational TV has been extensively reported in the press. See, for example, Newsweek, Aug. 15, 1966, ^{at} 76, 77; New York Times, Aug. 7, 1966, § 4, ^{at} p. 2, 7 E; Washington Post, Aug. 7, at E4; see also Marsten, supra n. 1, at . The cost of earth stations and the need for interference-free reception are obvious practical and technical limitations on the use of satellites for short-distance communications. However, once an earth station has been established for any reason, the distance involved in a transmission via satellite to another earth station has no bearing on the cost.

³⁵See Hedreich, "Communications Satellite Technology," Fourth National Conference on Peaceful Uses of Space 155 (NASA SP-51; 1964.)

Marsten, supra n. 1, at 681

describes systems concepts in several articles. Buckheim, New Space Handbook 259-64 (rev. ed. 1963) discusses passive and active, synchronous and nonsynchronous satellites. Glasstone, Sourcebook at 270-82.

³⁶ITU regulations require a shift from an up to a down frequency.

³⁷ Earth stations for synchronous satellites may cost approximately \$5,000,000 while a comparable station for a nonsynchronous satellite may cost from \$6,000,000 to \$10,000,000. Operating costs of synchronous satellites also tend to be a little less. These figures do not include the cost of tying the earth station to the terrestrial communications system. "The Comsat Compromise Starts a Revolution" 72 Fortune 128 (Oct. 1965).

³⁸ ComSat filed a petition with FCC for authorization to build six 1,200 voice-channel satellites, four of which would be orbited. Wall Street Journal, Mar. 1, 1966, at 4, col. 3. ComSat press release of Apr. 28, 1966, described a proposed contract with TRW, Inc. calling for delivery of six satellites between Feb. and May 1968.

³⁹ See ComSat press release of Oct. 19, 1966, Commercial Communication Satellite Service to Expand to Pac. & Atlantic.

⁴⁰ Intensive studies are underway to develop nuclear power and more efficient solar power for needed satellite power capacity. See Significant Achievements in Space Communications and Navigation 1958-1964, 55 (NASA, 1966).

⁴¹ This may be an obstacle in heavily industrialized areas where radio wave emitting sources are numerous.

⁴²Supra n. 40, at 52. Technological progress in satellite communications field is producing economic advantages over cable communications. See speech by Charyk, ComSat president, before Nat'l Assoc. of Broadcasters Annual Convention in Chicago in March-April 1966, reported in 32 T.R. 18 (Apr. 4, 1966).

⁴³Washington Post, Dec. 14, 1966, at 48.

⁴⁴Wall Street Journal, Jan. 16, 1967, at 1.

⁴⁵Airlines insisted before Congress that satellite service is essential. New York Times, Oct. 2, 1966, at 88, col. 3. First communication between an aircraft and an earth station via satellite was in early 1965. Charyk, "The Coming Era of Satellite Communications," Fifth National Conference on the Peaceful Uses of Spaces 139 (NASA, 1966). See also 32 TR 29 (Sept. 12, 1966) for reference to mobile radio service & satellites; 32 T.R. 31 (Oct. 3, 1966); 33 T.R. 51 (Dec. 19, 1966); 32 T.R. 25 (Nov. 28, 1966). ICAO members have been urged to participate in tests, 32 T.R. 38 (Nov. 14, 1966). FAA, in a status report to the House Government Operations Subcommittee for Military Operations, stated it saw a "positive need" for a satellite communications service to meet aviation requirements, 32 T.R. 20 (Sept. 6, 1966). ComSat requested bids for satellites for aeronautical service in Apr. 1966 but whether this was as manager of Intelsat is not entirely clear, 32 T.R. 10 (Apr. 4, 1966). Ford Motor Co. is studying the possibility of utilizing satellites in connection with automobile traffic control, 32 T.R. 27 (July 25, 1966). James W. Campbell of Technology Audit Corp. discusses the subject in "Possible Uses of Satellites for Navigation and Traffic Coordination," 31 ^{T.J.}Id. 37-42 (Feb. 1964).

⁴⁶"Broadcast satellites can further provide emergency and civil de-
fense communications to an entire country. As an educational aid they
can be used to bring the best of educational material to the remotest of
communities. They can provide for global dissemination of information,
and can ultimately serve to unite the people of large areas more rapidly
than would conventional techniques," Supra n. 40, at 55. The subject has
received considerable attention: Washington Post, Apr. 18, 1967, at 2;
May 5, 1967, at 11, col. 7; New York Times, Nov. 30, 1965; Chicago Daily
News, May 18, 1965; Haviland, "Space Telecasting for World Education,"
XVIth IAF Congress, (Athens, Sept. 1965).

⁴⁷ See Coddington, The International Telecommunication Union, passim (1952) for a comprehensive account of the history, structure, and operations of the ITU. At the risk of substantially oversimplifying a very complex problem, the members of the ITU in periodic conferences allocate bands of frequencies to particular uses (supra n.9); within these uses the first nation to file a claim for and use a particular frequency has priority in the event of interference with another nation using the same frequency. There is no real enforcement authority, however, and ordinarily most complaints are resolved through negotiations within the ITU framework. In many instances neighboring countries enter into bilateral or multilateral agreements to provide additional controls over radio and television as between the contracting parties. See, e.g., Inter-American Arrangements Concerning Radio Communications, entered into force July 18, 1938, 54 Stat. 2514; EAS 200; Inter-American Radio Agreement, entered into force April 13, 1952; 3 UST 3064. There are many similar agreements, all subject to frequent revisions as conditions change and as technology advances.

⁴⁸ 33 T.R. 29 (Apr. 30, 1967); 32 T.R. 18-21 (Oct. 10, 1966). These refer to the conflicts and arguments with communications carriers over costs, channels, etc., which reflect the possible impact on the existing structure. The press and periodicals contain innumerable references to various aspects of the problem.

⁴⁹ Concern for security, absolute control, and possibly costs contributed strongly to the establishment of the Dept. of Defense Communication Satellite System. Political chauvinism plus distrust of the political

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potential of Intelsat doubtless were major factors in the decision of the Soviets not to join Intelsat, although it is questionable whether the Soviets will be able to establish a commercially viable system, either domestic or international. France has indicated an intent to establish its own system, presumably motivated by political rather than economic factors, but has nonetheless joined Intelsat. Canada's discussion of a separate system for domestic purposes is openly motivated by the political desire to avoid losing control of its domestic communications system to the United States or to Intelsat.

⁵⁰ Intelsat is utilizing frequencies at 3700-4200 and 5925-6125 Mc/s plus some frequencies just below 5925. The Soviets have used 3400-3700 and 4400 to 4700 Mc/s. In experimental work there are many exceptions, and as traffic increases the competition will increase.

⁵¹ See editorial, "The ComSat Question," Technology Week (English) Oct. 24, 1966 ; see also E. W. Faller, "European Perspective on Satellite Communications" Communications Satellite Systems Technology 1033-51 in 19 Progress in Astronautics and Aeronautics, AIAA Series (R. B. Marsten ed. 1966). "It is pointed out that Europe's current demand for a role and voice in the development of a truly global satellite communication system should not be understood as a repetition of ancient patterns of wasteful competition, but as a plea for a joining of forces in the spirit of useful cooperation." The French views are well known.

⁵² Washington Post, Feb. 23, 1967, at 43. It is possible that this announcement was made to strengthen France's hand in negotiating the new Intelsat agreement, but it seems more probable that DeGaulle is determined to have a French system for prestige purposes.

⁵³ New York Times, July 31, 1966, at E8; 32 T.R. 31 (Oct. 3, 1966). The U S ambassador noted that the system would by-pass France, Washington Post, Sept. 29, 1966, at A22, col. 4.

⁵⁴ The most recently constructed trans-Atlantic cable has a capacity of 138 voice circuits. See Hough, supra n. 31, at 145. At a cost of \$11.9 million, IT&T Corp. is now laying a cable between England and Lisbon to be in operation by Spring. 1969, with 480 channels.

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Existing satellites could presently supply this requirement or, for about the same cost, an additional satellite with about three times the capacity could be put in orbit with a life expectancy of several years. Technology and cost will doubtless restrain many countries from establishing separate satellite systems which, if used, would serve national price but would not serve to expedite international communications.

⁵⁵This was the tenor of testimony given by AT&T representatives to the House Government Operations Subcommittee in connection with anticipated circuit requirements for the next several years; see ³²T.R. 28 (Sept. 19, 1966). Lester, Vice-president of Bell Tel. Co. of Canada, stated in a speech in Montreal Nov. 29, 1966: "But it is unquestionably by a combination [of satellite and microwave] that the general television public and broadcasting interests would be best served at the lowest cost," 32 T.R. 40 (Dec. 5, 1966). The same position has been adopted by the Telephone Association of Canada, 33 T.R. 37 (Feb. 8, 1967). It is hardly to be expected that a company such as AT&T would acknowledge that satellites could replace their long lines.

⁵⁶ See ComSat press releases of those dates. Competition is very keen for interference-free sites for electronic installations of many types.

⁵⁷ Wall Street Journal, Dec. 8, 1966, at 3: [redacted]. It may be justified to query if FCC approved a compromise solution because it did not think enough technological information was available to make a decision that might have extensive long term policy effects on the future structure of our communications system. Political pressures were obviously very heavy.

⁵⁸ Silberman, "The Little Bird that Casts a Big Shadow," ^{LXXV}Fortune 109 (Feb. 1967).

⁵⁹See generally for the structure and operations of ITU, ["]International Cooperation for Outer Space, ["]Sen. Doc. No. 56, 89th Cong., ["]1st Sess., ["]263-84 (1965); Coddington, supra n. 47.

⁶⁰Frequency uses are registered with the ITU's International Frequency Registration Board as they are received. Actual assignment of a frequency band to a user is made by the government of each member country in accordance with their domestic law. Detailed procedures are established in the ITU Radio Regulations.

⁶¹Art. 50 of the 1959 ITU Geneva Convention and art. 51 of the 1965 Montreux Convention provide that "members and associate members retain their entire freedom with regard to military radio installations of their army, navy, and air forces."

⁶²Since the natural transmission^s from space are usually weak and frequency cannot be changed, the appropriate frequencies must be kept free from man-made interference if the natural signals are to be received for use in man's efforts to acquire knowledge from deep space.

⁶³See supra n. 42; Significant Achievements in Space Communications and Navigation 1958-1964, 55 (NASA, 1966); Christol, C., The International Law of Outer Space 398-99, (1966); Naval War College, International Law Studies, (1962); Federal Communications Commission, Annual Report 161 (1965) for a discussion of handling of U.S. -Canadian interference problems; see also Korovin, "The Struggle for Space and International Law," Kosmos i Meshdunarodnoye Pravo 7 (Korovin ed. 1963) in which the author alleges that the U.S. used an "Echo" satellite for relaying Radio Free Europe programs. Sputniks I and II used frequencies assigned and registered for other purposes. Suggestions were made to give space communications priorities over all transmissions except distress calls. Svanyi, "Thoughts on Legal Provisions to Improve and Safeguard Space Communications," 30 T.J. 73-76 (1963).

⁶⁴The chart from the 1959 ITU Radio Regs., art. 2, para. 112, is reproduced supra n. 9 and the 1963 chart taken from 30 T.J. 367 (Dec. 1963) is reproduced supra n. 14; see also FCC Annual Report 47 (1964). Of the various cooperative agreements between the U.S. and other nations on experimental space communications work, tracking stations, etc., only one has been located which has a provision concerning frequencies available for use: Executive Agreement for Space Tracking and Communications Station

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at Antigua, between the U S. and the UK., signed Jan. 23, 1967, art. 7.
See also the Report of the Extraordinary Administrative Radio Conference of 1963.

⁶⁵The 1959 ITU Convention with six annexes is in 12 UST 1761. Treaties in Force (1967 ed.) lists 118 signatories as of Jan. 1967. The 1965 Montreux Convention, which supercedes the Geneva Convention for those countries which adhere to it, including the US, added an Optional Additional Protocol on Compulsory Settlement of Disputes which was not signed by the US, USSR, France, or Great Britain (International Telecommunication Convention, Final Protocol to the Convention, Additional Protocol to the Convention, Resolutions, Recommendations and Opinions, Montreux, 1965). Gen. Sec. ITU, art. 28 of the ITU Convention provides for diplomatic negotiations or, in case of any existing agreements between the disputants or of failures to resolve the questions, for arbitration under Annex 3 which constitutes a brief conventional arbitration agreement couched in permissive terms. Underwood, "Problems of Participation in the Global Commercial Communications Satellite System," 18 S. C. L. Rev. 796, 807-11 (1966) discusses the role of ITU and suggests that the situation may be analogized to that of a policeman assigned to a street intersection under a set of instructions which state he may indicate to motorists the direction in which they must legally travel in order to avoid hitting one another, but that if they violate these legal requirements than all he can do is stand on the street corner and cry 'foul'," id. at 808.

⁶⁶ Allocation of frequencies and enforcement of discipline are not peculiar to satellite communications and will not be treated in further detail in this study, although they will continue to be problems of major significance. For a record of some of ITU's activities relating at least in part to space communications see: the VIIIth, IXth, and Xth Plenary assemblies of the CCIR (Warsaw, 1956; Los Angeles, 1959; Geneva, 1963); the ITU Plenipotentiary Conference (Geneva, Oct.-Dec. 1959); the ITU Administrative Radio Conference (Geneva, Aug.-Dec. 1959); and the ITU Extraordinary Administrative Radio Conference (Geneva, Autumn 1963). In 1959, CCIR established Study Group IV, "Space Systems." The ITU has made a number of reports to the UN in 1962, 1963, 1964, etc. and to the International Telecommunication Convention of Montreux in 1965, cited previously. Frequency allocation and control are very clearly of such significance that they warrant a separate, extensive study not possible in a single volume on the law of man's activities in space.

⁶⁷For obvious reasons ComSat and Intelsat officials strongly oppose national or regional systems and argue that they are neither technologically nor economically feasible.

⁶⁸This is a matter of cost and is of some practical importance, especially during periods of strained relations or of war with neighboring states. Use of Intelsat during war is not mentioned in either the Interim or Special agreements. In connection with Spain's plans for an earth station, a representative of the Spanish National Telephone System suggested that the new medium of satellite communications offers Spain, for the first time in history, the chance to have her own communications, without depending in any way on other countries. The Spanish comment may be overly optimistic since the space segment will not be under exclusive Spanish control. Canada is utilizing the U.S. Andover earth station.

33 T.R. 14 (Jan. 23, 1967).

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For general background, see Hearings before the House of Reps. Subcommittee on Military Operations of the Committee on Government Operations (Aug. 15 - Sept. 14, 1966). "Government Use of Satellite Communications," 1-46; also 32 T.R. 9 (June 20, 1966).

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Seven communications satellites were placed in subsynchronous orbit on June 16, 1966 (New York Times, June 17, 1966, at A4, col. 1), but did not perform as well as hoped (Wall Street Journal, June 17, 1966). Additional launches have been made: see Washington Post, Aug. 27, 1966, at A3; id., Jan. 19, 1967, at A7. The DOD section of the US Aeronautics and Space Activities 1966, Report to the Congress from the President of the US, at 54-59 (Jan. 31, 1967) describes the Military Communication Systems: the Defense Communication Satellite Program Syncom (DCSP), the Initial Defense Communications Satellite Project (IDCSP), the Operational Defense Communication System (DSCS), the Tactical Satellite Communication Program (Tac Sat Com), and various other experimental programs.

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See references, supra n. 53.

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New York Times, July 9, 1967, at 17, col. 1.

⁷³ See NASA section of U.S. Aeronautics and Space Activities, supra n. 72 at 41-44.

⁷⁴ The first ATS satellite was launched Dec. 6, 1966 weighed about 1,550 pounds, and was placed in a near geostationary orbit (id. at 24, 33). Telecommunications Report 34 (Apr. 3, 1967) refers to the launching of a multi-purpose experimental satellite for this program and notes that NASA hopes to have at least 4 satellites of this type in orbit by 1970.

⁷⁵ Soviet Space Programs, 1962-65; Goals and Purposes, Achievements, Plans, and International Implications, Staff Report for Senate Committee on Aeronautical and Space Sciences, 225-26, ~~and~~ 327-29 (Dec. 30, 1966); New York Times, Oct. 21, 1966, at 10, col. 1; Chicago Tribune, May 26, 1967, at 4. A conference was held in Moscow, Nov. 15-20, 1965, with Bulgaria, Rumania, Czechoslovakia, and the Soviet Union attending. They discussed, among other things, the possibility of establishing a Communist block communications satellite system based on Soviet technology. The reports emanating from the conference contained the usual criticisms of AT&T, ComSat, and Intelsat. A forthcoming book by Zhukov and Korovin (deceased) discusses the conference briefly. Tass reported that delegates from Russia, Bulgaria, Hungary, East Germany, Cuba, Mongolia, Poland, Rumania, and Czechoslovakia met in Moscow, Apr. 5-13, 1967, to discuss "cooperation in space research and peaceful uses of outer space." The delegates agreed to set up a satellite communications program "open to all countries willing to join." (Chicago Tribune, Apr. 17, 1967, at 7).

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It is probable that at some propitious moment the Soviets will announce the establishment of an operating system, although it seems doubtful that such a system would attract enough traffic to be economically viable or to constitute any real competition to Intelsat. A brief description of the Molniya satellite taken from Pravda appears in 32 T.J. 192 (May 1965) and is also described by Fortushenko in 32 T.J. 422-24 (Oct. 1965). Lustiberg of the Soviet Press Agency, APON, described the Molniya satellite in some detail in "Satellite Radio Communications in the U S S R " 33 T.J. 425-27 (Dec. 1966). Several Molniya satellites have been launched in a continuing program.

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Soviet Space Programs, 1962-65, cited supra n. 75. See also Chicago Tribune, Mar. 19, 1967, at 4. The Soviet Union has not released much data about the capacity of the Molniya satellites. In the Soviet Space Program report it is stated at P. 226: "In spite of their possession of the capability, the concept, and the interest, the Russians have been content to let the transoceanic and intercontinental relay of teletype, facsimili, voice, data, and television, the erection of large structures in space and their use as passive reflectors of radio signals, and the active repeating of radio signals at various altitudes and orbits of interest to system designers become largely American achievements. The reason is very possibly a choice of priorities: the Russians could conduct an aggressive communications satellite program but have failed

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to do so, because they wished to do other things." It must be assumed that recently launched Soviet satellites reflect technological advances comparable to Intelsat developments, and ComSat acknowledges that the Soviets may have an operational system by 1969. See 33 T.R. 35 (May 8, 1967). But the Soviet Union has hardly enough commercial communication with the West to utilize a large capacity system if it provided only East-West service.

⁷⁷ Frutkin, International Cooperation in Space, passim, especially 159-62 (1965). Other nations obviously desire to develop their own capabilities but are limited by financial and technological resources and many are pleased to work cooperatively with the U.S. 220

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See Appendix C for a brief description of the proposals by Carnegie, ABC, Ford Foundation, and ComSat. The Dept. of Defense system is also discussed. NASA also has experimental and operational communications satellites in orbit. NASA satellites are usually multipurpose. ComSat, as has been noted, would prefer to see no communications systems other than Intelsat but if regional or national systems are established they "should be carried out in proper relationship to and with the recognition of the International goal and the international plan" for a global system. Charyk, president of ComSat, quoted in 33 T.R. 21 (Mar. 6, 1967).

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See "The *ComSat* Question," editorial in Technology Week, Oct. 24, 1966 (a British publication).

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See for example, New York Times, Nov. 15, 1964, June 8, 1965, Nov. 21, 1965; Washington Post, Aug. 2, 1964, p. A19, July 29, 1965, Feb. 28, 1966, p. A2, March 4, 1966, p. A8, May 1, 1966, p. A13, Sept. 25, 1966; and Wall Street Journal, Oct. 27, 1966, p. 13. France is developing a major rocket-launching base in French Guiana, which has replaced its Algerian base. This new facility will be used by ELDO and ESRO in connection with their efforts to develop reliable launch capabilities for communications satellites. France has also announced plans to launch its own communications satellite in 1970 to handle traffic between France and the French-speaking nations of Africa (33 T.R. 10 [Feb. 27, 1967]). Whether France will find this plan economically feasible is doubtful. It appears to be a desperate effort on the part of France to retain its old position as an interchange point as it has been with cable communications, which the new technology makes quite unnecessary. France and Germany are planning a communications satellite by 1971 at an estimated cost of about \$75,000,000 (33 T.R. 29 [May 8, 1967]). Canadian authorities have suggested they may wish to have their own satellites. The estimated cost for 2 satellites and 54 earth stations is about \$80,000,000 (32 T.R. 38 [Nov. 14, 1966] ; 33 T.R. 32 [March 13, 1967] ; 33 T.R. 27 [June 5, 1967]).

⁸¹D. M. Smythe in "Freedom of Information: Some Analysis and a ~~Proposal for Satellite Broadcasting~~" 6 Q. Rev. Econ. & Bus. 7 (Autumn, 1966), sharply attacks the entire ComSat-Intelsat system because of U.S. domination and proposes a UN-owned system financed in the same manner as the UN and structured in a pattern similar to the BBC. Smythe, born a Canadian, became an American in 1932 and reacquired Canadian citizenship in 1965. See also Morenoff, World Peace Through Space Law, ⁽¹⁹⁶⁷⁾ who strongly supports a communications satellite system under UN control. Zhukov, in a paper delivered at the 1966 Astronautical Federal, stated: "The organization of administration and operation of a worldwide system of telecommunications by satellites should incorporate a principle of equal cooperation of all States without any discrimination. Such cooperation might assume various forms: a special agency may be set up...." He indicated Intelsat failed to meet these standards. 9th Colloquium on the Law of Outer Space 91, 93 (1967). There has also been discussion of authorizing the UN or the ITU to license satellites for various purposes.

82 There are indications that the development of direct broadcasting to home receivers is being played down for national and international political, as well as technological reasons. See Hearings before the Senate Committee of Aeronautical and Space Sciences on S.2909, 89th Cong., 2d Sess. 319 (1966) in which Associate Administrator Newell stated:

"At this point it is emphasized that NASA does not have a program to develop a broadcast satellite system at this time, nor is there any intent to enter any phase of the broadcast business. We believe, however, that the application of space technology to the vast field of communications in all its forms is a very real technical possibility. NASA must be familiar with these applications of space and their technical requirements. It is with these considerations in mind that NASA has undertaken a modest study program in the space broadcasting area." Charyk, ComSat president, stated that it is "more natural, logical, economical" and permits wiser use of broadcast frequencies to go from space to ground stations and then redistribute the broadcasts by existing television networks as they are now (New York Times, June 22, 1966, at 12). Why "more natural" is entirely unclear. Schramm, director of Stanford University's Institute of Communications Research stated that "...in 10 to 20 years it should be possible to broadcast television directly from satellites to home receivers. Just how soon this will occur depends more on economic and political considerations than on technology which is far outstripping the former" (Chicago Tribune, May 23, 1966, sec. 1A, at 11). John A. Johnson, vice-president of ComSat in a paper entitled "Satellite Communications: The Challenge & the Opportunity for International Cooperation",

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delivered Sept. 14, 1965, at the Wash. World Conference on World Peace Through Law stated: "Perhaps the most revolutionary change promised by communications satellites will come about when direct broadcasting from satellites into the home receiver is realized...it is a possible development during the decade of the 1970's.... With the advent of direct broadcasting of television from satellites, a totally new situation will arise which will test the ingenuity and creativity of the architects of international order."

⁸³Ownership and control of programs as well as of distribution systems are among the many problems U S policy-makers must decide. The press contains innumerable articles about Congressional and FCC hearings on the general subject. See, for example, Washington Post, Oct. 25, 1965, at B13, in which Representative Cellar is quoted as saying: "I do not want CBS, nor NBC, or ABC to continue to be the pooh-bahs or panjandrums of what the public may see or hear, especially during the prize, prime hours." Views are strongly held, economic interests are very large, and the protagonists for different views will wage strenuous campaigns. See also Bishop's article in the Wall Street Journal, Sept. 26, 1966, at 1, col. 1, calling attention to the fact that direct broadcast could render obsolete most radio and TV broadcast equipment in the world while presenting the difficult problems of national sensitivity to foreign transmissions.

⁸⁴The literature in the field is extensive. For some of the problems see Doyle, "Communication Satellites: International Organization for Development and Control," 55 Cal. L. Rev. 431, 432-34, (May 1967); Schwartz, "ComSat, the Carriers, and the Earth Stations: Some Problems with Melding Variegated Interests," 76 Yale L.J. (Jan. 1967) 441, 445-46.

⁸⁵The President in a policy statement released July 24, 1961, declared: "Private ownership and operation of the U S portion of the system is favored, provided that such ownership and operation meet the following policy requirements:

- " 1. New and expanded international communications services be made available at the earliest practicable date;
- " 2. Make the system global in coverage so as to provide efficient communication service throughout the whole world as soon as technically feasible, including service where individual portions of the coverage are not profitable;
- " 3. Provide opportunities for foreign participation through ownership or otherwise in the communications satellite system;
- " 4. Nondiscriminatory use of and equitable access to the system by present and future authorized communications carriers;
- " 5. Effective competition, such as competitive bidding, in the acquisition of equipment used in the system;
- " 6. Structure of ownership or control which will assure maximum possible competition;
- " 7. Full compliance with antitrust legislation and with the regulatory controls of the Government;
- " 8. Development of an economical system the benefits of which will be reflected in overseas communication rates."

Levin in "Organization and Control of Communications Satellites," 113 U. Pa. L. Rev. 315, 335 (1965), suggested that the decision favoring

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private ownership was based in large part on the following assumptions:

"1. Private ownership of a global relay is legally possible and desirable notwithstanding the uncertain state of space law and the fact that orbital objects cannot be policed.

"2. Private ownership is crucial for speedy development and efficient operation even though the government also has the know-how and resources, and can alone provide necessary booster and tracking capability.

"3. Although satellites can accommodate far more varied services than cables, have unique foreign policy implications, and are far more expensive to install, they are essentially an adjunct of existing communications facilities and thus most suitably owned and operated by the international common carriers.

"4. The complex international negotiations needed for satellite communication are best handled by the common carriers--even though such negotiations, necessarily multi-rather than bilateral, involve the State Department and FCC in crucial ways.

"5. The great capital and operating costs of any system, added to the need to service uneconomic markets, virtually guarantee losses for a long time, and private common carriers rather than the government should bear these losses.

"6. The satellite and ground station components must be jointly owned, even though they are technologically distinct, and common ownership would open the door to government intrusion into both domestic and international communications."

86 These discussions relate primarily to domestic policy and law and will not be analyzed in detail here. Cordiner, R.J., "Competitive Private Enterprise in Space," Peacetime Uses of Outer Space 220 (Ramo ed. 1961) states: "If the space effort were only a minor activity, the dependence on government financing and control would have less economic impact. But the fact is that the military and peaceful needs of the space program are already employing a significant percentage of the industrial work force, and will make up an even larger proportion of the total production of the country as the years go by...we are not speaking of a minor element in the national economy but of its leading growth industries. These industries are subject to ever-increasing government influence by way of government contracts. And the Space Age is only beginning." Space activities could easily consume the entire productive capacity of the United States just as did temple building in some of the ancient civilizations.

~~H. J. Levin,~~ ^{supra n. 85, at 315.} "Organization and Control of Communications Satellites," 113 U. Pa. L. Rev. 315 (1965). The RAND Corp. has prepared a number of studies on various aspects of organization, ownership, and control. Among them are RAND Memo RM-2925-NASA (1963) "The Commercial Application of Communications Satellites: A Study of Major National Policy Considerations"; RAND Memo RM-3487-RC (Feb. 1963) by Reiger, Nichols, Early, & Dews, "Communications Satellites: Technology, Economics and System Choices"; RAND Memo RM-3484-RC (Feb. 1963) by Schwartz & Goldsen, "Foreign Participation in Communications Satellite Systems, Implications of the Communications Satellite Act of 1962"; RAND Memo RM-3472-RC (Feb. 1963) by

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Nichols, "Submarine Telephone Cables and International Telecommunications"; RAND Memo RM-2925-NASA, (Dec. 1961) by Goldsen, Lipson, Meckling, Moore & Reiger, "Communications Satellites & Public Policy."

Some of the major Congressional hearings were as follows: Hearings on Space Communications and S. J. Res. 32 before Communications Subcommittee of the Senate Committee on Commerce, 87th Cong. 1st Sess. (1961), which in ^{Section} A, contains a statement of President Kennedy on Communications Satellite Policy indicating the administration's consistent position favoring private ownership; Hearings on Space Satellite Communications before the Subcommittee on Monopoly of the Senate Select Committee on Small Business, 87th Cong., 1st Sess. (1961); Hearings on Antitrust Problems of the Space Satellite Communications System before the Subcommittee on Antitrust and Monopoly of the Senate Committee on the Judiciary, 87th Cong., 2d Sess. (1962); Hearings on S.2650 and S.2814 before Senate Committee on Aeronautics and Space Sciences, 87th Cong., 2nd Sess. (1962); Hearings on S.2650 and S. 2814 Amendment, before the Senate Committee on Commerce, 87th Cong., 2d Sess. (1962); Hearings on H.R. 11040 before the Senate Committee on Foreign Relations, 87th Cong., 2d Sess. (1962); Hearings on S. Res. 258 before the Subcommittee on Antitrust and Monopoly of the Senate Committee on the Judiciary, 87th Cong., 2d Sess. (1962); Hearings on H. R. 10115 and H. R. 10138 before the House Committee on Interstate and Foreign Commerce, 87th Cong., 2d Sess. (1962).

⁸⁷FCC Doc. 66-563, 6/23/66 holds that, except in unique circumstances, ComSat may furnish satellite services and channels to none but other common

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carriers. This position was reiterated in FCC Doc. 66-677 (July 21, 1966) but a clear definition of "unique circumstances" has not been given. Para. 38 of the FCC ruling states:

"Our ultimate conclusions are:

(a) ComSat may as a matter of law be authorized to provide

services directly to non-carrier entities;

(b) ComSat is to be primarily a carrier's carrier and in

ordinary circumstances users of satellite facilities should

be served by the terrestrial carriers;

(c) In unique and exceptional circumstances ComSat may be

authorized to provide services directly to non-carrier users;

therefore, the authorization to ComSat to provide services

is dependent upon the nature of the service, i.e., unique or

exceptional, rather than the identity of the user. The

United States Government has a special position because of

its unique or national interest requirements; ComSat may be

authorized to provide service directly to the Government,

whenever such service is required to meet unique governmental

needs or is otherwise required in the national interest, in

circumstances where the Government's needs cannot be effectively

met under the carrier's carrier approach."

See also, FCC order of Feb. 2, 1966, Docket No. 16058. A great deal more is likely to be heard about this before it will be possible to judge in advance with reasonable certainty what the rule for a particular set of facts will be.

88 See n. ⁰⁰⁰ Appendix ⁰⁰⁰ . See also Mansbach, "Authorized Users,"
20 Fed. Communic. B.J. 2 passim (1966).

89 See, for example, Smith's article in the New York Times, Sept. 18,
1966, sec. §3, at 1, col. 6. The Wall Street Journal, Mar. 31, 1967, at
11 refers to one of a number of requests by ComSat to reduce rates to and
from the satellite. The foreign partner controls the rates from the satellite
to the foreign earth station. This subject is mentioned subsequently and
in Appendix C.

⁹⁰ 47 USC 701-44 (1962).

⁹¹ Levin, supra n. 86 at

315 (1965); Rosenblum, "Regulations in Orbit: Administrative Aspects of the Communications-Satellite Act of 1962," 58 Nw. U. L. Rev. 216 (1963); Legislation Note, "The Communications Satellite Act of 1962," 76 Harv. L. Rev. 388 (1962); Schrader, "The Communications Satellite Corp: A New Experiment in Government and Business," Ky. L. J. 733 (1965); Symposium on Satellite Act of 1962, 7 Antitrust Bull. 411 (1962); Schwartz, "Governmentally Appointed Directors in a Private Corporation--The Communication Satellite Act of 1962," 79 Harv. L. Rev. 350 (1965); Boskey, "Monopoly and Antitrust Aspects of Communications Satellite Operations in Proceedings of the Conf. on the Law of Space and Satellite Communications," NASA SP-44 at 80 (1963). See also the Congressional hearings cited supra n. 86.

⁹² The FCC has ruled on this question, but it seems probable that the matter will eventually be tested through the courts or that additional legislation may be sought. See FCC rulings July 21, 1966, 31 Fed. Reg. 10144, Docket 16058, FCC 66-677; and Feb. 8, 1967, 32 Fed. Reg. 2829, Docket 16058, FCC 67-164.

⁹³ ComSat's efforts to prevent other entities in the United States from having separate communications satellites for domestic purposes indicates a strong opposition to competition in this particular area. Stated policies are not entirely compatible as far as competition is concerned.

⁹⁴Special Agr't, art. 7. The Dept. of State, the Department of Defense, and the FCC became involved in establishing circuits to S.E. Asia, and in testimony before the House Government Operations Military Operations Subcommittee Ass't Sec'y of State Loy stated, "The timing of events and the way the FCC regulatory action appeared to our partners (consortium members) was that the U.S. was reviewing or second-guessing actions after they had been made with full U.S. participation. They objected to that at the meeting of the Interim Communications Satellite Committee." Loy went on to say that it was a question of principle and not of delay. Each country instructs its representative before action is taken, and then when a decision is made, "no country in essence should have a veto power." See 32 T.R. (Sept. 6, 1966), 22, and 23. There are sharp differences of opinion between government agencies over control and guidance of communications satellite operations.

⁹⁵A contract between ComSat as manager of Intelsat and NASA dated Dec. 17, 1964, provides that NASA will furnish to ComSat on a reimbursible basis satellite launchings and related services as a contractor and not as an agent. ComSat is required to make appropriate payments. Although the contract as presently worded indicates that ComSat is the manager of Intelsat, there remain points of ambiguity about the obligations and relations between the members of the consortium. There are also ambiguities as to the relationship of members of the consortium to contractors and to third party strangers. Underwood, in "Problems of Participation in the Global Commercial Communications Satellite System" 18, S. C. L. Rev. 796-807 (1966) comments on the complicated international responsibilities

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of ComSat and states (p. 799): "At the present neither the United States itself nor foreign governments or communications entities can know entirely who is dealing with whom and with what authority."

⁹⁶ ComSat obtained FCC authorization to permit Canada to utilize "units of satellite utilization" via the Andover, *N.H.* earth station, 33 T.R. 14 (Jan. 23, 1967). The Dept. of State conducted a survey of potential Intelsat earth station markets, 33 T.R. 22 (Feb. 20, 1967).

FCC sharply criticized ComSat for obtaining Intelsat approval to construct Intelsat III satellites without having obtained prior FCC approval. Senator Pastore, chairman of the Commerce Subcommittee on Communications, suggested the need for hearings to find the cause and solution of the bickering between government agencies. FCC instructed "ComSat shall not apply to [Intelsat] for any units of satellite authorization, nor use any units it may obtain, except in accordance with an instrument of authorization issued by the Commission upon consideration of an appropriate application duly filed by ComSat." 32 T.R. 3⁴ (June 27, 1966). See also 32 T.R. ²⁸ (Mar⁹ 28, 1966) referring to ComSat efforts to obtain modification of FCC rules which appeared to attempt to regulate foreign communication entities; 32 T.R. 18 (June 13, 1966) suggesting White House or Congressional action might be required; 32 T.R. 11 (July 11, 1966) referring to a ComSat letter to FCC pointing out the difficulty of its position as a domestic corporation and as manager of Intelsat. See also supra n. 66.

97

Underwood, "Problems of Participation in the Global Commercial Communist Satellite System," 18 S. C. L. Rev. 796, 798 (1966) refers to ComSat as "a so-called mixed public-private corporation" and suggests the structure "in the potential for conflict."

9% See, for example, the statement by Senator Long on p. 1 of Hearings before the Subcommittee on Monopoly of the Select Committee on Small Business, Public Policy Questions on the Ownership and Control of a Space Satellite Communications System, U S Senate, (Aug. 2, 3, 4, 10, and 11, 1961): "Since this area of aeronautical development is the first to assume commercial importance, decisions made yesterday, today, and tomorrow will have far-reaching political and economic implications because they will create a precedent for later solutions in other areas of human activity in space." UN Res. 1721 (XVI) calls for a communications satellite system as soon as possible and on a nondiscriminatory basis. The preamble to the Intelsat agreements referred to the desirability of "a single global commercial communications satellite system at the earliest practicable date." Prestige was also a consideration. See Staff Report of the Senate Committee on Aeronautical and Space Sciences Communications Satellites: Technical, Economic and International Developments, 87th Cong., 2d Sess. 25, (Comm. Print 1962). The first officially announced Soviet communications satellite, Molniya I, was launched Apr. 23, 1965, but there are suggestions Cosmos 41, launched Aug. 22, 1964, may have been an earlier attempt. See Morenoff, J., "Communications in Orbit: A Legal Analysis and Prognosis," Communication Satellite Systems Technology 1011 (Marsted. 1966) citing New York Herald Tribune, Apr. 24, 1965, at 11. Then Deputy Attorney General Katzenbach speaking at the World Peace through Law Conference, held in Greece in 1963, said, "These interests especially included the Government's ^{new} responsibility to encourage satellite communications in order to improve communications among nations and assist in their

98 (Continued)

economic development, which have long been major objectives of the United States foreign policy." Leonard Marks of the USIA at the same conference stated, "Communication is the lifeline of civilization. Without it, people live in small tribal societies, suspicious of strange and different customs. With improved communication comes better understanding and a removal of the barriers of suspicion and distrust. When we know our neighbors we are more likely to become friends philosophically and socially, and from this relationship may evolve a world dedicated to the preservation of law in an atmosphere of peace." Sec. 102(a) of the ComSat Act refers to "^{##}...a commercial communications satellite system^{##}, which will contribute to world peace and understanding."

⁹⁹ See Staff Report of the Senate Committee on Aeronautical and Space Sciences, Communications Satellites: Technical, Economic and International Developments (87th Cong., 2d Sess. 26-28, (Comm. Print 1962), outlining some of the known and anticipated advantages.

100

Defined as the ground equipment linking a satellite and terrestrial communications systems. It consists of antenna to send and receive electromagnetic signals and facilities to track a satellite.

101

Paper by Istvan, Director of International Development for ComSat presented at the AIAA Communications Satellite Systems Conference, Washington, D.C., May 2-4, 1966, AIAA Paper No. 66-332.

102

The Washington Post, Oct. 29, 1965, at A6, reports that "The Soviet Union is cajoling France to become a partner in a French-Russian sponsored communications satellite system. One aim of such a partnership would be to compete against the American dominated system." French and Russian television is not compatible with U S television, and conversion equipment would be required for an interchange between the two systems. In answer to a question about a competing satellite system that might be launched by the Soviet Union, ComSat's chairman said he doubted two-way communications would be of much use to the Russians, but he added, "One way television would be very attractive to them and so we assume they will do it. We shouldn't kid ourselves that the U S will be the glorious leader in the only global communications satellite system over the next ten years." Wall Street Journal, Oct. 6, 1966, at 30, col. 2. France and Germany have announced the signing of an agreement to build a satellite for communications; whether for experimental purposes or for commercial use is unclear. A ComSat spokesman acknowledged that basic questions about the relationship of regional schemes such as the Franco-German proposal to Intelsat, are under serious consideration." AT&T indicated

102- (Continued)

it thought the proposal perfectly legal. Wall Street Journal, June 7, 1967, at 14. This problem of multiple systems is referred to in several places in the text as it has an impact on many aspects of communications satellites.

103

Names of the countries in Intelsat when this manuscript was completed are shown in Appendix *etc.* The original nineteen signatories are designated by asterisks: "These 48 [now increased substantially] countries account for at least 90 percent of the potential international world communications traffic which might be served by a global satellite system in the next few years." Paper by Edwin J. Istvan, Director of International Development for ComSat, presented at the AIAA Communications Satellite Conference, Washington, D.C., May 2-4, 1966, AIAA Paper No. 66-332, p.3. It will be noted that neither the Soviet Union and Communist China nor any of their close allies are members of Intelsat, although most are members of the ITU. There have been discussions with Yugoslavia and other Communist countries concerning possible accession to Intelsat. Washington Post, May 3, 1966, at A4, col. 1.

104

See for example, Kovalev & Cherpov, The Way to Space Law 70 (1962) suggesting that U.S. motivation is entirely military; Cherpov, Some Legal Problems of International Space Communications; 1964 Proceedings, Seventh Colloquium on the Law of Outer Space 10 (Haley ed. 1965) suggests a covert attempt by AT&T to rule earth and space.

104 (Continued)

Zhukov's forthcoming book contains very sharp political criticism along the same line.

105 "Behind the backs of these organizations [UN and ITU] they [U S] agreed with a narrow group of Western countries on the sharing of privileges from exploiting the system according to American conditions," Stashevsky, ⁱⁿ Sov. Go. i Pravo 57, 62 (Nov. 12, 1964). He continues: "countries which, due to their economic position are unable or do not wish to contribute capital to the creation of a system of communications on American conditions, who will only be users of that system and will build their own receiving stations, are completely excluded from deciding questions concerned with governing the system and also from defining general rules and principles of its activities.

"The organizational structure of the system creates almost limitless possibilities for discrimination in relation to those countries which shall be subscribers to the satellite communication system, although formally in the agreement there is a reference to the decision of the UN General Assembly that such discrimination must not be permitted." It is probable that a demand for one-nation one-vote will be heard although it is also probable that the Soviets would want veto power similar to that in the UN.

106

Agreement Establishing Interim Arrangements for a Global Communications
Satellite System, [hereinafter cited as Interim Agr't] Preamble

107

Id. at § 102(d).

108

If the U S permits the establishment of a national system for
its own use, the U S will not be in a strong position to object if
other nations or groups of nations wish to establish their own special
purpose or regional systems. Even the establishment of a separate system
for U S government purposes such as the military break³ the concept of
a single global system.

109

See FCC Docket No. 16495, Dec. 15, 1966, at pp. 4 and 5 wherein
AT&T states: "However, AT&T suggests that negotiations looking toward a
definitive international agreement should proceed on the premise that
domestic satellite systems or their regional equivalents are inevitable."

This is a realistic view.

110

15 UST 1705; TIAS 5646. Entered into force Aug. 20, 1964.

111

IV International Legal Materials 735, Washington, June 4, 1965.

112

Interim Agr't , Art. I(a) (2).

113

The company monopolistically operates overseas telecommunications services in Japan under the supervision of the Ministry of Posts and Telecommunication. Its activities were restricted by the Public Telecommunication Law and the Kokusai Denshin Denwa Co., Ltd., Law, besides the commercial code. The shares of the company may be possessed only by the government, local public entities, Japanese nationals or Japanese juridical persons. (Letter to authors dated June 6, 1967 from K. Sase, 2d Secretary of Japanese Embassy, Washington, D.C.)

114 See for example, the article in New York Times, Aug. 30, 1965, noting President Johnson's comments calling for cooperation in space programs; an article in the Washington Post, July 20, 1964, refers to an American invitation to the Soviets to join in forming the global system. To the same effect see Kohlmeier's article in the Wall Street Journal, Feb. 23, 1965. A part of Soviet response is referred to supra n.

74, ~~410~~ 75

115

Special Agr't, art. 15.

116

Interim Agr't., art. IX(c).

117

Id., art XI(a). Failure to pay accounts may result in
an automatic withdrawal as noted.

118

Id., art. XI(e).

119
Id., art. XII(f). Any entity designated by a signatory to the Interim
Agrt. would doubtless be acceptable as a signatory to the Special Agr't
although the agreement calls for a communications entity.

120

Id., art. II(b).

121

The United States Federal Tort Claims Act is a good example. 28

USC 1291-1346.

122 Interim Agr't , art. X; Special Agr't^{2/} art. 10.

123 Id., art. X.

124 Washington Post, 4/71, for a brief comment on the question of liability of members of the consortium. Members of Intelsat are, of course, national entities.

125 Both agreements must be signed before either is effective as to the signatory. Interim Agr't , art. XII(f).

126 Id., art. II.

127 Id., Preamble.

128 Established by Interim Agr't , art. IV.

129 The Interim Committee is composed of representatives from each of the signatories to the Special Committee whose investment quota in Intelsat is not less than 1.5%. Signatories have the right to combine smaller quotas to gain representation. "Quota" means the percentage of financial contribution to the total cost of the system, as established in the Annex to the Special Agreement. Votes are [#]reproportioned to the size of the quota, but limitations are imposed to assure that the United States does not have unfettered control, because its quota is in excess of 50% of the total. Interim Agr't [✓], arts. V, art. VI and Annex to Special Agr't.

130

The United States has, for various purposes, treated Intelsat as if it were a juridical entity. See E.O. 11227, June 2, 1965, designating the Interim Committee as a Public International Organization Entitled to Enjoy Certain Privileges, Exemptions, and Immunities; and E.O. 11277, Apr. 30, 1966, designating the International Telecommunications Consortium as an International Organization Entitled to Enjoy Certain Privileges, Exemption and Immunities. Other countries have taken somewhat similar actions.

131

The caption used in the Interim Agreement initially was "Multilateral Communications Satellite System," subsequently modified to "International Telecommunications Satellite Consortium" (Intelsat).

132

Interim Agr't [✓], art. IX provides for the negotiation of definitive arrangements "with a view to their entry into force by 1st Jan. 1970,"

132 (Continued)

although the interim arrangements "remain in effect until the entry into force of the definitive arrangements." Interim Agr't, art. XV. The agreements were negotiated and initially signed by only nineteen states. Members of the ITU in addition to the original signatories are eligible to participate in Intelsat subject to approval of quota and financial arrangements by the Interim Committee. Id., art. XII.

¹³³ ^{id^e} Art. 34 of the Statute of the International Court of Justice requires all parties before it to be states.

¹³⁴
The Community Court of the European Communities is an example. Treaty Establishing the European Economic Community, art. 4 and 188 and Statute of the Court, art. 39; 5 European Yrbk. 438 (1959).

135

See, for example, art^{icle} 104 of the charter of the UN which reads,

"The organization shall enjoy in the territory of each of its members such legal capacity as may be necessary for the exercise of its functions and the fulfillment of its purposes." The statutes of suitable international courts would also require modification, a highly controversial political question so far as the International Court of Justice is concerned.

136

Interim Agr't, art. XII.

137

Id., art. VIII.

138

Id., arts. I (b), III.

139

See infra Chap. 6 and art^{icles of the} VII, Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, signed Jan. 27, 1967.

140

See generally ^{infra} Chapter 6.

141

^{vice} President, International
Letter to the authors from John A. Johnson, ComSat, Aug. 25, 1965.

"The form of all such contracts is such as to obligate only the Communications Satellite Corporation directly and not the other signatories to the Special Agreement. Under the terms of the Special Agreement, ComSat has the right to reimbursement by the other signatories in proportion to their respective capital commitments." The probability of damage across international borders from launch vehicles is not great. See ^{infra} Chapter 6

for an extensive discussion of the subject.

142

See Restatement of the Law, Agency 2d, Sec. 20(e) and (f);
also Sec. 189, Illust. 2.

143

The Special Agrt., art. 3, requires each signatory "to contribute a percentage of the costs of the design, development, construction and establishment of the space segment equal to its quota." Art. 4 requires each signatory to "make their respective proportionate payments in order to enable obligations to be met as they become due...Where a signatory other than the Corporation (ComSat) incurs obligations pursuant to authorization by the (Interim) Committee, the Committee shall cause payments to be made to that signatory."

144

Interim Agrt., art. VI. Indications are that the cost of establishing the system will be substantially less than the estimates.

145

Special Agrt., art. 4, (a).

146 Interim Agr't, art. VI(a).

147 Special Agr't, art. 1(e) and Annex. Initially eleven signatories held 97.5% of the quota of ownership or investment which gave them the same voting power. A reduction of these quotas by 17% would still leave eleven signatories with 80.3% of the quota and four members would control 67.7% of the quota.

148 ^{supra}
See n. 105.

149 Special Agr't, art. 4(b) (c) and (d).

150 Interim Agr't, art. XI(b) and Special Agr't, art. 4(d).

151 Special Agr't, art. 3. The space segment is defined as "the communications satellite and the tracking, control, command and related facilities required to support the operation of the communications satellites," Interim Agr't, art. I(b) (i).

152 Special Agr't, art. 5.

153 Interim Agr't, art. III. Also, art. 10 of the Special Agreement provides that technical data and information arising directly from any work performed under contracts for design, development, and procurement of equipment for the space segment are to be available, insofar as possible to provide in the contract, for Intelsat use without payment of royalties. ComSat is obligated to use its best efforts to obtain the free use of technical information and data developed for the space segment under contracts signed prior to the effective date of the Special Agreement. Special Agr't, art. 10 (f) (g) and (h).

154

Special Agr't, arts.5, 6, 7 and 8 do not specifically mention that earth stations are to be owned by the individual members, but this is clearly the intent.

155

Special Agr't, art. 6.

156

Special Agr't, art. 7, and Interim Agr't, art. VII.

157

Special Agr't, art. 7(b).

158

There has been sharp debate in the U S over ownership of earth stations by communications entities other than ComSat; the controversy is still unresolved.

159

Various international banks, U S AID, and some contractors have assisted undeveloped countries both financially and technically. 33 Telecommunications Reports 28 (Feb. 22, 1967) notes an Export-Import Bank Loan to Thailand for an earth station.

160

Special Agr't, art. 7(c). Intelsat has approved more than 20 earth stations. 33 T.R. 2 (May 29, 1967). More than 40 may be approved by 1970. 33 T.R. 32 (Mar. 13, 1967) notes an AID loan to help finance a Malagasy communications improvement program not directly connected with communications satellites. NASA and AID have financed communications studies for Nigeria, Ivory Coast, Ghana, Togo, and Dahomey. The Peace Corps has financed a communications study in Botswana, 32 T.R. 12 (Dec. 5, 1966) and 33 T.R. 35 (Dec. 27, 1966). World Bank loans have gone to Kenya, Tanzania, and Uganda, 33 T.R. 28 (Feb. 22, 1967) and to Columbia. 33 T.R. 30 (June 12, 1967). For prestige, more earth stations than can be justified technically may be built with money that could better be spent on improving conventional communications.

161

Special Agr't, art. 7(c) Article 7 is not clearly drafted but is unlikely to cause difficulty as the interpretation given it by the Interim Committee will probably be accepted.

162

Special Agr't, art. 7(a).

163

Special Agrt², art. 8(b) and (c). States lacking finance may be able to obtain assistance from AID or one of the international banks.

National Communications Programs, ^{on A} Hearings ^{Senate} before the Committee on Aeronautical and Space Sciences, ^{US Senate} 89th Cong. 2d Sess., at 56 (Jan.

25, 1966). See *supra* n. 159.

164) Special Agrt², art. 9.

165) Newsweek, Oct. 3, 1966, ^{at} p. 77, suggests Intelsat may propose rates

which will be about half those charged for cable circuits, presently about

\$4,200 a month for an Atlantic circuit. Previously, ComSat had proposed a reduction of the Atlantic rate to about \$3,800 per circuit. Chicago

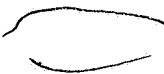
Tribune, July 8, 1966, Sec. ^{at} §3A, p. 1. See ComSat press release of Oct.

3, 1966 for proposed Pacific rates. See ^{Staff of Senator} U.S. Senate, Committee on Aeronautical and Space Sciences, "Communication Satellites: Technical, Economic, and International Developments," 87th Cong., 2d Sess., at 34-35, 169-71

(Feb. 25, 1962) for early cost estimates for channels.

European members of Intelsat have chosen to move slowly and circumspectly in utilizing space segments channels. Europeans have paid half the cost of an Atlantic cable opened in 1965 and want to see this investment protected before making heavy use of the satellite system. This Atlantic cable provides 400 circuits altogether, and with special equipment 500. Also, Intelsat has not had adequate experience to be able to make guarantees of continuity of service equivalent to cable circuits. The competition will continue, and it has been argued that satellite communications should bear the burden of amortizing the cost of research

166 (Continued)

and development which has been accomplished by the government. This is not likely to be done for past expenses nor is it possible to compute hidden subsidies, if any, received from government business. See 33 T.R. 46 (Apr. 10, 1967) for proposed rates for leased channels: \$2,700 from Brewster Flat, Washington, to Paumalu, Hawaii; \$3,800 from Paumalu to Japan, the Philippines, and Thailand; \$4,900 from Brewster Flat to Japan; and \$3,800 from Andover, N.H. to Europe. The competition between cables and satellites shows clearly even in advertising; see advertisements of Submarine Cables, Ltd. in 31 T.J.³⁹⁰ (Nov. 1964),  which has a caption, "Space for prestige--but cables for sure communications." The advertisements appeared repeatedly--even on the expensive back-page position.

167 Special Agr't, art. 8(a).

168 See for example, ComSat press release, Mar. 31, 1967, "ComSat Asks FCC for Permission to Reduce Satellite Phone and TV Rates for Atlantic Area."

169 Interim Agr't, art. V(c) (v) relating to total vote required for approval provides "establishment of the rate of charge per unit of satellite utilization pursuant to article 9(a) of the Special Agreement." Special Agr't, art. 9(a) provides "The Committee shall specify the unit of satellite utilization and from time to time shall establish the rate of charge per unit at a level which, as a general rule, shall be sufficient, on the basis of the estimated total use of the space segment, to cover amortization of the capital cost of the space segment, an adequate compensation for use of capital, and the estimated operating, maintenance and administration costs of the space segments."



170 Arguments may be based at least in part on the concept that Intelsat should be charged for research and development work paid for by the U.S. Government--that otherwise space communications will receive the benefit of a huge hidden subsidy. See supra n. 86. Such arguments may overlook the fact that many areas of private enterprise have received hidden and open subsidies from time to time. See also infra Appendix C, text, and Appendix C, n. 18.

171 Interim Agr't, art. XII(c).



172 Id., art. IV(e).

173 Id., art. V(a).

174

Id.,  art. XII(c) provides that the quotas of all signatories to the Special /  other than the original 19 shall not exceed 17%. The original U.S. quota was 61% which, if reduced by 17% would leave a U.S. quota of 50.63%.

175

Id.,  art. V. An Interim committee quorum consists of a number of votes exceeding the vote of the largest quota by not less than 1.5% of the votes. Thus, the votes of the United States plus an additional 8.5% of the total votes are required to make a quorum. The United Kingdom commenced with 8.4% of the votes; thus, the U.S. and U.K. are unable to make a quorum. The U.S. vote plus 12.5% of the total vote are required for major decisions relating to the type of space segment to be established, standards for earth stations, budget, adjustment of accounts for expenditures, charge per unit of satellite utilization, additional contribution, placing of contracts in excess of \$500,000, the program for launching satellites, approval of quotas for new members, approval of financial conditions for accessions, withdrawals from Intelsat, recommendations for amendments to the Special ^{Agreement} /  committee rules of procedure, and approval of compensation for ComSat's services as manager. In some cases the requirement drops to the U.S. vote plus 8.5% of the total vote after 60 days.

176

IV International Legal Materials 735 (July 1965). Reproduced in Appendix ~~100~~ as item 10.

177

Partisan-appointed members of arbitral tribunals seldom see their role as impartial jurists and are much more likely to conduct themselves as proponents of the position of the party appointing them.

178

The Communist countries normally favor a two-man "arbitral tribunal" which requires unanimous approval for any finding. Such a "tribunal" is at best only a negotiating forum between representatives of the parties to the dispute. See discussion on this point in ^{infra} Chapter 6.

179

Supplementary Agreement on Arbitration

art. 3.

180

Id., art. 4(c) and (d).

181

Id., art. 2(a).

182

Id., art. 2(b).


183

Id., art. 5.


184

Id., art. 2c. The right to appear before a tribunal, national or international, is an attribute of a juridical person, but possession of the right is not sufficient to make an entity a juridical person in the face of a contrary intent.

185

Id.,  art. 7. The closed nature of the hearings may make it very difficult to ascertain if there is a substantial interest.

186

Id.,  art. 5(g). Vacancies in the tribunal may be filled in accordance with procedures set forth in art. 4(f) and (g) but in some circumstances the remaining two members may give a final decision, art. 4(h).

187

Id., art. 11 (b).

188

Id., art. 11.

189

Id., art. 4(d).

190

See ^{*infra*} Chapter 6.

191

It is recognized that parties in arbitration proceedings under the Supplementary Agreement are limited to signatories to the Special Agreement and the Interim Committee, art. 3(c).

CHAPTER VI

LIABILITY AND SPACE ACTIVITIES

Causes, Objectives, and Parties

Theories of liability and general questions of international claims adjudication have been extensively considered in numerous scholarly studies¹ and will be discussed in relation to space activities only to the extent necessary for analyzing specific problems. Questions of liability under municipal law for damages incurred by nationals of the state to which liability is assigned internationally on any nexus are also generally outside the scope of this chapter.² Even so, some proposals made in the course of United Nations negotiations would appear to cover all claims arising from activities in space, even by a national against his own state. Damage inflicted intentionally as an act of war or in violation of accepted rules of international law is better analyzed in a discussion of the maintenance of international order in space.³

Probable or desirable developments in international law concerning space activities are, of course, subject to modification in the light of scientific, political, social, and economic developments.⁴ In particular, scientific developments may substantially change causative factors, and political developments may open the way to much greater international cooperation.

Occurrences Which May Give Rise to International Claims

A discussion of legal problems of international liability arising from activities in space⁵ requires an exploration of the occurrences which

may result in international claims. Rapidly developing technology, ~~much~~ of which is classified, makes it imprudent to attempt to prepare an exhaustive list of the possible sources of liability, however.

Some acts, such as interference with communications and navigational aids, are so similar to nonspace occurrences that existing regimes of law covering such acts will probably be extended so that no separate set of rules need be devised to provide coverage for the space-oriented part of a general problem. Thus, the International Telecommunications Union (ITU) has already been utilized to allocate frequencies for use in space activities and to resolve some questions of communications interference.

The novel and experimental aspects of man's activities in space, the nationalistic competition for achievement of space goals, and the necessity of utilizing high-energy propellants, exotic atmospheres, and experimental techniques and materials make many types of accidents both conceivable and credible.⁶ But a listing of possible types of accidental occurrences does not constitute an evaluation of the probabilities that damage will result. To date, no formal international claims based on damages and injuries resulting from activities in space have been presented,⁷ but there is, of course, no way to eliminate the possibility of damage.⁸

Actions resulting in the spoliation of scientific endeavor, such as the introduction on a celestial body of terrestrial bacteria, viruses, or other living matter from a man-made spacecraft before it can be determined whether life exists there independently,⁹ cluttering space with debris of dead spacecraft, boosters, copper needles, or other objects, and modification of radiation belts or other aspects of the space environment present special

problems. Such actions are unlikely to give rise to specific claims for compensation on the part of individual states, although the nations of the world collectively have a substantial, if nonmonetary, interest in the conservation of the resources and scientific integrity of celestial bodies.

Falling Boosters, Spacecraft, and Debris

Contrary to the expectations of some scientists that fragments and parts from space vehicles and boosters placed in orbit or sent beyond the atmosphere will burn up in the atmosphere prior to reaching earth unless designed and fabricated for reentry, experience indicates that some fall back on earth as solid pieces of metal. As the number of objects put into outer space increases, the probability of damage from falling debris correspondingly increases, even though as previously noted, the incidence of damage is likely to continue to be low.¹⁰ A more substantial risk is involved in the possible return to earth of a booster stage still containing unexpended fuel.¹¹

The possible extent and probabilities of damage occurring depend on variables the most important of which are: the nature of the site of the accident, the kind of fuel used, and the amount of fuel remaining at the time of the accident. As distance from the launch site increases, the amount of unconsumed fuel will decrease with a corresponding reduction in the probable violence of an explosion on impact. Except in an erratic launch, the altitude of a spacecraft rapidly increases as its distance from the launch site increases, thus greatly augmenting the probabilities that the unexpended fuel can be exploded harmlessly by built-in safety devices. Also, as the altitude of the spacecraft increases, so do the probabilities that in the

event of an unscheduled return of the vehicle and booster to the earth's surface, the remaining fuel will be ignited by the heat of friction and will be burned or exploded harmlessly as the spacecraft reenters the denser atmosphere, even if the safety destruct devices fail to function.¹² Consequently, questions of liability for large claims are likely to come under domestic law, unless a launching takes place near an international boundary close to sizable cities. Areas in Canada, Mexico, and the Caribbean may be close enough to some United States launching sites to be susceptible to damage from errant missiles containing unexpended fuels. Similarly, Russian launch sites may create international risks for areas of eastern Europe and Asia.

Fuels and pure oxygen used in space may cause severe damage during almost every stage of activity, including periods prior to the actual flight of the vehicle. The risk commences with the manufacture and transportation of the highly inflammable propellants and liquid oxygen to storage sites and launching pads.¹³ At the present time the risks of transporting and storing fuels are limited primarily to the territory of the launching state and are thus matters of domestic concern. International legal problems could arise when several countries participate in joint space activities, which are provided for in numerous agreements to which the United States is a party¹⁴ and which are being undertaken by the European Space Research Organization, (ESRO), the European Launcher Development Organization (ELDO), and other multinational groups.¹⁵

Liability questions involving launch-pad accidents are generally limited to the territory of one state,¹⁶ although launches may be made from platforms at sea and new methods of placing vehicles in orbit may present substantially different factual situations.¹⁷ Claims arising as a result of cooperative space endeavors, to the extent they cannot be disposed of by domestic law or by agreement among the participating states,¹⁸ present the same types of legal problems as accidents caused by errant vehicles launched by a single country.¹⁹

If nuclear fuels are developed for spacecraft, as seems probable,²⁰ scientists and engineers foresee possibilities of damages from radiation in the event of an accident and the return to earth of radioactive debris, even in the absence of a nuclear explosion.²¹ Very little information about the use and hazards of nuclear power in space activities has been made public, but classified details of operations are not required to recognize the existence of a risk.²² Radiation, with or without nuclear explosion, may constitute a hazard over an area many times larger than an impact area, and this hazard may continue to exist for a considerable time after the deposit of the material on the earth's surface.²³

If explosive warheads, nuclear or other, are placed in space in spite of the UN sponsored treaty to the contrary,²⁴ which appears possible,²⁵ their potential for causing damage to earthbound interests will be commensurate with the power of the particular warhead. Reentry heat shields and

safeguards against accidental detonations reduce but do not eliminate the possibilities of unintended explosions that could effect widespread pollution as well as direct destruction.²⁶

Collisions

The probabilities of collisions between spacecraft or between spacecraft and aircraft seem remote, given the vastness of airspace and outer space. At least one such collision has already occurred, however. To the apparent irritation of United States officials, an American scientist described a collision at the Seventeenth International Astronautical Congress in Madrid in October, 1966. Eight satellites had been placed in orbit by a single rocket on March 9, 1965. More than a month later, two of them brushed together but with only slight damage.²⁷ The increasing number and greater maneuverability of satellites will progressively increase the probability of collisions. Collisions involving a spacecraft in early ascent stages and aircraft would most likely occur within the territorial jurisdiction of the nation initiating the launching; the claims arising therefrom would usually be cognizable under national rather than international law, but an abortive launch resulting in an undesired orbit or in the destruction of a space vehicle might drop fragments across airplanes anywhere around the world.²⁸

Pollution

Pollution involves the introduction of substances capable of causing damage or undesired change by other than normal impact or fire.²⁹ Pollutants may include microorganisms, biological products, chemicals, radioactive debris, or other matter not found at the particular place except through the action of man. Claims, which may be in addition to or separate from those

for impact damages, may arise for specific damages caused by pollution. Introducing microorganisms to earth or to a celestial body might upset the "balance of nature" in such a way as to have lasting and unpredictable consequences. Of the possible contaminants, those involving nuclear radiation have generally received the most attention from various disciplines.³⁰ Increasing ability to move about in space will carry the risks of damage from all types of pollution to celestial bodies and activities which may be centered there.

Interference with Communications

Communications utilizing electromagnetic transmissions may be disrupted or completely blocked for varying lengths of time by competing electromagnetic emissions from many types of man-made sources. The most frequent interference is from other communications signals on the same or on adjoining frequencies. Space activity is a potential major contributor to the problem of overcrowded radio channels, not only because of the increased need for communications channels but also because of the existence of nuclear and sunpowered space vehicles which may continue transmitting indefinitely, even when their usefulness has long since ended.³¹ Since spacecraft are highly mobile, transmissions to and from them may result in interference anywhere in the world. Technological advances are being made with great rapidity, but the demand for communications facilities is increasing at such a rate that problems of interference will continue indefinitely into the future. In addition to competing communications signals, major interference may be caused by space activities which release electromagnetic emissions or otherwise disrupt the normal atmospheric and space electromagnetic patterns.³²

Interference with communications is not a new phenomenon and claims and complaints will, in the absence of new or amended international agreements, probably continue to be made as they are at present. ³³ Although international claims for interference with communications have not been successful as a device for collecting damages in the past, ³⁴ it is possible that rules could be devised which would provide a basis for claims for compensation of actual damages resulting from interference. Proof of causation and of the extent of damage would be difficult, and the inflexibility of rules which would be required to control use of frequencies might interfere with advantageous use of available frequencies under naturally varying electromagnetic and climatic conditions. Damages could involve the loss of planes, ships, spacecraft, and attendant personnel or the loss of experimental data and commercial profits of a communications carrier.

Reporting and Modifying Weather

Space beyond the atmosphere is being utilized for observation of atmospheric phenomena, and future developments may make possible greatly increased use of air and space for weather observation and modification. ³⁵ Activities relating to weather observation will involve both airspace and outer space; and it will probably not be possible to make any clear differentiation. Damages resulting from erroneous weather forecasts and from deliberately modified weather conditions may become serious problems. However, weather reporting and analysis is still such an imperfect science that it would hardly be possible to base an international claim for damages on inaccurate predictions. Weather prediction and modification have already ³⁶ been the subjects of some domestic litigation in the United States. Although some of the crucial information and concepts may be by-products

of space activities, modification at present is accomplished by activities in airspace and thus is not within the scope of a study of the law of activities in space. ³⁷

Earth Measurements and Navigation Aids

Spacecraft are being used extensively to make earth measurements and to provide additional information and fixes for navigational purposes. ³⁸

Erroneous navigational information may result in damage to or loss of ships, aircraft, and spacecraft. Collection of damages resulting from acting on erroneous or inadequate information furnished as part of a government discretionary function has seldom been possible, and developments in space are unlikely to make a significant change in this situation .

But the general trend of U S courts operating under the Federal Tort Claims Act is to place greater responsibility on the government when it is discharging an operational function. ³⁹

Other Claims, Nominal and Exemplary Damage

International claims are not necessarily limited to accidents involving death, personal injury, and property damage, and it is not possible to predict all the types of space activity which might give rise to claims.

For example, the American Institute of Aeronautics and Astronautics

recently commented: "We see orbital sightseeing tours within the reach of moderately affluent private citizens." ⁴⁰

Claims may be made in an effort to establish that a particular space activity is wrong, or for exemplary damages to punish the perpetrator of wrongful behavior, or to compensate for mental anguish and degradation. United States courts recognize claims based on damages without contact such as sonic booms; nonphysical damage such as mental anguish, pain and suffering; and claims without damages for

technical violation of a protected right such as trespass. Although all these claims could be raised internationally, they would not be different in theory from similar claims based on nonspace causes. A space treaty on liability should specifically include or exclude these kinds of claims because there is no established rule of international law on them. ⁴¹

The violation of national territorial sovereignty or privacy has received much attention since the development of aircraft and questions concerning information-gathering activities from aircraft just outside the territorial limits of a country and from spacecraft far overhead continue to be subjects of discussion and some controversy, particularly among nongovernment, international law scholars. As ability to rendezvous in space is perfected, claims might be presented for simple trespass on a spacecraft, the same as for a ship on the high seas. Formal claims for damages alleged to arise from such space activities have not been made. It seems likely that if objections are made, it will be through diplomatic channels or in military reaction rather than through legal forums; although the international law basis would be the same. If legal action is brought it would seem that the basic purpose, particularly where military information is in question, would be to establish the wrongfulness of the action rather than to collect a specified amount of damages. A successful claimant could utilize a decision for propaganda purposes and justify forceful self-help in the event the other party did not discontinue the objectionable actions. However, since the United States and Russia both utilize satellites to collect military intelligence, it is rather unlikely that a case will be brought other than for propaganda purposes. ⁴²

If no international tribunal will find that the collection of military information by satellite provides a basis for collecting damages, it is no more probable that a tribunal will award damages for the collection of information of economic value. It is technically possible that a space power may be able to obtain better information about mineral deposits and other resources than the observed state lacking space capabilities has about itself. This would ordinarily be true only for comparatively undeveloped areas.⁴³

Many legal systems utilize punitive damages as a deterrent to unlawful or undesirable conduct; this is clearly an objective of a Hungarian draft proposal concerning liability for damages caused by launching objects into space.⁴⁴ The processing of any such claims requires a prior political agreement as to which types of activities are undesirable. The nuclear test-ban treaty would serve as an example of such an agreement. However, the treaty does not provide for the assessment of damages.⁴⁵ In case of violations leading to war, the only way to process claims for damages would be through provisions in a peace treaty when hostilities ceased. In the event damage claims arise as a result of violations not leading to hostilities, claims could be processed through such customary procedures as might be agreed. Presumably, proof of damage would have to be specific rather than general.

This discussion of occurrences out of which claims for damages may arise exemplifies the difficulties space activities contribute to the international rules of law relating to liability for deaths, personal

injury, and property damages. The risk of damage is not limited to the nation carrying out the activity but may occur at any time anywhere on the surface of the earth, in airspace or in outer space. Consequently all nations, whether engaged in space activities or not, must participate in the establishment of legal rules or acquiesce in their promulgation if a uniform system of handling claims is to be developed. It is doubtful, to say the least, that this optimum goal will be achieved.

This discussion is not intended to indicate that the authors of this study are convinced that international claims arising from activities in space will constitute an intolerable burden on the economies of the space powers. Experience has thus far been very encouraging in that there has been no significant damage across national borders has occurred and no international claims have been presented.

Objectives in Resolving Claims Arising from Activities in Space

Laws on liability for damages are part of the rules of conduct laid down by a society, either national or international, for the advancement of its social, political, and economic objectives. The less homogeneous the society, the more difficult it is to agree on a set of common objectives, but without such agreed objectives the task of drafting acceptable rules of conduct or laws is an especially difficult process of compromise which calls for mutual adjustment, i.e., good faith bargaining. ⁴⁶ An essential precondition to fruitful negotiation is

that all necessary parties to an agreement have a sincere desire to make an agreement rather than a desire to prolong negotiations for political and propaganda purposes. ⁴⁷ The existence of appropriate national policy guidelines and international political accommodations relative to activities in space are essential before an internationally acceptable draft on even a comparatively uncomplicated subject such as liability for damages can be prepared. ⁴⁸

Although the political and legal conceptual differences between Communist and Western countries produce the most difficult stumbling blocks, there are also some differences related to whether a nation has present or potential space capability. A nonspace power may tend to see the problems of liability for damages more from the point of view of a claimant than a defendant ⁴⁹ but this factor has not appeared to play a part in the relationships between the United States and the Soviet Government where the East-West political differences have been a dominant factor. The expressed willingness of present and aspiring space powers to make provisions for compensation for damages resulting from activities in space has reduced the differences which ⁵⁰ might exist between space and nonspace powers, and some of the small nonspace powers have indicated an interest in limiting liability for damages so as not to be deterred from future participation in space activities. ⁵¹ It has also been argued that it may be desirable if the risk of liability for damages does serve as a deterrent to

entry into space activities, because the less wealthy nations could concentrate on economic and social development rather than on pres-

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tige projects. In fairness it should be said that few developing countries have shown any excessive interest in space projects. The promptness and fairness with which the first space damage claims are disposed of by the space powers will unquestionably have a sharp impact on opinion among the nonspace powers and may have a substantial impact on how soon an initial agreement requires revision.

Contributing to the optimism that a detailed agreement on liability for damages can be achieved within the next year or two is the fact that space activities have thus far caused no deaths, injuries, or appreciable property damage cognizable under international law.

Broad agreement on liability has already been reached in the Treaty on Principles.

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It is possible that the general terms of this treaty may be considered sufficient and that details of application may be developed as cases arise. The Treaty on Principles makes states internationally responsible for all national activities, whether effected by a governmental or nongovernmental entity. An international organization may also be liable. The UN process of formulating rules for inclusions in a treaty has tended to place heavy emphasis on political factors, and as these are minimized the prospects for an acceptable treaty improve.

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In comparison, questions relating to liability of airlines to passengers still, after many years of commercial air operations, cause

substantial disagreement between nations, but primarily economic
 rather than political. ⁵⁵ Because of lack of agreement on the
 extent and terms of liability, the Rome Convention on Damages
 Caused by Foreign Aircraft to Third Parties on the Surface ⁵⁶ is
 in force for only a few nations, not including the United States.

Each country's concept of its socioeconomic obligations to its
 own nationals will be reflected in its domestic laws of liability
 and in the efforts it makes to obtain compensation for its na-
 tionals for damages caused by foreign states or nationals. A
 sense of fairness and a recognition of requirements or reciprocity
 will result in comparable offers of compensation to aliens. The
 general objective of compensating victims of space accidents has
 been expressed repeatedly since activities in space commenced. ⁵⁷
 The statements of the negotiators at the United Nations indicate ⁵⁸
 firm political commitments by all the nations, including Russia,
 to this objective. Not everyone agrees that compensation to the
 damaged party is an absolute objective for systems of liability, and
 there may be advantages in keeping social welfare concepts separate
 from concepts of liability for specific injuries. ⁵⁹

Deterrence of unsafe or improper conduct is also generally re-
 cognized as an appropriate objective, but if an attempt is made to
 base space liability on fault, the problems of defining conduct con-
 stituting fault are raised and the task of the claimant is made almost
 impossibly difficult. Too, the political issues posed by the Hungarian

draft, which provides for unlimited liability when injury results from "unlawful" activity, are sharply accentuated.⁶⁰

A major objective of any arrangement for handling claims must be the avoidance of unnecessary and emotionally charged conflicts and the provision of adequate compensation to injured parties in accordance with present social concepts, which seem to require compensation without regard to fault. As stated, this objective is compatible with encouraging activities in space, although it will increase the budget requirements.⁶¹

Parties and Sources of Compensation

Claimants and Respondents

Traditionally only states may be parties to actions before international tribunals,⁶² but this concept is being modified and some treaties give nongovernmental entities and natural persons status before international tribunals.⁶³ Some bilateral treaties, particularly those dealing with commercial relations, create arbitration procedures to which natural and legal persons other than states can be parties. No state has shown an inclination to depart very far from the traditional rules, however, and the traditional concept will probably continue to be the general rule applicable to space activities. UN resolutions relative to liability questions reflect this position,⁶⁴ as do the terms of the Treaty on Principles. They also represent a compromise between the United States' position that private entities should be permitted

to participate in some space activities and the Russian view that only states should be permitted to engage in space activities. Unfortunately these compromises do not resolve all the problems.

A related question is whether international organizations may be parties before international tribunals. The answer to this is usually found in international agreements establishing the organization and the tribunal in question.⁶⁵

In the UN negotiations for a space liability treaty the United States initially proposed that only states could be signatories.⁶⁶ But it subsequently "clarified" its proposal to permit an international organization to present a claim for compensation and to be a respondent but not to become a signatory to the proposed treaty.⁶⁷

A revised Belgian proposal⁶⁸ would allow international organizations to sign or accede to the proposed treaty on the invitation of the UN General Assembly, whereupon they would have the "same rights and obligations as states."⁶⁹ Other Western representative proposed various modifications of the United States⁷⁰ and Belgian suggestions but generally accepted the position that international inter-governmental organization, should be permitted to receive the benefits and incur the obligations of the treaty without being treated in the same manner as states.⁷¹

The Hungarian proposal, apparently relying on the UN Declaration of Legal Principles Governing Activities of States in the Exploration and Use of Outer Space, imposes obligations on international organizations without regard to action by the organization. It stated:

"liability for damage shall rest with the state or international organization which has launched...the space vehicle...." ⁷²

The agreement was to be "open for signature to all states." The Western powers generally questioned the propriety of such an approach, while the Communist powers generally supported the Hungarian approach with some modification. ⁷³ The space treaty signed January 27, 1967, is open to states for signature and appears to bind them for activities originating from their territory.

The procedural pattern established by the treaty could very well be followed on an ad hoc basis by nations or international organizations not parties to the treaty if they are faced with problems of the type covered by the treaty and if they rely on conventional international law and customary diplomatic negotiations for resolution of differences.

Liability of private or nongovernmental international organizations has received limited attention from government officials and legal scholars they will probably be treated in the same manner as other nongovernmental entities such as natural persons. ⁷⁴ The United States and Great Britain reserved their positions on this point, however, obviously concerned about entities such as the United States Communications Satellite Corporation and Intelsat, whose members are governments, government entities, and private entities. ⁷⁵

Claimants

When states represent the injured parties, what relationships should exist between the state and the injured party? Traditionally, a state presenting a claim owns the award received and can do with it as it sees fit in the absence of an agreement or stipulation to the contrary, ⁷⁶ although international tribunals obviously know that the

real part in interest is ordinarily an individual. All proposals suggested for outer space application provide that under some circumstances a state may espouse a claim for a noncitizen.

If the claiming state refuses to pay the amount to the injured party, it is doubtful that any other state including the state of nationality of the injured party can, in the absence of treaty provision or other international commitment, demand that the compensation be handed over, either to be retained or to be paid over to the injured party. In international negotiations involving a number of claims, it is customary to agree on a lump sum payment, with the receiving government giving the paying government an acquittance and accepting the task of distributing the money among the various individual claimants. In the unlikely event of a space accident involving international claims by many individuals, there would be no reason why this procedure could not be used.

If the basic goal of a treaty on liability for damages arising out of activities in space is to compensate injured parties, then there is justification for including provisions which will assure that the benefits of the payments are enjoyed by the injured parties. If the basic goal is to provide a means for the efficient settlement of international disputes, then the treaty can leave the question of compensation to the injured parties to the domestic laws and policies of the claimant state.

Relationships between Claimant States and
Injured Parties

The discussion relative to the power of a claimant state to retain any sums recovered emphasizes the necessity for examining the circumstances under which a state may present a claim for damage suffered by a nongovernmental entity, natural or juridical. In some circumstances two or more states may have some basis for representing the same injured party.

The Principle of Nationality

Traditionally, only the state of which the injured party is a national may advance a claim on his behalf.⁷⁹ In a claim involving three countries, A, B, and C, in which country A has engaged in space activities which caused an accident in country C, where nationals of A, B, and C were damaged, under the traditional rules C may espouse claims of nationals of C only. B may espouse the claims of nationals of B, even though the damage occurred in C, and the nationals of A would proceed directly against A in accordance with the domestic laws of A. In the UN negotiations the United States has proposed that the rule for A and A's nationals be continued.⁸⁰ Several other Western nations have supported similar positions,⁸¹ and some representatives in the UN negotiations formulated proposals based on the idea that the provisions of the proposed convention should not apply to compensation for damages caused in the territory of the launching state or suffered by its nationals

or permanent residents. ⁸² If this rule were accepted the proposed treaty would not apply to damages caused by country A in the territory of A except possibly to transients. A revised Hungarian proposal ⁸³ included the territory of the responsible state in the coverage of the treaty. ⁸⁴ The Austrian ⁸⁵ and French representatives favored inclusion of the territory of the responsible state on the theory that a nation had a right to claim compensation for damages done to one of its nationals wherever they were, and both countries appeared to support the United States position that only nationals of the state causing the damage would not be covered by the treaty. The Hungarian ⁸⁶ and Mexican ⁸⁷ representatives stated the view that a state should be permitted to make a claim for damages occurring within its territory regardless of the nationality of the damaged party. Under the Hungarian proposal, C could espouse claims of nationals of A, B, and C, certainly an innovation in the law.

In all these proposals the state where the damage occurred would be permitted to make claims for nationals of a third state, which is a departure from the concept that nations may represent only their own nationals. In those instances where several states participate in a space activity resulting in damage in one of the participating states or in a nonparticipating state, the American proposal might result in a denial of the benefit of the treaty to nationals of all the participating states since they would all be respondents. ⁸⁸ Parties to a joint launch could resolve by agreement between themselves the procedures

for disposing of claims from their respective nationals, as well as from nationals of other states, but this could result in a different procedure for each launch which would hardly seem as satisfactory as a recognized uniform procedure.

Neither the United States, nor the Hungarian draft indicates if the espousal of a claim by a state of which the damaged party is not a national would prevent the state of which the damaged party is a national from presenting a claim. Permitting the state where the injuries occur to present claims regardless of the nationality of the injured party would tend to consolidate into one action all claims arising out of a single incident, although it would permit the imposition of a state between a national and his own state. Only one investigation and one basic presentation to the state liable would be required; this would be accomplished by the state having immediate and unfettered access to the site of the damages. Only the extent of damage would require individual determination. If state C where the injuries occur is permitted to espouse the claim of nationals of state B, there does not appear to be a theoretical legal justification to refuse state C to espouse the claims of nationals of the responsible state A. However, it may be argued that the relationship between a person and the state of his nationality is a domestic matter in which an intermediary is unnecessary and undesirable.

Unless the rule is adopted that state C may represent any injured party regardless of nationality and residence, it would be desirable,

if not essential, that "residence" be given some definition within the meaning of the treaty.

The United States' drafts provided that a nation might represent only its "permanent" residents, but not nationals of the state liable. This position was adopted by Belgium in a revised draft,⁸⁹ with an added provision to allow a nation to make a claim for its permanent resident even if the resident was abroad at the time of the injury.⁹⁰

Compensation paid to an intermediary government may never be received by the damaged party. This argument can obviously be applied to any payment made to a government rather than to the damaged party, but presumably paternalistic concern would be strongest where the damaged party is a national of the state making payment to an intermediary state. In some countries of the world where the social welfare function is highly developed in theory at least and the state is normally supposed to relieve the burdens of one who is injured or loses a spouse, there is a theoretical basis for payment to the state to recompense it for its expenses resulting from injuries to its nationals. At the present time this argument must be taken on faith since there is inadequate information from many countries about the functioning of their social welfare systems, even though the laws and national reports indicate an ideal situation. The state receiving payment of an award might be required to submit proof that payments were received by the injured party under conditions which afforded him the economic benefits of the payment within the framework of his country's laws.

Liability arising from activities in space is not of such a peculiar nature as to require a legal regime substantially different from that applicable to international claims in general, and if states are permitted to espouse claims of non-national in space activities, it might establish a precedent for general modification of international claims procedures. A provision authorizing a state in whose territory the damage occurred to present claims for residents, whether or not nationals, could result in presenting claims for nationals of states not parties to the convention. Such a result would doubtless be favored by some, but it might tend to reduce the incentive to become a party to the agreement under negotiation.

There remains the situation in which the damage occurs in the territory of the responsible state or states. In these cases states whose nationals suffer damage would presumably press the claims, since it would be illogical to have the state responsible for the damages press claims against itself. An alternative would allow resident nationals of other states to sue, which would presumably bring the claim into domestic law.

Allowing a state of residence as well as a state of nationality to represent an injured party in international claims raises a possibility of conflict over the right of representation which, under traditional rules, could arise only over dual nationals. This difficulty could be eliminated by assigning priorities to states that

could be waived in favor of another state or by providing that only one state, presumably the one where the injury occurs, could represent all the injured parties, regardless of nationality or residence. The state where the injury occurs will normally be in the best position to make investigations and will also be in a position to present the claims as a group, thus minimizing costs of investigation and adjudication.

It seems unlikely that the state where the damage occurred would refuse to represent a damaged alien,⁹¹ although a provision might be included in the treaty which would authorize the state whose national is injured to make application to the state in whose territory the damage occurred to represent the injured national or, this failing, to demand that the state where the damage occurred compensate the injured national. Since legal systems, styles, and standards differ, it is unlikely that many countries will be willing immediately to give up the long-established right to represent their nationals in international claims.

There are strong arguments based on practical aspects of world politics and firmly established tradition against curtailing the right of a state to espouse the claims of its nationals, in spite of technical advantages which might be gained by a different rule. It is suggested that the state of nationality retain the primary right to present claims for its nationals. This right may be waived in favor of the state of residence or the state where the damage occurred.

Respondents

In theory it is comparatively easy to ascertain what or who has suffered damages although, as has been shown above, it may be difficult in international law to determine which state will prosecute the claim if there is a departure from the traditional rule of nationality. It is equally difficult to determine who is to share the liability where more than one party or state has participated in the activity which caused the damage. Subject to identification of ownership or control of the causative activity, several basic questions must be resolved. Can states participating in multinational projects or international organizations, public or private, engaging in activities in space be held individually liable for injuries under international law? What should be the distribution of liability when more than one state participates in an activity causing damage? Can individuals or national nongovernmental entities be held liable under international law? Should sources other than the specific parties or states engaging in activities which cause damage be looked to for compensation?

Individuals and Intra-national Organizations

The classic concept that only states may be parties to international litigation applies equally to respondents and claimants.⁹² For the foreseeable future governments will sponsor or closely control significant space activities. Intelsat, a mixed private and government enterprise, is closely controlled by governments of the

participating countries, including the United States, whereas organizations such as the European Launcher Development Organization (ELDO) are intergovernmental institutions. Organizations such as the Committee on Space Research (COSPAR) of the International Council of Scientific Unions (ICSU) may be considered private institutions engaged in space activities, but they are for the most part controlled, financed, and otherwise supported by governments to such an extent that it may be argued that they are quasi-governmental or only quasi-private entities. The present extensive involvement of governments in space activities provides substantial justification for accepting the concept of state liability for all injuries arising out of space activities.

Objectives of the payment of compensation for damages are the quick and peaceful resolution of international disputes and the humanitarian concept of reimbursing victims for injury they could not avoid by any amount of diligence and care. These aspects of the problem provide an additional justification for placing liability on states, which are more likely to be able to respond fully in damages than are nongovernmental entities.

Distribution of Liability Among Multiple
Respondent States

Many nations and various "private" and public entities are participating in space activities, usually with the United States or Russia providing the launch capability. Russian cooperative efforts have, of course, been limited to governments. In addition to ad hoc

multilateral projects, international organizations have been established for the purpose of engaging in continuing space activities beyond the resources of individual members. Multilateral endeavors raise questions about the responsibility of participants, individually or collectively, or of the organization as an entity, whether or not it constitutes a formal international organization with a juridical existence of its own.

Participation in Space Projects

In discussions of the amount of participation required to affix liability, vague phrases have been used, such as, "a State undertaking activities in outer space"⁹⁴ or "States...responsible for the launching of space vehicles."⁹⁵ A United Nations resolution⁹⁶ and the Treaty on Principles were more specific, stating that "each state which launches or procures the launching of an object into outer space, and each state from whose territory or facility an object is launched, is internationally liable...." Subsequent discussions reflect continuing efforts to clarify positions and also differences of opinion.

A revised Belgian draft defined launching state to include all participants in the activity and made launching states jointly liable.⁹⁷ Revised United States proposals suggested that the launching state be liable and defined the term to include a state which "procures the launching" or "whose territory or facility is used in such launching,"⁹⁸ or which "exercises control over the orbit or trajectory of an object."⁹⁹

Where several states are liable, each state was to be liable to the claimant in the full amount.¹⁰⁰ A third United States revision included an attempt to spell out in precise terms what was intended by joint and several liability: "If under this convention more than one launching State would be liable the Presenting State may proceed against any or all such States individually or jointly for the total amount of damages, and once the amount of liability is agreed upon or otherwise established, each such State proceeded against shall be liable to pay that amount provided that, in no event shall the aggregate of the compensation paid exceed the amount which would be payable under this convention if only one Respondent State were liable."¹⁰¹

The Hungarian revised proposal,¹⁰² also proposed "joint and several liability forⁿ "all the States participating in the undertaking or the State from whose territory or from whose facilities the launching was made, or the State which owns or possesses the space vehicles or object causing the damage." The Hungarian draft would also make international organizations liable, but one Hungarian writer disagreed with his government's official position and suggested using¹⁰³ the single characteristic of territory to define the liable state.

The Rumanian representative questioned the territorial approach because of the problem raised by international organizations which have no territory and because of the possibility of launches from territory not a part of any state.¹⁰⁴

Some progress in the negotiations was made by the end of 1965,
and the Legal Subcommittee ¹⁰⁵ reported that where only one state
was involved in launching, that state should be liable, and that the
term "launching" included attempted launching. With reference to
joint launching involving two or more states, items discussed
included territory and facilities for launching a space object;
control, possession and procurement of launching; participating in
the launching; and registration (international or national) of a
space object. The Treaty of Principles, article VI, makes states and
the international organization responsible for activities of the
international organization. Joint and several responsibility is
apparently intended although not detailed.

In those situations where only states are involved in a space
activity there is no legal problem in having a single respondent to
answer the claim or claims arising from a given incident. Unless
the participants have registered the activity and designated a state
to which all claims should be presented, a claimant state should be
permitted to present its claim to any participant state. Even if the
participating states have designated one state to handle claims, it would
seem that a claimant state should not be bound and should be permitted
at its discretion to present its claim to a different state. However,
reasonable arguments based on uniformity of procedure and economy can
be made in favor of requiring a claimant state to honor a designation
made by a group of states participating jointly in a space activity. ¹⁰⁶

The Vienna Convention on Civil Liability for Nuclear Damage ¹⁰⁷
 provides that the operator of the nuclear plant is always liable. ¹⁰⁸
 The nearest equivalent position for claims arising from activities in
 space would presumably be to assign liability to the state control-
 ling the activity. But practical and technical factors may make it
 difficult, if not impossible, to identify the controlling state in the
 absence of that state volunteering information; and it is questionable
 if a long-dead satellite or a fragment can be said to be under anyone's
 control.

An alternative might be to assign liability to the state from
 whose territory or facility the launch was made. This appears to be the
 theory followed in the Treaty on Principles in article VII, although article VIII
 refers to retention of jurisdiction and control by a state "on whose
 registry" an object is launched.

The claimant should not have the burden of identifying relation-
 only
 ships which may be known/ to the participants. Consequently, the
 definitions of participants who may be respondents must be wide, and
 a claimant should be allowed to present a claim to any identifiable
 participant. A claimant should be required to make only one presentation.

If a claimant is allowed to present its claim to any state parti-
 cipating in a space activity resulting in injury, any participant
 which may be called upon to contribute to compensation awarded should
 be allowed to participate in the defense, although there should be
 only one action.

Whether a claimant is bound to present a claim to a designated respondent or may select one of several joint participants does not control arrangements which the participants in the activity may make among themselves for sharing the cost of reimbursing claimants.¹⁰⁹

Extensive discussions in the United Nations reflect a variety of ideas, but no final decision, about how best to resolve the complex questions related to responding to a claim for damages.¹¹⁰

Most academic commentators in Western countries seem to prefer that apportionment of liability among participants in an activity in space be left to individual agreements;¹¹¹ whereas at least some of the Communist countries suggest that the general agreement on liability should give a right to demand contribution among participants in an activity,¹¹² but allow the claimant to go against any participant.¹¹³ Another variation suggested would permit the respondent making payment to demand contributions to the absence of an agreement on the point among the participants.¹¹⁴

Sources of Compensation Other than the Particular Respondent

International Organizations

The status of international organizations as claimants or respondents in international litigation has been touched on previously and is, of course, the subject of considerable literature. Terms of agreements establishing international organizations are controlling for the parties to the agreements; and the questions considered here include whether agreements relating to activities in space should accord international

organizations such juridical status as to permit them to be parties to international claims without at the same time making the member states parties.

Prior to the space treaty signed January 27, 1967, discussions in the United Nations had explored, but not resolved, the problem; the report of the Legal Subcommittee¹¹⁵ indicated only the agreement that international organizations should be liable. It is not clear how the responsibility will be enforced because no reference is made about parties to litigation. The Soviets would probably use diplomatic representation to member states. In the UN negotiations for a treaty on liability several countries appeared to favor immediate joint and several liability of the organization and its member states,¹¹⁶ and a Belgian revision¹¹⁷ provided that "the states members of ... [an] international organization shall be held jointly liable for the obligation of the latter...." A United States draft¹¹⁸ provided a delay of one year before a claimant state could commence action against a contracting state, a member of a defaulting international organization. The year's waiting period is probably longer than necessary, and the Russian delegate suggested that the American draft did not provide for liability of a state which was a member of the international organization in question but not a party to the convention.¹¹⁹ However, the British representative argued that this was in accord with the sovereign acceptance of individual treaties by states.¹²⁰

It seems doubtful that it would be appropriate under international law to attempt, by a convention such as is contemplated for liability arising from space activities, to bind a nonsignatory state to its terms by such indirect means. If the state were not a signatory it would be a valid assumption that it was not interested in the convention or objected to its terms, and the objections would not be lessened by such indirection. Few states would ordinarily consider themselves bound by a treaty to which they were not a party. The Austrian representative questioned if even under the United States draft, the inter alios acta defense could be utilized by a signatory state.¹²¹ This argument hardly seems valid since parties to the convention would bind themselves to compensate injured parties if the international organization of which they were a member did not.¹²² The Treaty on Principles makes international organizations "and" its member states responsible, however. The intent is probably to make the liability joint and several, and by its terms the treaty is probably not intended to apply to nonsignatories.

The better arguments and precedents tend to favor making members of international organizations liable only if the organization defaults, although the terms of the Treaty on Principles may be a controlling precedent to the contrary.¹²³ Other workable regimes can be devised, and ultimately decisions about the juridical status of international organizations in general will have a part in the

final solution--which may be a number of years in the future. There should be substantial inducement for member states to agree in advance about the distribution of liability and to make provisions to enable an international organization to discharge its responsibilities promptly. A claimant should find the claims procedure simple, ¹²⁴ and in the ordinary course of affairs the individual member states should not have the burden of negotiating a claim as respondents where the action had been by an international organization, ¹²⁵ To provide otherwise could set precedents for other organizations, including the United Nations, and this has doubtless contributed to some of the discussions in the United Nations. ¹²⁶

Despite the detailed discussion of these problems during the extensive United Nations negotiations on liability, the Treaty on Principles signed January 27, 1967, contains only one very general article, article VII, providing that States "that launch or procure the launching... and each State--from whose territory of facility an object is launched, is internationally liable for damage," and another, article VI, on the broad responsibilities of States for all national activities in outer space, whether conducted by states, non-governmental entities, or international organizations. Article VI must be read in conjunction with all other operative provisions of the treaty, including article VII, and thus the liability for damages, which are not defined, is quite broad. Neither article VI nor article VII establish any machinery for the resolution of claims disputes;

this would be left to customary claims procedures under international law, including the International Court of Justice, existing or ad hoc arbitration arrangements, and diplomatic negotiations.

Sources of Compensation Other than from a Party
Engaged in Space Activities
made

Numerous suggestions have been/for providing compensation for damages from sources other than the identifiable participants in the space activity causing the damage. An international insurance or guarantee fund has been mentioned frequently.¹²⁷ Justification for establishing a fund is difficult in situations where there is an appropriate identifiable source from which to collect compensation. Questions of unwillingness, justified or not, to pay compensation will not be resolved by asking for payments before rather than after damage takes place,¹²⁸ although some authors have combined optimistic idealism with realism in a somewhat illogical manner on this subject.¹²⁹ Moral and international legal justifications for creating such a fund are no more compelling here than in any other area of liability, and the expense and effort of maintaining such a fund should be taken into consideration.¹³⁰ Suggestions have also been made that "each State should create a guaranty fund or otherwise obligate itself to compensate its nationals suffering damage from space vehicles up to a fixed minimum amount for each incident. Perhaps the Rome Convention limits should, for uniformity, be applied. In addition all States which are parties to the convention should agree to be subject to the compulsory jurisdiction of the International Court of Justice so that the State of the national

suffering damage on the surface or in the airspace could proceed against the launching State or States, jointly or severally to recover: a) by recouping the amount already paid by the complaining State to its nationals; b) such additional amount for the benefit of its nationals suffering damage as may be required for full compensation to cover the damage suffered; and c) such damage as the complaining State itself may have suffered. It is difficult now to fix any maximum amount to which the liability of the launching State or States ought to be limited. . . ." ¹³¹ Where damage results from an unidentified activity in space, an international fund would be the only non-national source of compensation: Cooper has observed that the plan he put forward at Stockholm in 1960 could easily be modified to provide for national compensation for damage from unidentified sources. ¹³²

If contingency funds are to be established, there is equal or greater justification for including damages from all unidentified sources and natural phenomena such as floods, earthquakes, etc. In the United States, at least, damage from any cause beyond the local capacity to handle is of immediate concern to state and national authorities and to voluntary organizations such as the Red Cross. Establishment of special funds for damage from space activities away from the vicinity of the launching site might tend to exaggerate the risks involved and give rise to unwarranted fears. Although the possibility of a catastrophic accident across national boundaries cannot be arbitrarily dismissed, experience thus far--the Apollo

accident and the Soviet loss to the contrary notwithstanding--indicates the probabilities of such an incident are very low. 133

Consequently, it can be questioned if the difficulty, cost, and complexity of establishing and administering such special insurance fund are justified at the present time. In the event the Treaty on Principles has not adopted any fund as a source of payment but places the obligation directly on states, and through article VI, on international organizations.

Some of the occurrences resulting from activities in space that may give rise to international claims have now been surveyed and related to the identification of claimants and respondents. Although the injured party may be a natural person and the party causing the injury may be only a quasi-governmental entity, states probably will ordinarily be the parties to litigation or negotiations. This traditional rule is implicit in the Treaty on Principles but could be modified by subsequent agreement. States will, for the time being, be the source of payment of compensation, although possibly the negotiators will devise a formula under which international organizations will be made initially responsible for payments for injuries which their activities have caused.

As has been shown, the probabilities are that there will be few international claims resulting from activities in space. Nevertheless, international accommodations in this area have a tendency to remove or at least to minimize a source of potential conflict.

Forum and Procedures for Presenting Claims

The dramatic nature of activities in space and the use of space activities for propaganda have led many to believe in the need for special procedures and tribunals to handle claims arising from activities in space, although there have been no claims to adjudicate thus far. Article III of the Treaty on Principles contains only the general mandate that space activities are to be carried on "in accordance with international law, including the Charter of the United Nations ^{U.N.}" Customary diplomatic negotiations between governments and arbitration pursuant to existing or ad hoc agreements are always available and the International Court is open to those nations accepting its jurisdiction.

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The Forum

The selection of a forum, not referred to in the Treaty on Principles, for consideration of claims arising from activities in space presents no legal problems markedly different from general international claims law, and usually damage will have occurred in the territory of the state presenting the claim. Several writers have suggested that nations should agree to submit all claims arising from space activities to an established tribunal, with the International Court of Justice being most frequently mentioned. Justification for a single forum has been based on the supposed expertise which would develop and the uniformity of decisions which might be expected. But, it is doubtful that nations, including the United States and the Soviet Union, which have steadfastly refused to accept mandatory juris-

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diction of the World Court generally will make an exception for liability cases arising out of activities in space.¹³⁶ And as previously indicated, the number of cases to be adjudicated is likely to be so small that the cost of a permanent establishment specifically for space claims cannot be justified, nor can the development of great expertise be expected.¹³⁷

Discussions in the United Nations indicated a willingness to allow the parties to a damage claim to adopt any peaceful procedure they find suitable for resolving the dispute, without recourse to formal international arbitration or litigation.¹³⁸ Since states will usually be the parties in claims proceedings, it would be inconsistent with normal concepts of state sovereignty to give jurisdiction to national courts, which was done in the nuclear liability and third-party aircraft-liability conventions. There it was anticipated that respondents would be other than states or if states, they would be operating through a proprietary corporation or similar instrumentality.

The Communist nations and some others have not favored arrangements that would result in compulsory jurisdiction and conclusive judgment,¹³⁹ whereas most of the Western nations have proposed procedures which would.¹⁴⁰ In essence, the Communists favor continuation of argument with no possibility of a conclusive answer unless by unanimous consent even in an arbitral commission, their standard approach to all arbitration. An arbitral tribunal should be judicially independent, but unfortunately all too many arbitrators consider themselves partisans whose

responsibility is to support a principal's position. The result frequently is that the only impartial member of a three-man tribunal will be the chairman appointed by an outside authority or selected by the two partisan members. It is doubtful that the Communist nations will abandon their historic opposition to international tribunals having mandatory jurisdiction to issue binding decisions. Also, even if most nations were willing to give the World Court or some other international tribunal compulsory jurisdiction to issue final judgments, the Connally reservation might present problems for the United States.¹⁴¹ Procedural provisions, such as the right to refer a "dispute" to the Court of International Justice included in an early United States draft, in addition to raising jurisdictional questions, are subject to abuse as a delaying tactic.¹⁴²

Situs of Proceedings

The geographic location of proceedings to resolve claims arising out of activities in space has received comparatively little attention, although it may have some political and economic as well as legal implications for claimant and respondent.¹⁴³ If provisions for ad hoc arbitral tribunals or panels drawn from membership of the World Court are established, there might be little justification for having all adjudications heard in one location. Selection of the location for the proceedings might be left to the parties to each controversy, which is the situation under the Treaty on Principles.

Injured parties, witnesses, and evidence will for the most part be

located in the immediate vicinity of the incident causing the damages. Thus, there are practical advantages in holding the proceedings in the territory of the claimant state, but it can be argued that they should be held on neutral territory. If the theory of absolute liability is accepted, questions of negligence, for which the evidence would probably be in the territory of the respondent, will not require adjudication. Absolute liability has generally been favored by all nations, subject to some minor exceptions, and is the rule included in the Treaty on Principles.

If the proceedings are held in the territory of the claimant state, it would be comparatively simple under municipal law to provide a method for the compulsory attendance of most of the necessary witnesses. Compulsory attendance across international borders can be accomplished, but it is considerably more troublesome. Since the award of compensation will be based primarily on the presentation of the claimant state, it should not be necessary to require that state to make information available, as it must do if it wishes to recover. Having made a claim and presented some evidence the claimant state should then be required to submit all pertinent evidence. There is little basis for requiring that claimants go to the territory of respondents who may not be fully identified ¹⁴⁴ except during the course of the adjudication. The claimant however, might be given the option of having the proceedings held in the territory of a known respondent, or at some other location agreed upon at the time, which is the procedure in the absence of a treaty.

The Proper Law

Vexing conflict of law problems will be presented unless there is an advance agreement identifying the law to be applied in resolving claims. ¹⁴⁵ The Treaty on Principles gives no guidance. Jurisdictional questions will probably be resolved on the basis of a general convention on space liability of the type under negotiation in the United Nations in 1965-67 or on the basis of some other agreement; general or ad hoc, entered into before a claim is submitted to a tribunal. Theories of liability without fault will, at least for the present, be applied, thus eliminating the extremely difficult, if not impossible, task of determining questions of negligence and due care. The question of causation will remain. When liability has been established, the amount of compensation to be paid will have to be determined. There is, however, a risk that any detailed rules presently formulated and based on existing technological information may become outmoded at any time or may encounter strong opposition by one or more countries. ¹⁴⁶

Consistent with the concept that law relating to activities in space is a part of international law and that codification should be approached slowly, the United States has supported the view that the measure of liability should be determined in accordance with applicable principles of international law, justice, and equity. ¹⁴⁷ Use of international law for general guidance was both supported ¹⁴⁸ and objected to by other states. ¹⁴⁹ Suggestions have been made that the law of the claimant state should be utilized, ¹⁵⁰ but adoption of such a rule

would not contribute to uniformity of results.¹⁵¹ The possibility
of utilizing the law of the respondent state has been mentioned,¹⁵²
but objections have been encountered.¹⁵³

Comparatively little attention has been given to the possibility
of setting forth in a convention the detailed rules of law. In few,
if any, areas of the international law of claims has a detailed code
been adopted, although the Conventions on Damage Caused by Foreign
Aircraft to Third Parties on the Surface¹⁵⁴ gives jurisdiction to the
courts of the country where the damage occurred,¹⁵⁵ limits the amount
of liability,¹⁵⁶ establishes periods of limitation, and provides
some additional guide lines.¹⁵⁷ The Vienna Convention on Civil
Liability of Nuclear Damage also limits liability and periods of
limitation¹⁵⁸ while providing that, subject to the provisions of the
convention, "the nature, form and extent of the compensation, as well
as the equitable distribution thereof, shall be governed by the law of
the competent court," which is generally "the courts of the Contracting
Party within whose territory the nuclear incident occurred."¹⁵⁹ The
Harvard Draft Convention on International Responsibility of States for
Injuries to Aliens provides that "responsibility is to be determined
according to this Convention; and international law..." makes refer-
ence to the Statute of the International Court of Justice, and stipu-
lates that "a State cannot avoid international responsibility by in-
voking responsibility by invoking its municipal law."¹⁶⁰ Treaties
give the parties to a controversy an option of choosing the law to be

applied, and it is not unusual to utilize both international and
 municipal law. ¹⁶¹ Most countries, including the United States, ¹⁶²
 recognize and accept international law as a part of the law to be
 enforced by their national courts, and so far as the international
 relations of the state are concerned, international law is superior. ¹⁶³

Analogies have been suggested for guidance, with air law most
 frequently mentioned, ¹⁶⁴ but the laws of the sea, of nuclear damage, ¹⁶⁵
 and of enterprise liability ¹⁶⁶ have also been suggested.

To avoid disputes at the time of an actual incident, a treaty
 adopted should permit the parties to agree on the application of
 any regime of law they choose, whether it is the law of one of the
 parties or "international law" or a specially devised regime. The treaty,
 however, should identify the proper law to be applied if the parties do
 not agree on another within a limited time.

For those areas for which it is not feasible to provide rules in a
 treaty, it is suggested that the claimant state be allowed to utilize
 the claims laws of both the claimant and respondent states to supplement
 international law. Where there are conflicts in the laws of claimant
 and respondent, the claimant should be allowed to utilize the law most
 favorable to him. Interpretation of the law of the respondent state
 should probably be by that state, and for the sake of uniformity where
 federal and local law exist, as in the United States, only the federal
 tort law should be considered. ¹⁶⁷ A respondent can hardly complain if
 his own law is used, and he will be protected against any unjust law of

a claimant by the requirement that only the general claims law and not special law be used and also by the limitations and rules set forth in a treaty to which both parties have agreed. Although some claims have been resolved by application of "general principles of international law", there does not, as previously noted, exist a body of international law with precise rules which give adequate guides by which to determine causation and measure of damages. National law is almost invariably relied upon heavily in the preparation of claims for international presentation.

If utilization of the laws of the claimant and respondent is politically unacceptable, international law should be utilized. This would provide flexibility for technological development and would contribute, to the extent that there are cases, to the development of international law adapted to the requirements of activities in space.

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If article III of the Treaty on Principles is interpreted as applying international law to damage claims, however, it should be recognized that arbiters will utilize their own national law to a considerable extent in determining what they think international law is or should be. It would have been helpful had the Treaty on Principles indicated whether or not there should be compensation for items such as interest from the time of the incident, consequential damages, costs of prosecuting the claim, pain and suffering, invasion of privacy, and simple trespass without injury. These problems can be treated in ad hoc arrangements if and when claims arise, but it would

be well to have agreement in advance.

Methods of Presentment

Methods of presentment of claims need not and should not differ appreciably from methods used in other international claims. Significant questions involve (1) time limitations, (2) channels for presenting claims, (3) availability of remedies other than those provided by treaties, with requirements for efforts at settlement by negotiation prior to recourse to treaty machinery, and (4) necessity for joinder of actions.

Time of Presentment

The objective should be prompt resolution of disputes without imposing penalties for delays outside the ability of the parties to prevent. Reasonable time must be given in which to ascertain facts and prepare necessary documents. A year¹⁶⁹ or two years¹⁷⁰ has been suggested as the time within which to commence action after damage is or should be known,¹⁷¹ but this has been criticized as being too short, particularly if it includes damage from nuclear radiation.¹⁷² Difficulty in identifying the responsible party must also be taken into consideration.¹⁷³ It is apparent that time limitations should be fairly generous if concurrence of many nations to the treaty is to be obtained.

The possibility of nuclear radiation damage presents such long-term special problems that it has been suggested that a general convention on liability for space activities should exclude such damages,¹⁷⁴

and unless fairly extensive provisions for radiation damage are included, this seems to be a reasonable solution. Four major conventions on nuclear liability have been prepared,¹⁷⁵ and while none of them specifically purport to cover space activities, the Vienna Convention rules could be used, although it may be desired to give jurisdiction to a tribunal established in a space activities liability convention, rather than to the courts of the state in which the damage occurred, as in the Vienna Convention. Otherwise, two unrelated tribunals would be adjudicating different aspects of the same occurrence.

The comparatively short limits suitable for ordinary damage are unsuitable for radiation damage.¹⁷⁶ Damage from unidentified man-made space objects is unlikely to be paid, unless an insurance-type arrangement can be established. This seems improbable on an international basis. A prolonged limitations period would substitute a long period of uncertainty for the probability of prompt settlement of disputes. Financially, this is not as significant to states as to private interests, but it might constitute a continuing source of political friction.

Identification of the proper respondent will become increasingly difficult, and sometimes impossible, as more nations engage in space activity and as increasing numbers of man-made objects orbit the earth.

Consequently, assuming that radiation damage is separately provided for, it would seem that a two-year period of limitation from the time of the occurrence or a year from the time of identification of the respondent, which ever is shorter, is a reasonable formula. A space power, by notifying a claimant of its responsibility, could limit to not much over one year the normal period during which the claimant would have to commence action. A respondent should be obliged to reply promptly; failure to reply should constitute an acknowledgment of participation in the activity in question. The problems of causation of and measure of damage remain to be resolved after the identity of the space activity is established.

The Channels for Presenting Claims

Since it is generally accepted that states are liable for damages resulting from activities in space, it follows that claims should initially be presented through diplomatic channels ¹⁷⁷ by the claimant state or by a third state if there are no diplomatic relations between claimant and respondent. If the respondent state is willing, the actual party suffering the loss might be permitted to submit a claim directly to the respondent, ¹⁷⁸ although some claimant states might object to such procedure since a recovery in foreign exchange might escape control. The Communist nations would probably object on principle. It could also be argued that a respondent state might take advantage of a private claimant. Barring an express agreement to the contrary, diplomatic channels not only should but will be used to make the initial contact in all normal cases, and private parties will seldom be directly involved in the negotiations.

The Pursuit of Alternate Remedies

The basic concept of state-to-state claims renders recourse to national judicial systems inappropriate except by special agreement

between the parties.¹⁷⁹ The customary rule of international law requiring exhaustion of local remedies¹⁸⁰ by injured parties before sponsorship by governments can give rise to delays and other abuses, although it eliminates most small claims. The cost of prosecuting an international claim will, in most instances, deter the presentation of inconsequential claims by states when local remedies are not first used. Activities in space present a different factual situation than in more familiar international claims, where most frequently the injury is to a foreigner or foreign interests within the geographic limits of the respondent state. In other instances, claims may arise out of contract or aerial or maritime collisions, which are for the most part covered by some form of treaty provision.

The simplest possible procedure is obviously desirable. There is inadequate justification to require parties to a claims dispute either to follow a fixed procedure or to require them to exhaust other remedies before resorting to a tribunal constituted in accordance with treaty provisions. If the parties have agreed expressly or by clear implication and actions to be bound by an alternative method, they should obviously follow through. Use of procedures provided by treaty should be available on a compulsory basis if alternative[#] methods, including direct negotiations between the parties,

are unsuccessful or are making little or no progress. Pursuit of a claim through two or more channels at one time should not be permitted. Initiation of alternative procedures should not be allowed to extend the time to institute action in accordance with the terms of the proposed space liability treaty. Neither should use of the treaty provisions be permitted to harass the respondent.

The Joinder of Actions

An objective of any procedure for the resolution of claims is to consolidate actions and parties so that there will be a single action for each incident resulting in damage. Ideally, all claims from a single incident should be handled in a single adjudication with all claimants represented by one state and all respondents represented

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by another. The claimant state would distribute the award in accordance with the decision of the tribunal, and the respondent state would receive contributions in accordance with such arrangements as had been made by the participants in the space activity causing the damage.

What constitutes a single incident is open to argument. If a space vehicle breaks up and pieces fall in widely scattered areas, perhaps in several states and over a period of several days or even weeks, it seems doubtful that the resulting damages should be considered as having arisen from a single incident. If an adjudication utilized some parts of the domestic law of claimant states, the applicable law would be different; and even if the adjudication utilized international

law, it must be recognized that in the area of claims different states have different views about what constitutes international law.

In those instances where several states have engaged in a joint venture or where two unrelated space activities have together caused damage in one place at one time, the claimant or claimants should be able to recover in a single action. If a rule of law permitting the claimants to take advantage of favorable provisions in the respondent's law is adopted, the claimants should be permitted to utilize the law of the respondent states.¹⁸³

Some may argue, however, that this gives the claimant undue advantage. A single regime of law, theoretically available if rules of international law only are applied, appeals strongly in its simplicity of joinder of actions and its encouragement in developing international law, but there will probably not be a sufficient number of cases to make this a significant advantage. Insistence on combining actions and parties where there is no common evidence and general mutuality of interests could result in confusion, extra expense, and delays-- if not a denial of justice. Where the interests of the claimants and respondents do not coincide, the interests of the claimants

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should receive preference. If procedures are adopted requiring joinder of actions and of parties even as to the "same event" narrowly construed, it will be essential that appropriate rules be established to protect the interests of each of the claimant and respondent states. Appointment of arbiters would require joint action, and any consent or compromise settlements would require the approval of each concerned party. Few states will be willing to commit themselves in advance to allow an

unknown state to represent them as either claimant or respondent without being assured of a voice in the appointment of the arbiters and in the conduct of the litigation, ¹⁸⁵ which would include presentation of evidence and arguments.

A "single incident" should include only the damage and injury resulting from a single piece of falling debris or a group of pieces falling within a comparatively short period in the same general locality and within the borders of one state. Actions for incidents involving the territory of more than one state could be joined by agreement of the claimants and respondents. This is considered necessary since, even under Article III of the Treaty on Principles, states will have substantially differing views over the content of the rules of international law under which states are to carry on activities in space.

Substantive Principles of Law for the Resolution of Claims

Substantive rules of law may be determined by selecting an already existing regime of law, international or national, by prescribing a fairly detailed code of law by treaty, or by leaving the determination to the tribunals hearing the claims. The Treaty on Principles applies international law to activities in space with almost no specific guidelines. Although it is desirable to provide as much guidance by treaty as can be agreed upon, there are substantive questions involving a mixture of law and fact-- such as man-made causation, national identification, ¹⁸⁶ and measure of damages-- about which prior detailed agreements would be difficult

to achieve. Some of the difficulties arise from political factors involving the world community, but a substantial problem arises from the necessity to keep rules flexible enough to allow for technological advances. It is desirable to establish simple and automatic procedures to accomplish periodic revisions of the substantive rules or to give the tribunal substantial authority to devise its own rules.

The Investigation of Claims

Parties to a claims case and the adjudicating authority must have access to the information necessary to make a determination and a basis on which to determine where the burden of proof lies.

Scope of Space Activity

It must be agreed what constitutes "space activity," from which claims for damages should be covered. The definition may be narrow, encompassing only damage done by the space vehicle,¹⁸⁷ or it may be expanded to include all related activities connected with launching,¹⁸⁸ orbiting, and landing or retrieval. It may be included in a treaty or be left to subsequent adjudication, as was done in the Treaty on Principles, although the terminology used seems to contemplate a fairly restrictive¹⁸⁹ definition.

If a convention on liability is to accomplish the desired purposes of minimizing the risk of international friction from space-connected mishaps and of compensating injured parties, however, "space activity" should be defined and interpreted broadly to encompass all international claims arising from damages caused by a space vehicle or fragments and by

other activities so closely related thereto as to be a part of the same activity. Fueling a booster would fall within this definition. Efforts to retrieve a space capsule which had just landed could be considered a part of the space activity. If the activity resulting in injury is closely related to the space activity proper it should not matter whether the damage is caused by a space vehicle itself or whether outer space is reached. Unless covered by other arrangements, the mechanisms established by a convention should be available for handling international claims from mishaps involving surface or air transportation of space-vehicle components, including fuel. In most such instances, however, special arrangements on liability can and should be made in connection with obtaining permission of the host country for passage through its territory, unless the states concerned wish to include such matters under a multilateral space liability convention.

Causation

Even if a broader definition of space activities were adopted, the first task of a tribunal charged with responsibility for handling claims will be to ascertain whether the alleged damage has been caused by a "space activity." This primarily factual question will require access to the situs of the damage for investigation. The unsupported assertion of a claimant is unlikely to be accepted. ¹⁹⁰ The situs of the damage should be blocked off to keep out souvenir hunters and other unauthorized persons. The claimant should be required to return to the respondent, as soon as they have served the needs of the tribunal, the space vehicle or fragments

which caused damage. Unnecessary delay in accomplishing this might raise questions about the validity of the claim,¹⁹¹ and timely access to the situs by the tribunal and respondent could appropriately be made a condition precedent to pursuit of the claim. Such a rule would raise the issue of inspection, which has been a continual stumbling block in negotiations involving Communist territory.¹⁹² Possibly, however, the Communist nations will in most instances permit access to and inspection of the damage situs, since the situs would not per se be a sensitive security area. Inclusion of a provision requiring access should not prevent Communist nations from being parties to a convention since they could, by forfeiting their claim, forbid access.

Assuming that the claimant has control of the situs, the burden should be on the claimant to establish that a space activity caused the damage although the respondent should cooperate in good faith by providing available information to assist in identifying the cause of the damage. Where fragments or residue of any kind are recovered, it may be comparatively easy to establish that the damage was caused by a space activity; but in the absence of tangible items, the proof may require lengthy and intricate computations of the trajectories and orbital paths of a number of space launchings and even then the results may be inconclusive. The technical problems are such that until additional experience has been acquired it would be unwise to formulate detailed rules of evidence in excess of placing a burden on the claimant to

establish, with cooperation of the probable respondent or respondents, that a space activity of the respondent caused the damage.

Identification of Respondents

Evidence to establish the identity of the originator of the activity may be available only in the records of the originator. Such information consists of data relative to the metallic composition, structure, and orbit of space objects. Space powers could simplify the problem of identification of spacecraft and components by including a signature or identifying trace element in the metallic components of the spacecraft. A United Nations resolution ¹⁹³ has called upon states "launching objects into orbit or beyond to furnish information promptly to the Committee on the Peaceful Uses of Outer Space, through the Secretary-General for the registration of launchings." Most nations have periodically registered their space activities, although no real enforcement machinery exists. Proposals for the space liability convention have included references to registration, ¹⁹⁴ but the discussion ¹⁹⁵ made it clear that failure to register could not be utilized as a device to avoid liability. Article XI of the Treaty on Principles requires reporting space activities to the greatest extent feasible and practical. Registration could be one helpful element in making identification of space activities, but it would obviously be unsatisfactory to place exclusive reliance on it since, even if mandatory, there would be no assurance that all states would observe a rule requiring registration any more than they would observe one requiring use of designated trace elements.

Shifting the burden to require the respondent to disprove that its space activity caused the claimant's loss has also been considered. But such a procedure is unrealistic and unworkable. A state desiring to conceal its own activities might use materials and designs pointing to another country that would have no way of disproving responsibility other than with self-serving denials.

Detection and identification methods may eventually be developed so that it will be technically impossible to conceal the identity of the state whose spacecraft causes damage, but at present it is probable that a state could deliberately render proof of identity impossible. Even with the fullest possible cooperation of all potential respondents, it may not be possible to establish the origin of a space-vehicle fragment which has been in orbit for a substantial period, or which cannot be identified as having come from the orbit of any particular space shot. In those instances where identification of the originator cannot be made, the claimant will be unable to recover unless some international fund or insurance is established or unless one of the space powers elects to make an ex gratia payment.

Extent of Damage and Measure of Compensation

A claimant must, in addition to establishing the identity of the state responsible for a space activity causing damage, prove the extent of damage and measure of compensation. The legal problems in this instance are similar to those involved in establishing the measure of compensation in any other international damage claim, subject to such provisions as may

be specified in applicable treaties. The relevant information for property damage will almost invariably be at the situs of the accident. Information relative to personal injuries or to death claims will also ordinarily be located at or near the situs, and the claimant should be required to grant access to maintain the claim. The burden of proof, as is customary, should be on the claimant.

Theories of Liability

The presentation of international claims arising out of activities in space will necessitate the selection and application of general theories of liability, subject to such modifications and exceptions as may be considered desirable.

The Principle of Absolute Liability

Discussions held under the aegis of the United Nations indicated a general acceptance of the position that liability for damage should be absolute and without the requirement of showing fault on the part of the respondent state.¹⁹⁶ Thus the United Nations has by resolution recommended absolute liability for space activities,¹⁹⁷ adopted in article VII of the Treaty on Principles. In some recent instances international air law appears to have adopted a rule of absolute liability.¹⁹⁸ Most nongovernmental authorities now support the absolute liability rule for space activities.¹⁹⁹

The Reasons for Absolute Liability

Arguments justifying and explaining absolute liability and limitations thereon are varied and sometimes conflicting. It has been argued

that automatic liability for space accident damage constitutes liability for intentionally caused damage,²⁰⁰ but it would seem preferable to save "intent" liability for situations where there is a conscious plan or design to injure. It has also been argued that, by analogy to pilotless aircraft, launching any spacecraft is illegal, thus carrying with such activity penalties in the form of liability for any damage done.²⁰¹ Part of the argument is based on the concept that the re-entry of a spacecraft violates the sovereignty of the subjacent state.

Another justification for absolute liability is that injured parties do not assume the risk which is foreseeable and controllable solely by those in charge of the space activity.²⁰² This argument is almost equally applicable to any complex activity of the modern industrial society, and if the authority in charge of the activity could in fact completely control it there would be no accidents and no damage. Another argument is that standards of care to assess fault in space activities have not been developed.²⁰³

It is also argued that the ultrahazardous nature of activities in space justifies and requires the application of absolute liability for any damages caused.²⁰⁴ But even the best definition of an ultrahazardous activity is vague.²⁰⁵ Aviation has apparently outgrown that appellation,²⁰⁶ although many

insurance policies continue to carry special exclusionary provisions for losses from certain types of activity in the air. Activities in space, whether or not ultrahazardous, have not yet resulted in international claims, although the theoretical potential for loss unquestionably exists. Justification for considering activities in space ultrahazardous comes from lack of knowledge of its dangers rather than from a record of damage-causing accidents.

It can hardly be argued that the very occurrence of an accident causing damage is unlawful and entails absolute liability or makes the activity ultrahazardous. "Unlawful," based on political concepts, ²⁰⁷ has also been applied to some space activities, but "unlawful" in this context is impossible to define ²⁰⁸ except on an arbitrary basis. Furthermore, the law of compensation for accidents should not be confused by the penal and political provisions, which have already given rise to considerable discussion and disagreement. ²⁰⁹ If a decision is made to include references to "unlawful" or "improper" activities in space in a convention on liability, it appears essential that great care be exercised in defining precisely what is meant, since the problems of conflicting interpretations between East and West are well known.

One of the stronger justifications for the principle of absolute liability, frequently argued in other areas of tort law,

is that it places the burden on the party best able to absorb the loss. ²¹⁰ Application of this argument for absolute liability assumes that the state responsible for the activity is in the best position to know the risks and since as a general rule only the wealthier states will engage in extensive space activity, to absorb the loss. To the extent that a state is not in a position to accept the risk of absolute liability, it may be deterred from space activity, which is consistent with the idea that a state engaging in space activities should bear the

²¹¹ full cost but it is not consistent with the concept that space activity is for the benefit of all mankind. In international law the loss is by the claimant state rather than by the damaged individual, and even if the claimant state pays over to the individual promptly sums received, traditional processes are almost invariably too slow to provide the injured individuals with emergency relief. ²¹² Thus, it is argued, the focal point is correctly on relations between states rather than on concern for individuals who must in any event look to their own states for emergency relief. Absolute liability will ensure that the claimant state is reimbursed for payments for damages caused by an identifiable space activity and, as between the states, it would seem more equitable to require the state initiating the activity to pay for the unanticipated consequences than to require a state with no connection with the activity to be burdened.

It is frequently argued that the imposition of absolute liability in international space law will reduce the number and severity of accidents.²¹³ However, the costs of space activities are so great that a very strong monetary inducement already exists to exercise the utmost care to avoid any accidents. National prestige for accomplishment and acceptance of space programs by nonspace powers are also deeply involved. From a realistic point of view it is doubtful that absolute liability rules will cause the space powers to exercise any greater care than they are now doing.²¹⁴ But, acceptance of the principle of absolute liability will, primarily for psychological reasons, contribute to the acceptance of space activities by nonspace powers. This is true even though proponents of space activities argue that mankind generally is the beneficiary and that nonspace powers should be willing to contribute to the cost these activities. Fault liability²¹⁵ for damages is almost the equivalent of no liability because of the extreme difficulty of proof.²¹⁶

Exceptions to the Principle of Absolute Liability

Sentiment favoring absolute liability for damages resulting from space activities is general and exceptions to the principle have been viewed with some skepticism.²¹⁷ None are expressed in the Treaty on Principles.

Contributory or Comparative Negligence

Drafts of conventions submitted for consideration in the United Nations negotiations have all suggested, in different language, some

exception for damage which would not have occurred but for the neg-
 218
 ligence of the injured party. Language used includes "a wilful
 act or from gross negligence," wholly or partially from a wilful
 or reckless act or omission," and "wilful misconduct." India and
 219
 the United Arab Republic have objected to any such exception.
 Others have, as noted previously, questioned the language used but
 have indicated sympathy with the concept.

An apportionment of damages for contributory negligence is ap-
 propriate. In some instances involving property damage, such an
 exception may supply a major motivation to the claimant state to
 avoid or minimize damage. Even for personal injuries and deaths, the
 contributory negligence exceptions may prove to be an inducement to
 some countries to take action to minimize the danger,²²⁰ or at least
 to refrain from submitting claims for losses which would not have
 occurred, except for the claimant's lack of care,²²¹

This exception, to be effective, obviously requires that the
 respondent state have access to pertinent information likely to be
 available only at the situs of the accident.

The degree of negligence required to make an exception to absolute
 liability would have to be spelled out, since no generally accepted
 guidelines exist in either national or international law. Ordinary or
 minor negligence is probably insufficient justification to invoke
 the exception. but reckless or willful disregard of safety will
 suffice.²²² It will be necessary to allow the tribunal considering

the claim discretion since, at best, the most precise definition possible will be one of degree and the burden of establishing contributory negligence would probably have to be on the respondent. A contributory negligence exception should cover only the increase in the amount of damage resulting from the negligence of the claimant and should not defeat the entire claim, although there has been some sentiment in favor of complete exoneration.²²³

Force Majeure

There has been no uniform view as to whether or not force majeure should exonerate a respondent whose spacecraft causes damage;²²⁴ the arguments are similar to those customarily raised in discussions of the subject in municipal law.²²⁵ No separate justification such as encouraging care on the part of either respondent or claimant exists, as in the case of contributory negligence. There are no clear precedents or either municipal or international law to follow.

In any subsequent negotiations, the final decision will be one of practical policy rather than of legal theory. As the concept of absolute liability has been accepted, it would seem that the space powers would and should be willing to forego the defense of force majeure. The adjudication of claims would be greatly simplified, and the space programs would carry this part of their costs to society.

Other-Party Interference

This point has many similarities to force majeure. Presumably, the respondent as well as the claimant is unable to do anything to

prevent the adverse consequence. And there has been no uniform view as to whether other-party interference should exonerate a respondent whose spacecraft causes damage. ²²⁶ Since the absolute liability theory is to be followed, with respect to damage caused to a third state as a result of the respondent's space activity which has been interfered with by second state, a claimant should be allowed to proceed against either state. In the absence of a showing of negligence, the respondent against whom the claim is presented might be permitted to collect proportionate share from the other state or states which were involved. Such other respondent state or states should be permitted to join the original respondent in the proceeding. If one of the respondents is able to establish negligence on the part of the other, then rules of contributory negligence should be applied to apportion the cost. This should not be a problem for the claimant who should be able to recover from any of the respondents without waiting for them to determine their respective degrees of responsibility.

A problem remains as to liability for spacecraft collisions or other damage involving the space activities of two or more states. Application of absolute liability without an exception will require that each state pay for the damage of the other. Such a result has frequently been criticized, ²²⁷ but it has been included in a U.S. proposal ²²⁸ with the suggestion that "it was better to formulate a clear and simple rule than to allow the unlikely possibility of a collision in

space to affect the statement of the principle of absolute liability." ²²⁹ Although consistency of policy may theoretically suffer, the simplest policy may be to let each party to a collision bear his own loss, except where negligence of the other party can be established.

We conclude, therefore, that provision should be made for absolute liability, subject only to the exception of contributory negligence of a willful variety on the part of a claimant and in the case of one space activity causing damage to another space activity. ²³⁰

Types of Damage and Amount of Compensation

After it has been determined that the respondent's space activity has caused damage for which he is liable, the issues remaining are the elements of damage covered and the amount of compensation due. Although ideally a claimant should be restored to his condition prior to the injury or damage, for practical reasons monetary compensation ²³¹ is almost invariably used. Among the adjectives used to describe proper compensation are "full," "fair," "adequate," "just," and "appropriate," ²³² all terms requiring subjective interpretations to some degree. The claimant state might also be allowed to recoup the amounts it had paid to its nationals, ²³³ plus such additional amounts as might be required for "full compensation" for the damages suffered by the nationals and damage suffered by the complaining state itself. This would give the claimant state substantial unilateral control over the amount of compensation. None of these problems were

solved by article VII of the Treaty on Principles. It may be preferable to provide by subsequent treaty, to the extent possible, the types of damage for which compensation will be paid, the methods of evaluating the losses suffered, and the limitations, if any, on the amount of recovery.

Compensable Damages

Various definitions of "damage" have been proposed and discussed. Among them are that: damage means "loss of life, personal injury, or destruction or loss of, or damage to property;"²³⁴ "loss of life, personal injury or other impairment of health, and damage to property"; and "loss of profits and moral damage whenever compensation for such damage is provided for by the law of the State Liable for damage in general," but excluding "nuclear damage resulting from the nuclear reactor of space objects";²³⁵ and that the law of the situs of the loss be utilized to determine the compensable loss.²³⁶ The diversity of views emphasizes the desirability of either specifying in a subsequent convention the types of damages for which compensation is to be made or specifying a regime or regimes of law to be applied. Silence in article VII of the Treaty on Principles and article III's prescription of general rules of international law merely postpone the decision until a claim arises. The decision will then of necessity be made by whatever tribunal is formed. This is not necessarily undesirable if the tribunal has sufficient authority to make binding decisions.

Article VII of the Treaty on Principles specifies that damages resulting from activities in space are to be compensable, although it was suggested that a convention on liability might cover only damage caused on the surface.²³⁷ All the drafts of a liability treaty considered by the UN in 1965 included damage occurring on the surface, in the air and in outer space,²³⁸ and this position²³⁹ was accepted by the UN Subcommittee considering the question and by the resulting Treaty on Principles.

Exclusion of nuclear damage from the types of losses to be covered has been extensively discussed.²⁴⁰ There is no doubt that respondents should be liable for nuclear damage. The question is whether the subject should be covered in a separate agreement because of the difficulties and delays in determining the existence and extent of nuclear damage.²⁴¹ Also, a limit on liability for compensation could have been set more easily if liability for nuclear damage were handled separately from liability for damages from other causes. Maximum liability limits for nuclear damage would probably be higher, partly for psychological reasons, than for other kinds, and time limitations for presenting claims for radiation damage might be considerably longer than for readily identifiable damage.

Nuclear damage was not separately provided for in the general liability article of the Treaty on Principles. This provision would have avoided the inconvenience of separate conventions but would have made more difficult the task of obtaining agreement. As written, the

Treaty on Principles doubtless encompasses liability for nuclear damage from space activities. Precedents for providing separate liability in the field of nuclear energy are found in the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy, in the 1962 Brussels Convention on the Liability of operators of Nuclear Ships, and in the 1963 Vienna Convention on Civil Liability for Nuclear Damage,²⁴²

Another possible area for exclusion from coverage in a convention are various categories of intangible and noneconomic losses.²⁴³ Legal systems of the Western world often provide for such damages, whereas the legal systems of the Communist countries ordinarily do not.²⁴⁴ Another problem is the inclusion of liability for consequential economic loss. The Treaty on Principles contains no guidelines for what should be included in "damage," and in view of the differences in national laws on the subject it is essential, if subsequent arguments are to be avoided, that the coverage intended be explicitly defined by agreement. There is little support for an argument that because a state has more generous national laws, its obligation under international law should be greater than its neighbor's unless the parties agree on a reciprocal basis that the laws of both claimant and respondent may be utilized to give the claimant the benefit of whichever provision may be more liberal. Otherwise, if for example, the Soviet Union and the United States were engaged in space activities that caused identical damage in each other's territory, there might be a substantial disparity in the awards, a result not likely to be considered appropriate.

An early Belgian draft ²⁴⁵ included as part of the damage "judicial and legal costs and interests." Assessments of costs and interest might encourage the respondent to expedite handling a claim. However, delays are also frequently the responsibility of the claimant, and if interest is to be included provision should be made to avoid assessing it for periods for which the claimant is responsible. Inclusion of costs and interest as part of the damages is consistent with absolute and fault liability, although it may serve to encourage submission of minor claims where the cost of international adjudication is greater than any legitimate recovery. If costs are to be included, safeguards should be written in to prevent abuse. ²⁴⁶

Valuation of the Losses

Negotiators of a separate detailed liability convention might consider establishing a set of values for each type of personal injury with fixed amounts for loss of life, loss of limbs, loss of work days, etc., as is generally the rule in workmen's compensation. Property damage could be fixed at original or replacement cost with straight-line depreciation for the age of the property. This would simplify the task of the tribunal, but the awards would not necessarily have a rational correlation with the loss suffered by the claimant state. Also, the task of obtaining agreements for specific amounts for each type of injury would be difficult and might take more time than is justified in view of the probability that there will be few claims. Even if agreement could be reached, amounts set would be quickly outmoded and the

negotiations would have to be done over again, ²⁴⁷ unless provisions were included tying amounts to some international economic index or to a national economic index of the claimant and/or respondent.

The diversity of provisions for determining the amount of compensation to be paid for an injury or property loss, even within a single country, is so great that inclusion of a provision in a treaty to use national laws in determining the amount of compensation would require careful drafting to assure that only generally applicable laws would be utilized. Specific laws could hardly be cited because of excessively cumbersome numbers and because of the fact that such laws are subject to modification by national legislators. ²⁴⁸ Probably the most satisfactory method would be to provide the tribunal with standards as precise as possible, but allow it to make the final decision ²⁴⁹ as to the amount of compensation to be paid for each injury or loss.

Valuation of loss of life, if not to be done on the theory that all lives are worth the same amount, would logically require the ascertainment of the net loss in productive capacity resulting from the death of the individual. This involves a factor of net earning capacity and probable working-life expectancy discounted to present values. If this formula is adopted, compensation for lives of nonproductive persons would be nominal and theoretically a claimant state might be spared future expenses by the elimination of permanently nonproductive persons, requiring continuing institutional care. Theory and acceptability are obviously at variance. Maximums and also minimums could and probably

should be established by a subsequent agreement. Compensation for personal injuries could be computed on the basis of lost or lessened earning capacity and the cost of treatment and care.

Property losses can be computed on the basis of loss of net return, cost of replacement, or international market value. The question of compensation for consequential or indirect loss is the subject of much difference of opinion, nationally and internationally, and many subsequent arguments could be eliminated if rules could be agreed in advance. 250

If compensation for items as pain and suffering, sentimental value, trespass, etc., is to be included, a subsequent international agreement should so specify. It will be difficult, however, to show that the state has suffered a loss 251 since compensation for such items is not required to give the claimant state the same resources as if the damage had never occurred.

It has been suggested that average recoveries for other international claims might serve as a starting point in the valuation process. 252 But it is also apparent that some items of compensation in international claims are in addition to what would be required if the only criteria were to restore the claimant state. 255

Conduct of the respondent should not be a factor in determining the amount of compensation to be paid. 254 The question of whether the respondent should be disciplined for its behavior should be determined outside the scope of any convention on liability. 255

Limitations upon Recovery

It will probably be necessary, as a condition to obtaining general approval of a detailed agreement on liability, to establish a limit on recovery for a single accident and possibly also for recovery for a life.²⁵⁶ Arguments favoring a limitation include analogies to other areas such as maritime and air law which have limitations; and to international and domestic law relating to atomic energy.²⁵⁷ The concepts that space activities are for the benefit of all mankind and an imposition of absolute unlimited liability could cripple or severely limit the activity and that limitations are necessary to protect small countries from damaging liability and to encourage cooperative activities between states, have also been advanced.

There is also support for unlimited liability, although most nations, as reflected in the discussion in the UN are uncertain about their final position.²⁵⁸ The same objectives of compensating for losses of the claimant state which support absolute liability are cited also to support unlimited liability. It is argued that space powers do not need the extra encouragement of limitations on liability to engage in space activities which is required to encourage the use of nuclear energy for peaceful purposes by less developed countries. Probable costs of absolute unlimited liability are very small in comparison to amounts space powers spend on space activities. Nuclear energy technology has developed to the extent that some insurance can be purchased, but the same is true to only a limited extent for space

activities, which lack any international standards of safety or precautionary measures. It has also been suggested that the deterring of small states from participating in space activities because of the possibility of liability is not necessarily undesirable, as they might better devote their resources to urgent social welfare problems.

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Establishing maximums by other than arbitrary means would be difficult, as it would be necessary to determine by international agreement if there should be a limitation for each accident, each launching, each claimant state, each individual victim, each year, each respondent, or some combination. It would also be necessary to determine if the limitations would be a percentage of loss or a flat ceiling. Since the Treaty on Principles appears to include liability for nuclear damage, it may be desirable to establish, in some manner, a special limitation for it. Before an agreement on limitation is reached, it would be desirable to know the possible extent and type of damage; this could best be supplied by space scientists, but even their information is inadequate for lack of technical experience. There are conventions such as those concerned with nuclear and aircraft liability which can be looked to for precedents. The extent of liability for collisions at sea are fixed according to the size of the respondent vessel, and conventions relating to liability for damage on the ground caused by aircraft contain limitations related to size of the aircraft.

Another approach to the question of limitation is to consider ²⁶⁰ the need and status of the individual claimant. This ignores the concept that international space claims involve only states and adds complications of detailed agreement that probably makes the suggestion impractical. However, it would be possible to use current earnings and actuarial life expectancy, number of dependents, etc., as factors in computing compensation for a life; this is commonly done in the United States in cases not subject to statutory limitations.

An agreement for a ceiling on compensation for life should, if possible, include a provision for automatic adjustment upward or downward to avoid a hiatus, such as occurred under the Warsaw Convention on aircraft liability. ²⁶¹ If a limitation is accepted it should be clear that it is a ceiling which is not to be exceeded and is not an amount everyone will receive without proof of loss in that ²⁶² amount.

If a limit on liability is established, policy guidelines should be established for apportionment between injuries to persons and damage to property. ²⁶³ It should also be decided whether interest ²⁶⁴ and costs are to be included in the maximum limits.

Enforcement of Awards

Enforcement or collection of awards for damages presents the same problems as other international claims for which awards have been made. Problems of enforcement of decrees by international or foreign tribunals

against natural or nongovernmental judicial persons are unlikely to _____ arise for some time if, as appears probable, international claims continue to be handled on a state-to-state basis, either by diplomatic negotiation, adjudication under a general agreement, or by adjudication in accordance with the terms of an ad hoc agreement reached under the Treaty on Principles. It has been suggested that claims for compensation should not constitute grounds for sequestration of or the application of enforcement measures to such spaceships. 265

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies established a rule of absolute liability and made states liable for all activities in space, but normal rules of international law still control most aspects of liability for damages. No special procedures or forums have been established or identified, and questions relating to jurisdiction, limitations, types of injuries covered, and representation rights remain for resolution as cases arise or in a detailed treaty on liability. Although the probabilities of numerous claims are small, so that a low priority for negotiation of a liability treaty could probably be justified, the space powers and the other members of the United Nations have indicated their intent to go forward with the negotiation of a treaty. ²⁶⁶ If, unexpectedly, a number of international claims for damages arise from activities in space, or if it becomes necessary to show accomplishment in international cooperation, it should be comparatively easy for the major space

powers to complete the negotiation of a fairly comprehensive liability treaty within a short time, for precedents have been established in previous negotiations for several of the more difficult questions.

Fixed

CHAPTER VI - 1

LIABILITY AND SPACE ACTIVITIES

FOOTNOTES

1

In addition to the standard texts on claims see Blum and Kalven, "Public Law Perspectives on a Private Law Problem-- Auto Compensation Plans," 31 U. Chi. L. Rev. 641 (1964); Calabresi, "The Decision for Accidents: An Approach to Nonfault Allocation of Costs," 78 Harv. L. Rev. 713 (1965); Keeton, "Conditional Fault in the Law of Torts," 72 Harv. L. Rev. 401 (1959); Keeton & O'Connell, "Basic Protection--A Proposal for Improving Automobile Claims Systems," 78 Harv. L. Rev. 329 (1964). For the general handling of international claims, see for example; Sohn & Baxter, "Responsibility of States for Injuries to the Economic Interests of Aliens," 55 Am. J. Int'l L. 545 (1961); Hackworth, Digest of International Law 471-851 (1943); Bishop, International Law: Cases and Materials 626-743 (2d ed. 1962). Lipson & Katzenbach, The Law of Outer Space 31 and abstracts 411-31 [hereinafter cited as Lipson & Katzenbach]. (1961) Goldie, "Liability for Damage and Progressive Development of International Law," 14 Int'l & Comp. L.Q. 1189-1264 (1965), discusses theories of liability with specific reference to claims arising from activities in space.

2

Several excellent studies of the domestic liability problems arising out of United States government programs have been published, although many basic questions remain unanswered. See, for example, Rosenthal, Korn, & Lubman, Catastrophic Accidents in Government Programs

[hereinafter cited as Rosenthal, Korn, & Lubman];
 (National Security Industrial Association 1963) Haley, Space
 Law and Government 233-57 (1963); Stason, Estep & Pierce, Atoms
 and the Law (1959) [hereinafter cited as Stason, Estep, & Pierce];
 Berger, "Some Aspects of Civil Liability for
 Space Craft and Vehicle Accidents," 33 Pa. Bar Ass'n Quar. 301
 (1962); Parry, "Space Law: Surface Impact Liability of Space
 Vehicles," 14 Okla. L. Rev. 89 (1961); Schrader, "Space Activities
 and Resulting Tort Liability," 17 Okla. L. Rev. 139 (1964).

Liability to the personnel of a space program is thus a question
 of municipal law. A member of the National Aeronautics and
 Space Council has called for a space rescue team, saying, "We
 intuitively know that we and/or the Soviets will suffer a manned
 space catastrophe." Washington Post, Dec. 2, 1966 §A, at 14.

3

McDougal, Lasswell & Vlastic, Law and Public Order in Space 387 ff.
 [hereinafter cited as McDougal, Lasswell & Vlastic];
 (1963) Jessup & Taubenfeld, Controls for Outer Space (1959) 222-30;
 Haley, Space Law and Government 136-58; (1963); Cohen, Law and Politics in
 Space 63-94 (1964) [hereinafter cited as Cohen].

4

A developing sense of social responsibility by states to their
 residents is a significant factor in assessing what nations may be
 willing to do in the event of space accidents resulting in damages.
 Many nations have developed social welfare systems which are
 supposed to prevent acute suffering caused by lack of earning capacity;
 and no special rules are likely to be adopted or needed to extend the
 same protection to disabilities caused by activities in space.

5

Unless indicated to the contrary, "space" is used to refer to
 outer space as distinguished from airspace. A precise line of

5 (con't)

demarcation between the two has not been established. A line of demarcation is not essential for a discussion of liability since, with the exception of possible damage to space vehicles in orbit, all the damages which will be the subjects of discussion will probably occur on the surface of the earth or in airspace, although a result of activities in space. This includes efforts to put vehicles into space even if the vehicle does not leave airspace.

6

Rosenthal, Korn & Lubman,

23-33;

Arthur D. Little, Inc., On Credible Catastrophic
 [hereinafter cited as Arthur D. Little, Inc.];
Eventualities in Selected Areas of Government Sponsored Activities (1963)

Hassialis, Bernstein, & O'Neill, Some Major Hazards in Government Sponsored
 [hereinafter cited as Hassialis, Bernstein & O'Neill].
Activities (1964) See New York Times, Jan. 28, 1967, at 3, for an

account of the accident involving tests of a spacecraft at Cape Kennedy which resulted in the deaths of three astronauts in an oxygen fire on Jan. 27, 1967. The accident has been extensively investigated by Congress. See, for example, Apollo Accident, Hearings before Senate Committee on Aeronautical and Space Sciences, [redacted] 90th Cong., 1st Sess., Parts 1-7 (Feb., Mar., Apr., May, and June, 1967).

7

Fragments of an American navigation satellite fell in Oriente Province in Cuba, New York Times, Dec. 2, 1960, at 10, col 1. A piece of the Soviet satellite, Sputnik IV, landed at Manitowoc, Wisconsin, in 1962 while at the same time a number of pieces of varying sizes fell into nearby Lake Michigan. Plimpton, representing the United States, placed the Manitowoc fragment weighing about 20 pounds before the Soviet Union representative at the United Nations but stated that no damage had been done; UN Doc. No. A/AC.105/PV. 15, at 33-34 (1962). The second and third stages of a Vanguard missile impacted 1,500 miles from its launch site Apr. 28, 1958; Senate Com^m on Aeronautical and Space Sciences, Legal Problems of Space Exploration; A Symposium, S. Doc. No. 26, 87th Cong., 1st Sess. 1307 (1961). The third stage of a Vanguard missile impacted near the east coast of the Union of South Africa. *on*

7 (con't)

May 27, 1958; id. at 1308. The payload and third stage of a Vanguard missile fell into the Atlantic Ocean several hundred miles off Cape Kennedy, Apr. 13, 1959; id. at 1313. The third stage of a Vanguard missile fell into the Atlantic Ocean 300 miles northeast of the Atlantic Missile Range, June 22, 1959; id. at 1314. Pieces of the second stage of an Atlas-Able launch vehicle were found on a farm in Transvaal, South Africa, Sept. 25, 1960; id. at 1325. Fragments of the booster which propelled Col. Glenn into orbit impacted in South Africa in March, 1962; New York Times, Mar. 2, 1962, at 20, col. 3. The 4,000-pound first stage of the booster which propelled the Gemini V manned spacecraft into orbit was recovered from the Atlantic Ocean a few hundred miles from Cape Kennedy; Washington Post, Aug. 22, 1965, part 2, at 5, col. 2. An Agena-Atlas rocket, orbited Feb. 15, 1966, from the West Coast, returned at least 40 fragments to earth over a seven-day period; Chicago Tribune, Mar. 11, 1966, at 22, col. 5. Three heavy metal spheres, apparently pressure tanks from a Soviet spacecraft, were found near Seville, Spain; Chicago Tribune, Dec. 23, 1965, at 3, col. 8. An Agena-Atlas target for docking for Gemini IX misfired into the sea several hundred miles southeast of Cape Kennedy; Washington Post, May 18, 1966, at 1, col. 4.

It might be argued that the 1954 nuclear test explosions in the Pacific utilized space to some extent. One or two Japanese fishermen died and several were quite ill as the result of exposure to radioactive fallout from the Bikini hydrogen bomb tests, and Pacific Islanders are still showing the effects of exposure. Although disclaiming legal responsibility for the injuries resulting from the Bikini

7 (con't)

explosions, the United States, after negotiations with Japan, made ex gratia payments of two million dollars. Payments to the islanders were approved by Congress only in late 1965. In general, see McDougal & Schlei, "The Hydrogen Bomb Tests in Perspective: Lawful Measures for Security," 84 Yale L.J. 648 (1955).

8

Unless the context indicates to the contrary, the term damage will be used to include property damage, death, and personal injury.

9

Tass has given assurance that the Russian spacecraft which allegedly landed on Venus in early March, 1966, was properly sterilized. Chicago Sun Times, Mar. 6, 1966, at 4, col. 1.

10

An analogy to falling particles from man-made objects are natural meteorites. The Smithsonian Astrophysical Observatory indicates that approximately 5,600 meteorites of 2.2 pounds or more strike the earth every year. Murchie, Music of the Spheres III (1961) ^[hereinafter cited as Murchie] states: "There is no record of anyone's having been killed by a meteorite in all history" Murchie goes on to describe some instances of injuries and property damage and at p. 122 he refers to the huge meteorite which fell in Siberia in 1908. This meteorite, estimated to weigh 40,000 tons, completely devastated an area 50 miles in diameter. Scientists at Pa. State U. have located 42 "probable or proven" meteorite impact sites in the continental U.S. and southern Canada; see map, Chicago Daily News, Nov. 20, 1965, at 31. There is some popular support for the idea that Sodom and Gomorrah were destroyed by a similar meteorite; True Magazine, Dec. 1965, at 31. In contrast, the United States rocket S-11, expected to be used in the Apollo moon-landing program, weighs no more than 500 tons fully loaded. Chicago Tribune, May 11, 1965, at 3, col. 5.

11

The fuel in the Aug., 1965, Gemini V booster which was recovered from the Atlantic Ocean had, of course, been consumed. Washington Post, Aug. 22, 1965, pt. 2, at 5, col. 2. In Hassialis, Bernstein & O'Neill⁴² ~~Some Major Hazards in Government Sponsored Activities 42 (1964)~~ the opinion is expressed, without reference to classified data, that the upper stages of the Saturn V moon rocket and its Apollo spacecraft "is

dynamically stable and therefore unlikely to destroy itself by violent maneuvers during descent. This opinion is strengthened by the fact that the structure is designed to survive substantial axial and transverse loads (the latter due to winds) during first stage burning." See also Arthur D. Little, Inc., Credible Catastrophic Eventualities in Selected Areas of Government Sponsored Activities 67-83. (1963). It is unlikely, but not impossible, that United States boosters containing unexpended fuel will land on foreign territory. Some may very well land on the high seas. Smaller countries are faced with the dangers of unexpended fuel falling across international borders.

12

See discussion in Hassialis, Bernstein & O'Neill, ~~Some Major~~

Hazards in Government-Sponsored Activities, especially at 3, 4, 42, 43, 56, 66, 67, 70.

13

For an extensive discussion of the risks involved in transporting highly volatile missile propellants, see Arthur D. Little, Inc.,

On Credible Catastrophic Eventualities in Selected Areas of Government-Sponsored Activities, 9-66, (1963).

14

The United States is party to over 100 agreements providing for cooperation in space activities, but only a few of the cooperative projects provide for joint launching responsibilities.

15 .

See report of Staff of Senate Com^{m.} on Aeronautical and Space Sciences, International Cooperation and Organization for Outer Space, S. Doc. No. 56, 89th Cong., 1st Sess., at 103-20 (1965). Also see Frutkin, International Cooperation in Space, 132-41 (1965).

16

The tragic death of three American astronauts at Cape Kennedy on Jan. 27, 1967, technically presents only domestic legal questions. See ^{supra} note 6, ^{Hearings:} ~~Apollo Accident, Hearings before the Committee on Aeronautical and Space Sciences, US Senate, 90th Cong., 1st Sess., Parts 1-7 (1967).~~

The Apollo accident has been extensively reported in the press, as has been the death of the Russian astronaut on reentry. See Wall Street Journal, Apr. 25, 1967, at 5; Washington Post, Jan. 29, 1967, at 1; Apr. 25, 1967, at 1; Apr. 26, 1967, at A1; New York Times, Apr. 25, 1967, at 1.

17

The use of very large bore guns as launchers is an example. See New York Times, Nov. 9, 1965, at 3, col. 1.

18

Liability relationships between members of a cooperative space endeavor can be provided for in the agreement or understanding establishing the project. However, an examination of the hundred or so cooperative project agreements and arrangements to which the United States is a party indicates that none covers the question of liability specifically. On the other hand, NASA "operation support" agreements mention the question of liability in general terms. Cooperative projects anticipate direct foreign participation whereas operations support appear to contemplate only passive participation on the part of a foreign country. The line of demarcation is not clear.

19

For a discussion of the risks of an occurrence such as the Texas City fire-initiated fertilizer ship explosion of 1947 which resulted in 600 deaths, 3,000 injuries, and \$75,000,000 in property damage, see Hassialis, Bernstein & O'Neill, 94-108.

20

See Finger, "Space Nuclear Systems," NASA-Industry Conference, passim (1963); the New York Times, Mar. 15, 1966, at 12, col. 2; Chicago Tribune, Apr. 14, 1966, §1C, at 1, col. 1. The President has requested \$91 million for use in developing a nuclear powered space engine with 200,000 to 250,000 pounds of thrust. See Washington Post, Mar. 1, 1967, at A3.

21

Hassialis, Bernstein & O'Neill, 91;

Stoner, The Next Ten Years in Space; 1959-1969, H.R. Doc. No. 115, 86th Cong., 1st Sess., at 194 (1959). See also the statement of Harold B. Finger, Manager, AEC-NASA Space Nuclear Propulsion Office, in Hearings before the Senate Committee on Aeronautical and Space Sciences, NASA Authorization for Fiscal Year 1966, 89th Cong., 1st Sess., 377 (1965); Glasstone, Sourcebook on the Space Sciences 135 (1965); O'Toole, "Radiation Causation, and Compensation," 54 Geo. L. J. 751, passim (1966).

22

Knutson, The Next Ten Years in Space: 1959-1969, H.R. Doc. No. 115, 86th Cong., 1st Sess. 102 (1959).

23

Hassialis, Bernstein, & O'Neill, 89-93.

24

Treaty on Principles Governing the Activities of States in the Exploration and Use of Space, Including the Moon and other Celestial Bodies, signed Jan. 27, 1967.

25

The New York Times, Nov. 9, 1964, at 5, col. 1, refers to a military parade in Moscow on Nov. 7, 1965, in which was displayed a large three-stage rocket described by Tass as an orbital missile which "can deliver their surprise blow on the first or any other orbit around the earth." In response to a U-S query, the ~~U-S-S-R~~ denied that there was any intent to engage in actions contrary to the terms of the UN resolution.

26

There have been airplane accidents involving nuclear weapons, but no nuclear explosions have occurred. There is an unconfirmed report of a B-52 Bomber jettisoning a 24-MT weapon over North Carolina with five of the six safety devices failing; Hassialis, Bernstein, & O'Neill^{92.}

A bomber carrying nuclear weapons crashed over Spain in Jan. 1966; one bomb was not recovered until late Mar. 1966. Conventional explosives in one of the warheads detonated and scattered some radioactive debris, but there was no nuclear explosion; The Washington Post, Mar. 3, 1966, §1, at 1, col. 6.

27

Washington Post, Oct. 11, 1966, §A, at 1. See generally, Murchie,

114-115. "Even when improved radio devices for 'homing in' and automatic speed-blenders designed to avoid... errors have become standard space equipment, the increase in speed differentials as astronomical evolution unfolds is bound to cause serious meeting mishaps, including collisions, and a space collision obviously will seldom be the gentle sideswipe of the earthy highway which you can 'see coming' but will more likely strike completely without warning producing a lightening like disintegration from explosive friction and heat, with death mercifully instantaneous to all." An analysis of legal problems relating to the use of spacecraft for commercial passenger service would require assumptions of technological developments which cannot presently be anticipated with any degree of certainty, but a series of treaties similar to those applicable to commercial aircraft come to mind.

33 The International Telecommunications Union (ITU) is basically a forum for the resolution of differences rather than a lawmaking institution. It has done excellent work in obtaining cooperation from nations and in obtaining observance of common-sense rules.

See Huszagh, "The International Law Making Process: A Case Study on International Regulation of Space Telecommunication" 1-3

(Unpublished doctoral dissertation, U. of Chicago Law School, 1964).

34 See Huszagh, The International Law Making Process (1964),

"The vast extent of damage possible and the likelihood of such interference due to the crowded radio spectrum necessitate a legal system of financial penalties to discourage unauthorized radio frequency use. Despite the thrust of these undesirable circumstances the 1959 Convention (ITU) did not establish provisions for payment of damages. Consequently, only the cumbersome mechanism of diplomatic negotiations is available to compensate injured parties and deter unauthorized frequency use."

35 For a discussion of past accomplishments, present programs, and future possibilities, see Stroud, "Weather Satellites, 4th Nat'l Conf. on the Peaceful Uses of Space 133 (NASA, 1964); National Science Foundation, Weather and Climate Modification (1965); Taubenfeld, Weather Modification Law, Controls, Operations (NSF, 1965) [hereinafter cited as Weather Modification].

36

Oppenheimer, Legal Aspects of Weather Modification (Western Snow Conference, 1965); Taubenfeld, Weather Modification Law, Controls, Operations 45 (NSF 66-33 1965).

37

If technology develops to the point that weather modification as well as weather predicting is brought about by activities in space, the problem of damages will have to be considered. Proof of causation will remain difficult. See Hassialis, Bernstein & O'Neill, Some Major Hazards in Government-Sponsored Activities 131-32 (1964) for a discussion of "Project Cirrus," the seeding of a tropical hurricane in 1947. Six hours after the seeding the direction of the storm changed so that a coastal area of Georgia was subjected to the storm. "It is by no means certain that the change in course of this storm was causally related to the seeding equipment. Such storms have been known to change their directions before. Contrary-wise it cannot be said that the change in course was not due to the experimentation-- the probability is that it was." See also Arthur D. Little, Inc., 98-104; Weather Modification, 26-29, 117-21.

38

See Kershner, "Navigation Satellites," 4th Nat'l Conf. on the Peaceful Uses of Space 127-32 (NASA, 1964); Significant Achievements in Satellite Geodesy, 1958-1964 (NASA Sp-94; 1966); Significant Achievements in Communications and Navigation, 1958-1964 (NASA-SP-93; 1965).

39

See Aero Enterprises, Inc. v. American Flyers, Inc., 167 F. Supp. 239 (N.D. Texas 1958) wherein the United States was held liable for the negligence of the CAA control tower operators which resulted in a midair collision of two airplanes causing four deaths. A 1960 United-TWA crash over Brooklyn resulted in an agreement for the U.S. to pay 24% of total damage; New York Times, Oct. 23, 1963, at 1, col. 2. The FAA denied that the decision implied admission of fault, however New York Times, Oct. 26, 1963, at 14, col. 3. In U.S. v. Maryland, 257 F. Supp. 768 (DDC 1966), the court held the government liable for the actions of its employees at an air control center where their negligence contributed to a fatal accident; commented on in 33

J. Air L. & Comm. 364-65 (Spring 1967).

40

Washington Post, Dec. 1, 1966, at 3.

43

See McDougal, Lasswell, Vlasic, Law and Public Order in Space 540 (1963). "It is conceivable that if a state acquires through unauthorized observation from space a more comprehensive or specific knowledge of the physical (including mineral) properties of state B than state B itself possesses, such knowledge on the part of state A may represent a deprivation for state B." Taubenfeld correctly states that there is presently no rule requiring a state obtaining information through activities in space to pass such information on to any other state; Legal Aspects of the Use of Satellites in the Exploitation of Natural Resources, paper delivered at American Astronautical Society Annual Meeting Feb. 21, 1966, San Diego, Cal.

44

UN Doc. A/AC.105/C.2/L.10 (1964) Art. 11, § 1 proposes a general rule that "Liability of the State shall not exceed [amount left blank in the draft]." Art/ IV provides that "The State shall assume full liability for damages caused directly or indirectly on the ground, in the atmosphere or in outer space, if the State is exercising an unlawful activity in outer space. . . ." The draft does not define "unlawful" and is unlikely to be accepted because of the uncertain political implications.

45

The Jan. 27, 1967, Treaty on Principles provides for liability for damages without regard to whether or not the causative action was authorized or prohibited by any other treaty or rule of law. The questions of "legal" peaceful activities have provided the major political obstacles in the negotiation of a liability treaty.

46

Several nongovernmental efforts have been made to draft codes of law for activities in space. See, for example, William A. Hyman's "Magna Carta of Space," adopted by Resolution of the Inter-American Bar Association at its 12th Annual Conference, Feb. 2, 1961, 166-67 (1966). See also David Davies Memorial Institute of International Studies, Draft Code of Rules on the Exploration and Uses of Outer Space (1962). These drafts are general in nature but, even so, contain provisions not likely to be acceptable to nationalistic governments, including the U S. See Lay & Poole, "Exclusive Government Liability for Space Accidents," 53 A.B.A.J. (Sept. 1967) for discussion of objectives in determining liability questions involving activities in space.

47

One American author suggests that "[T]he Soviets use international law not as a means to resolve and remove conflict but rather to manage and direct conflict in the interests of Communist global expansion." Crane, "Basic Principles in Soviet Space Law: Peaceful Coexistence, Peaceful Cooperation and Disarmament," 39 Law & Contemporary Problems 943, 955 (1964).

48

An impasse based on political factors has delayed UN negotiations relative to separate agreements on assistance to and return of astronauts and space vehicles as well as on liability. Com^{m.} on the Peaceful Uses of Outer Space. UN Gen. Ass. ^{2m.} Doc. No. A/AC.105/29 (1965). The Jan. 27, 1967 Treaty on Principles in article V provides in broad terms that astronauts are envoys of mankind in outer space and are

48 (continued)

to receive "all possible assistance in the event of accident, distress, or emergency landing . . . , they shall be safely and promptly returned to the State of registry of their space vehicle." Minor shifts in the political approach would allow approval of both agreements. The inability to devise a general agreement on disarmament is well known. Considerably better progress has been made in the negotiation of a treaty on liability for damages from space activities, but lack of agreement on objectives and policy in determining lawful and unlawful activities and several other points has prevented a final agreement. See, e.g., Hungarian draft proposal art. V, Com. on the Peaceful Uses of Outer Space, Report, UN Gen. Ass. Doc. No. A/AC.105/29, Annex II, p. 4 (1964).

49

For example, the Belgian draft proposal, UN Doc. No. A/AC.105/C.2/L.7/Rev. 2 (1964), provides for no limitation on liability. Orbiting spacecraft are peculiarly international and not susceptible to satisfactory bilateral arrangements. These factors furnish rather strong arguments in favor of establishing an international legal regime to cover the risks, even though as a practical matter the probability of numerous incidents is very slight.

50

See Rosenthal, Korn, & Lubman, Catastrophic Accidents in Government Programs 147 (1963) [hereinafter cited as Rosenthal, Korn & Lubman] who suggest that "While the harmful effects on this country's foreign relations [resulting from damages caused by space activities] could not be wholly undone, they might be significantly mitigated by arrangements that would speedily provide adequate financial compensation for the victims."

51

See comment of the Mexican representative summarized in UN Doc. No. A/AC.105/C.2/SR.48 p. 13 (1965): "Since it was agreed that responsibility was absolute, then unlimited liability could spell financial disaster for a small country."

52

See for example, the statement of George R. Woods, former president of the World Bank, to the annual meeting of the bank's Boards of Governors, Sept. 27, 1965: "It is useless to attempt to sugar-coat the fact that in many of the underdeveloped countries, economic performance can be greatly improved. It is essential that these countries take effective measures to increase the mobilization of capital through taxation and through incentive to investment, both domestic and international. It is urgent for many of them to cut down some of the biggest items of waste-excessive military expenditures, prestige projects, inefficient administration, overstaffing of railways and other public enterprises, and subsidies to public services that could and should be self-supporting."

53

Treaty on Principles Governing the Activities of States in
the Exploration and Use of Outer Space, Including the Moon and Other
Celestial Bodies, signed Jan. 27, 1967, in Washington, London, and
Moscow, Articles V and VII (reproduced in Appendix 60).

54

On Nov. 15, 1965, the United States renounced the Warsaw
Convention of 1929, 49 Stat. 3000, T.S. No. 876, III Air Laws and
Treaties of the World 3103 (1965) because the other nations party
to it were unwilling to increase adequately the limits on liability
(less than \$10,000) for the death of passengers; 54 Dept. of State
Bull. 580 (Apr. 1966). Pursuant to a subsequently reached agreement
increasing to \$75,000 the limit for death in flights involving the
United States, the denunciation was withdrawn; 54 Dept. of State Bull.
956 (June, 1966). Without such a treaty a plaintiff might find
himself bound by foreign law even in a U S court. Recently, a
widow suing for wrongful death of her husband in an airplane accident
in Brazil was bound by the Brazilian maximum of \$170. *Tramontana v.*
S.A. Empresa de Viacao Aerea Rio Grandense, 350 F. 2d 468 (1965).
cert. denied, 383 U.S. 943(1966). Negotiations on the new treaty
provisions have not gone smoothly, and there is sharp disagreement
between the U S government representatives and representatives of the
various American airlines. See Wall Street Journal, July 10, 1967,
at 1, for some speculation on the final outcome.

55
Senate Committee on Commerce, 89th Cong., 1st Sess., III
Air Laws and Treaties of the World 3147, 3221 (Com^m, Print 1965).

56 See Goldie, "Liability for Damage and the Progressive Development of International Law," 14 Int'l & Comp. L.Q. 1189 (1965) at 1191.

"The great damage these [space] objects could cause to the victim State, and their close relation to the national defense and prestige of the launching State, may tend to predispose these incidents to becoming political questions--to be resolved in the atmosphere of heightened tensions which such questions tend to carry with them. Frequently these tensions may be intensified by the lack of objectively formulated definitions and rules to which both parties may make common reference. Reference to common standards and rules can, by contrast, reduce the tension of claims arising from disasters to 'objects of litigation,' and so help to avert the development of international tests of strength." Goldie has perhaps overemphasized the probabilities of major damage from activities in space cognizable under international law, but providing machinery to resolve only one serious incident would justify the efforts being made to draft a treaty.

57

See, for example, United States proposals for a convention concerning liability for damages caused by the launching of objects into outer space, UN Doc. No. A/AC.105/C.2/1.8 (1964): "The Contracting Parties . . . seeking to establish a simple and expeditious procedure to provide financial protection against damage . . . agree as follows"; and UN Doc. No. A/AC.105/C.2/1.8/Revs. 1 and 2 (1964): "The Contracting Parties . . . seeking to establish a uniform rule of liability and a simple and expeditious procedure governing financial compensation for damage Agree as follows"; Belgium appears to have emphasized continuously the compensation objective. See Belgium's proposal in UN Doc. No. A/AC.105/C.2/L.7/Revs. 1 and 2 (1964): "The Contracting Parties . . . Recognizing that activities in the exploration and peaceful uses of outer space may from time to time result in damages, recognizing the need to establish rules governing liability with a view to ensuring that compensation is paid for damage thus caused, Have agreed as follows"

Some American writers have given strong support to the humanitarian concept of compensation as the basic objective. See, for example, Estep, "Book Review," 17 Yale L.J. 343,353 (1965): "The needs of business have to be taken into account, but surely the most important concern is how to provide the most compensation for the greatest number of people with the least amount of overhead expense."

58

UN Doc. No. A/AC.105/C.21 S.R. 48, at 11 (1965). The Russian representative stated, "That provision [Items of General Assembly Resolution 1962 (XVIII) (1963)] was intended to safeguard the interest

of those outside the launching State which might suffer injury as a result of the space activity."

59

See Keeton & O'Connell, ¹ supra n. 1 at

329, 331,

where it is suggested that "an award is not to be made unless there exists some reason other than the mere need of the victim for compensation. Otherwise, the award will be an arbitrary shifting of loss from one person to another at a net loss to society due to the economic and sociological cost of adjudication." Blum & Kalven,

supra n. 1 at

641, 721

observe that "The welfare

universe is not limited to victims of auto accidents but includes victims of all other kinds of human misfortune. We can think of no ground for singling out the misfortune of auto accident victims for special welfare treatment." The same thought might be applied to space accident victims.

60

UN Doc. No. A/AC.105/29 Annex IV, Hungarian draft, art. V.

See also Goldie, supra n. 1 at

1189 for an

analysis of strict and absolute liability applied to sovereign states.

61

G.A. Res. 1721 (XVI) (Dec. 20, 1961) begins by "Recognizing the common interests of mankind in furthering the peaceful uses of outer space"

62 article
See article 34, § 1, of the Statute of the International Court of Justice T.S. 993 (1945): "Only states may be parties in cases before the Court." The Treaty on Principles supports this proposition in

article VI: "States Parties to the Treaty shall bear international responsibility for national activities . . . whether such activities are carried on by governmental agencies or by non-governmental entities"

63 article
See article 175 of the treaty establishing the European Economic Community, 295 U.N.T.S. 2 (Mar. 25, 1957): "Any natural or legal person may submit to the Court of Justice . . . a complaint to the effect that one of the institutions of the Community has failed to address to him an act other than a recommendation or an opinion." Article 25 of the draft of the Convention for the Protection of Human Rights and Fundamental Freedoms, 231 U.N.T.S., 221 (1950), provides that "(1) The Commission may receive petitions addressed to the Secretary-General of the Council of Europe from any person, non-governmental organization or group of individuals claiming to be the victim of a violation by one of the High Contracting Parties of the rights set forth in this Convention, provided that the High Contracting Party against which the complaint has been lodged has declared that it recognizes the competence of the Commission to receive such petitions" Article 2(c) (i) of the Supplementary Agreement relating to Intelsat permits "any signatory" to be a party before the arbitral tribunal. Article 1 (d) defines a "signatory" as "a government or communications entity which has signed the Special

63(continued)

Agreement and in respect of which it is in force." See Articles 28 and 36 of the Convention on Settlement of Investment Disputes between States and Nationals of Other States, signed Mar. 18, 1965, IV International Legal Materials 532 (1965) which provide, "(1) Any Contracting State or any national of a Contracting State wishing to institute (conciliation/arbitration) proceedings shall"

64 "States bear international responsibility for national activities in outer space whether carried on by governmental agencies or by nongovernmental entities, and for assuring that national activities are carried on in conformity with the principles set forth in the present Declaration. The activities of nongovernmental entities in outer space shall require authorization and continuing supervision by the state concerned. When activities are carried on in outer space by an international organization, responsibility for compliance with the principles set forth in this Declaration shall be borne by the international organization and by the states participating it." A/RES/1962 (XVIII) (1963), para. 5. ^{article} V of the Treaty on Principles adopted this language with only minor changes. If and when a separate treaty on liability is adopted it is probable that this theory will be included. See discussion in Jenks, Space Law 210-11 (1965).

For an excellent discussion of the UN negotiations on the subject of liability see Dembling & Arons, "Space Law and the United Nations: The Work of the Legal Subcommittee of the UN on the Peaceful Uses of Outer Space," 32 J. Air L. & Com^{m.} 329, 349 (1966).

See Bishop, International Law Cases and Materials 257-58
[hereinafter cited as Bishop].

(1962) "Theory and practice both suggest that any 'personality' which they [international organizations] may have in international law must be conferred upon them by states . . . either expressly or through customary development It . . . seems clear that an international organization may be given the capacity to sue or be sued before an international court." The Charter of the International Court of Justice would require amendment to permit other than a state to be a party before it.

66

UN Doc. No. A/AC.105/C.2/C.2/L.8 (1964), art. I.c. and art. XIII reading in part, "This convention shall be open for signature by States"

67

First revision to the United States draft, UN Doc. No. A/AC.105/C.2/L.8/Rev. 1. (1964), art. I(d) defines a "Presenting State" as "a State which is a Contracting Party, or international organization which has transmitted a notification to the Secretary-General under Art. III, para. 1, of this Convention, which presents a claim for compensation to a Respondent State." Art. III, para. 1, provides that "If an international organization which conducts space activities transmits to the Secretary-General of the United Nations a declaration that it accepts and undertakes to comply with the provisions of the present Convention, all the provisions [subject to exceptions] shall apply to the organization as they apply to a state which is a Contracting Party." Article XIII permits only states to accede to the proposed treaty. Subsequent revisions leave these provisions basically unchanged. UN Doc. No. A/AC.105/C.2/L.8/Rev. 3 (1965).

68

UN Doc. No. A/AC.105/C.2/L.7/Rev. 2, art. 5 (1964).

69 Article 7

6. The Belgian representative indicated "one of the main purposes of the Belgian provisions concerning international organizations was to enable and encourage States which were not parties to the Convention to participate in it by joining an organization which was a party." UN Doc. No. A/AC.105/C.2/SR.52, at 7 (1965).

⁷⁰ UN Doc. No. A/AC.105/19, Annex II, at 14 (1964); UN Doc. No
WGII/6 (1964); No. A/AC.105/C.2/SR.52, at 3, 5, 9, 10-11 (1965).

⁷¹ UN Doc. No. A/AC.105/C.2/L.10/Rev. 1 (1964).

⁷² UN Resolution 1962 (XVIII) (1963) para. 5.

⁷³ UN Doc. No. A/AC.105/C.2/SR.52 at 4, 7, 10-11 (1965);

UN Doc. No. A/AC.105/21, Annex I, para. 2 (1964); No. WGII/31 (1964);

UN Doc. No. A/AC.105/C.2/SR.29-37, at 91 (1964).

⁷⁴ UN Doc. No. A/AC.105/C.2/SR.52, at 7, 10, 12 (1965); A/AC.105/21 Annex I, at 12, Doc. No. WG I/31 (1964).

⁷⁵ UN Doc. No. A/AC.105/C.2/SR.52, at 12 (1965) and see Chap. 4

⁷⁶ Bishop, 741:

"The private claimant ordinarily has no legal right to any monies recovered by his government as compensation or redress, but normally such sums will be paid to the claimant or to the persons properly entitled thereto" Borchard, The Diplomatic Protection of Citizens Abroad 383-98 (1927).

⁷⁷ O'Connell, International Law 121 (1965): "The pursuit of an international claim is an assertion of the primary right of the individual, so that the national State has the duty, albeit an unenforceable one, to hand over the proceeds of litigation to the claimants."

78

Bishop,

740-41;

"Sometimes a lump sum settlement is made between the two states, and a domestic tribunal established to make the awards. This practice is not new, but seems to be growing in favor at present."

79

See 5 Hackworth, Digest of International Law, 802 (1943):

"It is well settled that the right to protect is confined to nationals of the protecting state."

80 Article

V of the first U S draft, UN Doc. No. A/AC.105/C.2/L.8 (1964), states that: "A state shall not be liable under this convention for damages suffered by its own nationals." Subsequent revisions contain the same language. UN Doc. No. A/AC.105/C.2/L.8/Rev. 3 (1965).

81

UN Doc. No. A/AC.105/C.2/L.7/ (1964); UN Doc. No. A/AC.105/C.2/L.7/Revs. 1 and 2 (1964).

82

UN Doc. No. WG. II/5 (1964); UN Doc. No. A/AC.105/C.2/SR.48, at 13 (1965).

83

UN Doc. No. A/AC.105/C.2/L.10/Rev. 1 (1965).

84

UN Doc. No. A/AC.105/C.2/SR.49, at 8-9 (1965).

85

UN Doc. No. A/AC.105/C.2/SR.49, at 10 (1965): "It would be difficult . . . to abandon the existing principle of diplomatic protection with regard to aliens present in the territory of the launching state." It noted that the Belgian proposal would prevent a state from representing its nationals permanently residing abroad.

86

UN Doc. No. A/AC.105/C.2/L.10/Rev.1 (1965); UN Doc. No. A/AC.105/C.2/SR.49, at 809 (1965). The Hungarian representative, in commenting on his revised draft, noted that it did in fact cover the case of a national of the launching state resident in the applicant state.

87

UN Doc. No. A/AC.105/C.2/SR.48, at 7 (1965). The Mexican representative suggested the convention should apply to damage caused in the territory of one contracting state by a space vehicle registered in another contracting state.

88

It would hardly seem proper to permit the state where the damage occurred to seek recovery from all the states engaged in a cooperative endeavor except the national state of the injured party; this would result in an inequitable distribution of the burden. This problem would be overcome if the Hungarian proposal were accepted but the Austrian representative commented: "The Hungarian proposal went too far for it would enable the applicant state to claim compensation from the launching state for a national of the launching state permanently resident in the territory of the state which had suffered the damages." UN Doc. No. A/AC.105/C.2/SR.49, at 9 (1965). The Treaty on Principles does not resolve this point. It is possible that a special treaty on liability can break new ground in international law and be a precedent for other situations.

89

UN Doc. No. A/AC.105/C.2/L.7 and Rev. 1 (1964). The Belgian delegate justified the revision as "based on provisions which were not new and were to be found in the Rome Convention on Damage Caused by Third Parties on the Surface." UN Doc. No. A/AC.105/C.2/SR.49, at 9 (1965).

90

The Hungarian delegate voiced disagreement. UN Doc. No. A/AC.105/C.2/SR.49, at 8 (1965).

91

'See McDougal, "The Hydrogen Bomb Test and the International Law of the Sea," 49 Am. J. Int'l L. 355, 357-58 (1955): "The duality in function . . . or fact that the same nation-state officials are alternately in a process of reciprocal interaction, both claimants and external decision-makers passing upon the claims of others, need not, however, cause confusion: it merely reflects the present lack of specialization and centralization of police functions in international law generally."

92

Bueckling, "State Liability for Damages in Outer Space,"
Neue Juristisch Wochenschrift 527, 530 (1964): "On the basis
of the principle of territorial integrity in international law the
state, because of its duty to supervise and control, which has its
counterpart in space-flight enterprises being dependent upon state
concession, is liable for damages caused by private space-flight
enterprises to subjects of other states." See also the comment of
the Belgian representative in the UN discussion, UN Doc. No.
A/AC.105/C.2/SR.25, at 7 (1964): "If private individuals or public
entities were authorized by a State to launch space devices, the
State authorizing such activities would be liable for any resulting
damage to third persons."

93

National law will ordinarily determine whether the state or states which are held liable or accept liability for international space claims have a right of reimbursement from a national nongovernmental entity. ~~Contracts between governments and nongovernmental entities~~ should be precise in spelling out liability for damage.

94

U S S R Draft Declaration of the Basic Principles Governing the Activities of States in the Exploration and Use of Outer Space, art. 11., UN Doc. No. A/AC.105/12 Annex I, at 2 (1963).

95

U.S. Draft Proposal on Liability for Space Vehicle Accidents, art. 3(a) & (c) UN Doc. No. A/AC.105/C.2/L.4 (1962).

96

UN Doc. No. A/RES/1963 (XVIII) (1963). The Treaty on Principles uses "Each State Party to the Treaty that launches or procures the launching . . . and each State Party from whose territory or facility an object is launched . . ." (Article VII) The treaty language is clearly copied from the resolution.

97

UN Doc. No. A/AC.105/C.2/L.7/Rev. 2, art. 2 (1964):

"Launching State shall be understood to mean the State or States which carry out the launching of a space device or whose territory is used for such launching." Proposals in UN Doc. No. W.K. II/27 (1964) suggested, "If several states participate in the launching of a space device, each of them shall be liable for the whole of the damage, and a claim for compensation may validly be addressed to any one of them."

98

UN Doc. No. A/AC.105/C.2/L.8/Rev. 1, art. 1, 1.C (1964).

99

UN Doc. No. A/AC.105/C.2/L.8/Rev. 2, art. I(c) (1964) and UN Doc. No. A/AC.105/C.2/L.8/Rev. 3, art. I(c) (1965).

100

UN Doc. No. A/AC.105/C.2/L.8/Rev. 1, art. II.3 (1964); UN Doc. No. A/AC.105/C.2/L.8/Rev. 2, art. II, 3 (1964); UN Doc. No. A/AC.105/C.2/L.8/Rev. 3, art. II.3 (1965).

101

In UN Doc. No. A/AC.105/C.2/SR.52, at 13 (1965), the U.S. representative stated: "That concept (joint and several liability) varied somewhat even in different jurisdictions within the United States itself and procedures varied widely in the different common-law countries The intention was to specify that the presenting State should proceed for the total amount at one time and not make a series of separate actions for various amounts of damages against different States; once the amount had been established, the Presenting State might seek payment of any amount from any of the liable states within any amount from any of the liable states within any time period

102

UN Doc. No. A/AC.105/C.2/L.10, art. VII (1964); UN Doc. No. A/AC.105/C.2/L.10/Rev. 1, art. VI (1965).

103

• Ference Madl, Jogtudományi Közöny, No. 3 of 1963, quoted in Szadeczky-Kardoss, "Activities of the Space-Law Committee of the Hungarian Lawyers' Association," Seventh Colloquium on the Law of Outer Space 259 (~~International Institute of Space Law of the International Astronautical Federation, Warsaw~~ (1964)). "Liability must lie with the state the territory of which was used for launching the spacecraft. This is international liability, and the state will appear as the sole depositary of the faculties offered by sovereignty of the territories under its rule. It is the sovereign right of the state to decide whether, in addition to its own agencies, it will grant or deny the right to other states, to international organizations outside its sovereignty, or to private persons subjected to its sovereignty, to launch spacecraft from its territory. Inasmuch as the state grants such rights it is its own business under what conditions it will do so."

104

UN Doc. No. A/AC.105/C.2/SR.51, at 3 (1965).

105

Report of the Legal Subcommittee on the Work of its Fourth Session (20 Sept.-1 Oct. 1965) to the Committee on the Peaceful Uses of Outer Space, UN Doc. No. A/AC.105/29, at 4 (1964).

106

It can be argued that permitting a binding designation of a state to receive claims would provide greater uniformity of procedures, simplify the allocation of costs between states jointly liable, and would probably result in less cost of administration in disposing of claims. Since there will doubtless be liability without fault, at least for some time, there will not be a moral issue of right and

106 (continued)

wrong. The respondent states would be in a better position to prepare replies to claimants, and it can probably be assumed that the state with the largest participation in the activity would usually be assigned the task of responding. It could also be assumed that the state registering the joint space activity usually would have the largest participation. Smaller states might feel more free to participate in space activities since they would be assured that they would not be saddled with the burden of defending against a substantial claim.

107

II International Legal Materials 727 (1963).

108

The official comment is as follows: "In order to facilitate, for the victims, the filing and litigation of claims, and for the persons liable the purchase of financial coverage for their liability, the Convention [The Vienna Convention on Liability for Nuclear Damage] channels liability for nuclear damage to one person with respect to each incident. This person is the operator of the nuclear installation concerned, who shall always be liable for incidents occurring in his installations." The 1952 Convention on Damages Caused by Foreign Aircraft to Third Parties on the Surface (III Air Laws and Treaties of the World 3221 [1965] art. 2) also places the liability on the operator.

109

Jenks, Space Law 228 (1965) describes how such arrangements in fact have already been carried out. "[T]he Interim Agreement of May 6, 1964 between Australia, the United Kingdom and the European Organization for the Development and Construction of Space Vehicle Launches concerning ELDO firings provides that ELDO is to indemnify the Commonwealth of Australia and the United Kingdom against any loss or damage suffered by the Commonwealth or the United Kingdom and against any liability of any kind in respect of claims against the Commonwealth or the United Kingdom, their respective servants or agents for loss, damage or injury that occurs in any place, whether within or outside Australia arising howsoever out of any activity carried out on behalf of the Organization in Australia"

110

The French representative emphasized, "one claimant to one respondent," UN Doc. No. A/AC.105/C.2/SR.53, at 8 (1965); and suggested, "(1) if 'launching State' meant the State to which the claim for compensation would be presented, his delegation was in favor of the largest possible number of liable states," UN Doc. No. A/AC.105/C.2/SR.51, at 9 (1965). The Austrian representative suggested (pp. 7, 9-10) ^R the applicant State might be allowed to decide to which of the participating States--all such States being liable--it would make its claim, and the latter States would be responsible for apportioning the liability among themselves This solution would enable the injured State to choose from among the States that were liable the one which would be best able to bear the material burden of liability." The Austrian also mentioned the possibility of making the state whose territory was used for the launching liable for all claims, subject to reimbursement in accordance with agreement among the participants. The Belgian representative suggested (pp. 8-10): "[T]he Belgian draft was designed, for practical reasons and also to ensure the payment of compensation for damage, to leave a broad range of alternatives open to the applicant State. Wealthiness should not be the determining factor, but the fact was that when two or more States took part in a launching in different capacities it was difficult to fix liability. . . . if States agreed on a launching operation they should be allowed to make their own arrangements concerning liability. What was needed was a solution which would facilitate action by the applicant State." The Italian

110(continued)

representative suggested the possibility of making the registering state liable. UN Doc. No. A/AC.105/C.2/SR 51, at 4 (1964) and A/AC.105/C.2/L.8/Rev. 1 (1964). The Rumanian representative stated: "The definition of 'launching State' must, in fact, be given the widest possible scope." UN Doc. No. A/AC.105/C.2/SR.51, at 4 (1965). In UN Doc. No. A/AC.105/C.2/SR.48 (1965) at pp. 12-13 the Hungarian representative is reported saying: "[T]he motion of joint and several responsibility must be referred to . . . and . . . it [must be] equitable for respondent as well as for claimant States. It would in effect, induce member countries of organizations which were potential respondents to agree beforehand on the sharing of liability." The United States representative stated that it was necessary to define the degree of participation on the basis of which a State would be considered liable as a launching State. He wondered whether, for instance, a state which had sent a technical observer to cover a launching or which had taken advantage of a launching in order to carry out experiments on insects, would bear equal liability. Too broad a definition might affect international cooperation in the exploration of outer space. The meaning of substantial participation should be defined; the Italian-United States San Marco operation was a good example. On the other hand, if State A had built a space vehicle and State B had purchased it, paid for it and launched it, there could be no basis for saying that State A was liable. UN Doc. No. A/AC.105/C.2/SR.51, at 9 (1965).

111

See the comment of the British representative in the UN discussions: "[T]he questions of the apportionment of liability between respondent states did not concern presenting states, which the convention was intended to protect." UN Doc. No. A/AC.105/C.2/SR.53, at 4 (1965). See Goldie, "Liability for Damage and the Progressive Development of International Law," 14 Int'l & Comp. L.Q. 1189, 1254 (1965): "[A] general convention on space liability should not deal with the apportionment of liability. This is a matter which is better left to individual agreement. For in these the degree of liability should be proportioned to the degree of control, participation, and financial contribution. Hence, it may best be stipulated in terms of the mutual relations of the parties to the enterprise and to each other "

112

UN Doc. No. A/AC.105/C.2/SR.53, at 3¹ (1965). The Rumanian representative stated: "[I]t would be useful to add a further subparagraph defining relations between co-debtor States where the presenting state claimed compensation from only one of the various jointly and severally liable States. That State would be obliged to pay, and if the agreements it had concluded with the other States liable did not entitle it to claim against them, the convention should give it the right to claim reimbursement of the amount it had paid in excess of its share of the total amount of compensation."

113

UN Doc. No. A/AC.105/C.2/SR.53, at 4 (1965). The Soviet representative stated: "[T]he presenting State must be able to demand full or partial compensation for the damage either from all

113(continued)

the respondent States or from any one of them. If it did not receive compensation for the total amount of the damages, it should be able to claim the balance of the compensation from the other respondent states. The latter would remain debtors until the total amount of compensation had been paid."

114

UN Doc. No. A/AC.105/C.2/SR.53, at 5 (1965), the Australian representative suggested: "Nevertheless, the Convention might, without going into detail, say that if one of the launching states liable to pay compensation for damage had paid the full amount of such compensation, it would have the right of recovery against its co-respondents, it being understood of course that such a provision would be subject to and overridden by any agreement that might have been concluded between the participants which would have priority." This point is not mentioned in the Treaty on Principles, although the silence on the subject may be interpreted to mean joint and several liability with contribution required between the responsible States.

115

The Report of the Legal Subcommittee on the Work of its Fourth Session (20 Sept. - 1 Oct., 1965) to the Committee on the Peaceful Uses of Outer Space, UN Doc. No. A/AC.105/29, at 4 (1964): "There was general agreement that international organizations engaged in space activities should be liable under the convention for damages caused by such activities. An exchange of views took place in respect of the relationship of the liability of an international organization to that of its constituent members."

116

A. Hungarian draft provided: "If liability for damage rests with an international organization the financial obligations toward States suffering damage shall be met by the International organization and by its member States jointly and severally." UN Doc. No. A/AC.105/C.2/L.10/Rev.1, art. VII (1965). The Czechoslovakian delegate expressed approval of the Hungarian draft while the Rumanian representative justified the position at length. The Russian representative strongly supported the Hungarian position. UN Doc. No. A/AC.105/C.2/SR.51 at 13 (1965). UN Doc. No. A/AC.105/C.2/L.7/Rev.2, at 8-9 (1965).

117

UN Doc. No. A/AC.105/C.2/L.7/Rev.2, art. 6 (1964).

118

UN Doc. No. A/AC.105/C.2/L.8/Rev.3, art. III, para. 3 (1965).

119

UN Doc. No. A/AC.105/C.2/SR.52, at 809 (1965).

120

UN Doc. No. A/AC.105/C.2/SR.54, at 5 (1965).

121

UN Doc. No. A/AC.105/C.2/SR.54, at 5 (1965): "[I]f the international organization refused to pay, a member State liable under art. III, para. 3, of the United States text could argue that it was a third party and that the provision had been raised inter alios acta."

122

The Swedish and Italian representatives endorsed the proposal for making the members of international organizations liable only if the organization defaulted. UN Doc. A/AC.105/C.2/SR.52, at 5, 10 (1965).

123

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The pertinent language from article VI reads: "[R]esponsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization." Use of the article "the" before Treaty is slightly ambiguous, particularly in view of the use of "this" in the preamble and in Articles XIII, XIV, and XVII.

124

"There would . . . be great procedural economy if the international organization itself was regarded as the launching State, since it would clearly be in the best position to deal with the claims. If the international organization did not give satisfaction as first debtor, there would of course be a residual right against individual states." Statement of the British representative, UN Doc. No. A/AC.105/C.2/SR.52, at 12 (1965).

125

The Argentine representative commented, UN Doc. No. A/AC.105/C.2/SR.51, at 12 (1965): "When the United Nations, one of its specialized agencies or a similar organization generally recognized as having international status was involved, the liability of the organization took precedence over that of its members. In other words, the latter were required to answer for the activities of the organization only if it did not do so itself. If, on the other hand, a more limited organization which did not have the same international

status was involved, the organization and its members were simultaneously liable. There were already a number of organizations of that type, which had been established for the specific purpose of promoting cooperation in space activities. Since they had no international legal status, they were bound only by their statutes and their declarations were authoritative only inter partes and not erga omnes; some of them, such as COMSAT, had not yet set up any machinery to ensure compensation for those affected by any damage which they might cause on land." It might be noted that contracts let by ComSat on behalf of Intelsat are reported to contain since mid-1965 provisions specifying that as between the parties, only the maker of the contract (ComSat) is liable. It is doubtful that such a provision would be binding on a party not privy to the contract or agreement.

126

UN Doc. No. A/AC.105/C.2/SR.48, at 19 (1965) and SR.52, at 8 (1965). The Austrian representative suggested: "As the [Hungarian] text stood, it would seem to mean that a country claiming damages against the United Nations--say, Belgium in connection with the Congo operation--could present a claim against any individual member of the United Nations--say Hungary. . . . Austria did not assume responsibility as an individual State for the activities of the International Atomic Energy Agency, of which it was a member and the host country; that was stated in the headquarters agreement. Similarly Switzerland had denied responsibility for the activities of the League of Nations during the Second World War."

127

See de Rode-Verschoor, The Responsibility of the States for the Damage Caused by the Launched Space Bodies, In Sen. Doc. No. 26, 87th Cong., 1st Sess. 460 (1961): "One may consider the solution of an international guaranty fund for paying the damages caused by satellitesEach state interested in astronautics will deposit a sum of money in this FundSuch a Fund could exist under control of the United Nations, a body that most experts have pointed out already as most competent to control the traffic in outer space." See also Valladso, writing in the Brazilian periodical Revista Forense (Apr.-June 1961), who says that any damages caused by spacecraft should be borne ratably by all nations because space activity is for the good of all humanity. The Arab delegate to the Vienna Convention on Nuclear Damages advocated establishment of an international guarantee fund. The Soviet writer Osnitskaya, in The Conquest of Space and International Law 68(1962) supports the idea of an international fund for accidents beyond the ability of an individual state to provide compensation. Hyman's resolution, "Magna Carta of Space," adopted by the Twelfth Conference of the Inter-American Bar Association, Bogota, Columbia Jan.-Feb. 1961 provides that, "An international insurance fund shall be established through some appropriate international association such as the United Nations for the payment of compensation for . . . damage."

128

In air law, payment of claims can be compelled by refusing permission to overfly territory until a bond is posted. See art. 15, para. 1 of the Rome Convention on Damage caused by Foreign Aircraft to Third Parties on the Surface, 1952, Senate Committee on Commerce, 89th Cong., 1st Sess., III Air Laws and Treaties of the World, 3221 (1965). A similar method of enforcement for activities in space is not available.

129

See Rauchhaupt, "The Damages in Space Law" Fifth Colloquium on the Law of Outer Space 5 (1962): "The usefulness of an international fund for the world space damages was also mentioned in discussions. But some states, as for instance Russia, are known for their neglect to pay their contributions to the United Nations: Therefore, it is to be feared that a new international fund might get into money difficulties soon and even get bankrupt, if the bad example should be copied by an increasing number of States. Nevertheless, it seems to be advisable that a special international authority should receive all necessary guarantees and money for the potential cases of world space damages and still better have them in their possession before the permission of the covered world space flight be granted."

130 See Wimmer, "Suggestions for an International Convention on Damages Caused by Spacecraft," Fifth Colloquium on the Law of Outer Space 6 (1962). After reference to de Rode Verschoor's argument for an international fund Wimmer says, "An obligation to pay a contribution to the Guaranty Fund could be imposed on those States only which themselves operate or have licensed spacecraft. Simultaneously an

130(continued)

obligation to pay additional contributions would have to be provided for in case the Guaranty Fund would be exhausted by payment of compensation. Those states, however, the spacecraft of which did not cause any damage will scarcely be prepared to pay any additional contribution to the Guaranty Fund."

131

John Cobb Cooper, "Memorandum of Suggestions for an International Convention on Third Party Damage Caused by Space Vehicles," Third Colloquium on the Law of Outer Space 144 (Stockholm, 1961).

132

Letter of Nov. 16, 1965, to the authors.

133

Studies on the probabilities of major or catastrophic damage from space activities have not for the most part distinguished sharply between domestic and international liability, although they have noted the lessening danger as distance from the launching site increases.

Thus, Rosenthal, Korn, & Lubman, supra n. 2 at

119 (1963) say: "At the present time, the danger of exceedingly large accidents abroad is less than at home. The damage which could be done by the crash of an errant space vehicle might depend on the amount of chemical fuel still unconsumed at the time of the crash; the greater the distance from the launch site, the smaller would be the damage." See also Hassialis, Bernstein, & O'Neill, supra n. 6 at

19 ff. (1964). After

discussing possible accidents, the authors note, at p. 33: "At this point, it is appropriate to emphasize once again that the events referred to [space accidents other than at the launching site] are possibilities, not likely events." Murchie, supra n. 10 at

Chap. 5 (1961) minimizes the probability of injury from falling meteorites and artificial satellites.

134. See Schrader, "Space Activities and Resulting Tort Liability,"
[hereinafter cited as Schrader]
17 Okla. L.Rev.139, 153-54 (1964) for an analysis of some of the
obstacles to the use of the International Court of Justice: limited
jurisdiction, the Connelly Amendment, failure of the U S S R and
other Communist nations to accept the court, etc. As is true with
agreements relating to liability for activities in the air, those
relating to liability for claims resulting from activities in space
will require periodic modifications to take into consideration
changing political, economic, and technological conditions.

135

See Cooper, "Memorandum of Suggestions for an International Convention Third Party Damage Caused by Space Vehicles," in Sen. Doc. No. 26, 87th Cong., 1st Sess. Legal Problems of Space Exploration, 682 (1961). "[A]ll states which are parties to the convention should agree to be subject to the compulsory jurisdiction of the International Court of Justice so that the state of the national suffering damage on the surface or in the air space can proceed against the launching state or states, jointly or severally"

See also Meyer, "Legal Problems of Outer Space," 28 J. Air L. & Comm. 339, 345 (1961): "[E]xclusively before the International Court of Justice." See Poulantzas, "The Chambers of the International Court of Justice and their Role in the Settlement of Disputes Arising Out of Space Activities," Seventh Colloquium on the Law of Outer Space 186 (1962); and "Legal Liability in Space," 104 Solicitors Journal 904 (1960).

136

See Schrader,

139, 153-54,

"The first obstacle to the

International Court of Justice's being the ideal forum from the injured plaintiff is the limited jurisdictional aspect of the court. In addition the Court may consider those cases in which jurisdiction is conferred on the Court by treaty outside the United Nations Charter

[T]he United States has enacted the much discussed Connally Reservation, which, in effect, states that the optional clause [of the Statute of the International Court of Justice, art. 36.2 (a), (c), (d)] does not apply to disputes with regard to matters which are essentially within the domestic jurisdiction of the United States of America

136(continued)

as determined by the United States of America. [I]t is obvious that if neither the United States nor the Communist World accept compulsory jurisdiction, this eliminates the World Court as a present or future forum for the settling of international disputes arising from space exploration." Even without the Connally reservations, there are other methods of avoiding the jurisdiction of the court.

¹³⁷ See supra Chap. 600 for a discussion of the arbitral arrangements established for the participants in Intelsat.

¹³⁸ Drafts of a proposed treaty submitted for UN consideration assumed negotiations between the states concerned but provided for those situations where the parties are unable to resolve their differences. UN Doc. No. A/AC.105/C.2/L.7/Rev. 2 (1964); U.N. Doc. No. A/AC.105/C.2/L.8/Rev.3 (1965); UN Doc. No. A/AC.105/C.2/SR.48, at 11 (1965) and UN Doc. No. A/AC.105/C.2/L.10/Rev. 1 (1964). The Treaty on Principles, art. VII, appears to contemplate only states could be parties to claims proceedings arising from activities in space.

139

UN Doc. No. A/AC.105/C.2/L.10/Rev. 1 (1964); UN Doc. No. A/AC.105/C.2/SR.13 (1962) at p. 5; UN Doc. No. A/AC.105/SR.29-37, at 88-89 (1965); UN Doc. No. A/AC.105/C.2/SR.48, at 11 (1965).

140

UN Doc. No. A/AC.105/C.2/L.7/Rev.2, art. 4 (1964). The Belgian draft reads: "[T]he State receiving the claim shall appoint one arbitrator, the applicant state shall appoint a second and the President of the International Court of Justice a third. If the State receiving the claim fails to appoint its arbitrator within a prescribed period, the person appointed by the President of the International Court of Justice shall be the sole arbitrator. The Arbitration Commission shall take its decisions according to law by majority vote . . . its decisions shall be binding." The United States drafts were similar in substance. UN Doc. No. A/AC.105/C.2/L.8/Rev. 3, art. VII (1965); U.S. drafts in UN Doc. No. A/AC.105/C.2/L.4, art. 3(e) (1964); UN Doc. No. A/AC.105/C.2/L.8/Rev.3, arts. IX and X (1965); Swedish position in UN Doc. No. A/AC.105/C.2/SR.11, at 2 (1962); Japanese position in UN Doc. No. A/AC.105/C.2/SR.13, at 9 (1962).

141

It is conceivable that treaties relating to space activities might be used as a vehicle for general review and modification of United States policy relative to the jurisdiction of international tribunals.

142

See comment of U.S. representative, UN Doc. No. A/AC.105/C.2/SR.55, at 6-7 (1965).

143

The subject is not mentioned in the Treaty on Principles.

The Vienna Convention on Liability for Nuclear Damage

(II International Legal Materials 727 [1963]; International Atomic Energy Agency Document CN-12/46 May 20, 1963) at art. XI provides: "[J]urisdiction over actions for nuclear damage shall lie only with the courts of the Contracting Party within whose territory the nuclear incident occurred." The 1933 Convention for the Unification of Certain Rules Relating to Damages Caused by Aircraft to Third Parties on the Surface (III Air Laws and Treaties of the World 3147, at 16 [1965]) gives jurisdiction to "the judicial authorities of the defendant's domicile and those of the place where the damage was caused, without prejudice to the injured third party's right of direct action against the insurer in a case in which it can be exercised." The Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, signed at Rome on Oct. 7, 1952, (III Air Laws and Treaties of the World 3221 [1965]) provides in art. 20 that "Actions under the provisions of this Convention may be brought only before the courts of the Contracting State where the damage occurred. Nevertheless, by agreement between any one or more claimants and any one or more defendants, such claimants may take action before the courts of any other Contracting State, but no such proceedings shall have the effect to prejudicing in any way the rights of persons who bring actions in the State where the damage occurred. The parties may also agree to submit disputes to arbitration in any Contracting State" Identity of the respondents under these treaties will

144 (continued)

usually be known in advance, and the presence of the instrumentality causing the damage will usually be pursuant to specific agreement.

145

See Cooper, "Memorandum of Suggestions . . ." supra n. 131, at 680:

"After thirty-five years of somewhat varied experience with flight law problems, I am convinced that practical uniformity in the field of liability can be accomplished in no other way than by international legislation. Waiting for eventual uniformity through the development of customary rules is impractical and much too slow in so dynamic a field of human action as flight."

146

Schra der, "Space Activities and Resulting Tort Liability," 17 Okla. L. Rev. 139, 156 (1964): "[F]rom a practical aspect, the space age is not ready to accept international conventions as a solution to the problem of liability[A]ny international convention on the subject of liability would be enforceable only if the Soviet Union and the United States were in agreement and accepted the terms and responsibilities imposed therebyBoth nations could promulgate domestic legislation without compromising their national sovereignty thereby allowing adequate recovery." McCollum, "Tort Aspects of Space Technology," 8 Clev.-Mar. L. Rev. 292, 304 (1959): "The exigencies of the matter make it necessary that agreement be reached pro re nata." Secretary of State Rusk in Hearings before the Senate Foreign Relations Committee on the Communications Satellite Act of 1962, at 177 (Aug. 6, 1962). stated: "I had always believed the genius of the common law was that it proceeded from case to case, refining its rules and norms out of the ore of experience and practice, solving problems pragmatically as they arise, rather than seeking to provide all the answers in advance through some sort of generalized code. We believe the law of space communications will grow in this organic way rather than by a process of abstract speculation. Where early international agreement--one might almost say 'legislation' is needed to move ahead, as in the case of frequency allocation, we will be prepared to take our place at the conference table."

147

UN Doc. No. A/AC.105/C.2/L.8/Rev. 3 (1965), U.S. draft art. II, para. 4. The American representative indicated this "was designed to

147 (continued)

insure uniformity in the determination of damages by reference to international law" and where necessary to "equity and justice" (UN Doc. No. A/AC.105/C.2/SR.48, at 4-5 [1965]), and subsequently added that these were "the sort of claims which arbitral tribunals had been settling for years without any great difficulty on the basis of international law" UN Doc. No. A/AC.105/C.2/SR.54, at 11 [1965]).

-148

"[T]he case for applying an international standard and avoiding the differences in particular national laws seemed very strong," U.K. representative, UN Doc. No. A/AC.105/C.2/SR.54, at 7, 14 (1965). "...seemed preferable," Canadian representative, UN Doc. No. A/AC.105/C.2/SR.54, at 8 (1965) "[O]nly the approach taken in the United States proposal was acceptable," Austrian representative, UN Doc. No. A/AC.105/C.2/SR.54, at 10 (1965). "The problems of collective responsibility seemed to point conclusively, as did many other arguments, to the use of international law as the law applicable under the Convention," Australian representative, UN Doc. A/AC.105/C.2/SR.54, at 10 (1965).

149

". . .not satisfactory since international law did not give any precise rules for such calculation," Mexican representative, UN Doc. No. A/AC.105/C.2/SR.48, at 8 (1965). "[V]ague and possibly controversial notions of justice and equity . . . as was evidenced by the fact . . . that moral damage was provided for under some systems and not under others," Belgian representative, UN Doc. No. A/AC.105/C.2/SR.54, at 7-8 (1965). Even the Canadian representative questioned

149 (continued)

"whether the principles of international law on the subject were sufficiently developed for such a clause to require no further elaboration," and suggested the possible substitution of "ex aequo et bono" for "equity and justice," U.N. Doc. No. A/AC.105/C.2/SR.54 at 8 (1965). The Soviet, Rumanian, and Hungarian representatives considered that "equity and justice" and "principles of international law on such matters, if they existed, could hardly be considered precise enough to be made the point of reference To invoke international law was simply to defer the whole question."

UN Doc. No. A/AC.105/C.2/SR.54, at 9, 11, 13 (1965).

150
 Belgian drafts, articles Ib, III, IV and Rev. 2, UN Doc. No. A/AC.105/C.2/L.7 (1964). The Rumanian, Swedish, Belgian, and French representatives variously supported applying the claimants law with the French representatives suggesting "[I]nterstate claims probably offered the best guide to the solution of the problem. When one State suffered damage as a result of the activities of another State, it submitted a claim in which the damage was assessed according to its own laws . . . [with] no fixed international compensation for particular damage or injury Only domestic law could settle such issues If a member of a Claims Commission was told not to apply the laws of the claimant state, he could only fall back on the laws of his own state" UN Doc. No. A/AC.105/C.2/SR.54, at 7,9-12 (1965). Jenks 290: "[A]ny . . . tort committed in space but taking effect on Earth, on the surface or in territorial airspace, would appear to be governed, subject to the general rules

150 (continued)

of international law and of any applicable international agreements,
by the law of the jurisdiction within which it takes effect."

151

"Even though it might not be conducive to uniformity," Swedish representative, UN Doc. No. A/AC.105/C.2/SR.54, at 10 (1965).

"It would be easier, furthermore, to obtain some uniformity among national provisions than to work out international rules," Romanian representative, UN Doc. No. A/AC.105/C.2/SR.54, at 11 (1965). "[T]he assessment of damages might then vary considerable according to the country where the damages occurred, and the possibility of special legislation being enacted by countries on the matter could not be discounted. The position would thus be uncertain, and States might be deterred from acceding to the Convention," Canadian representative, UN Doc. No. A/AC.105/C.2/SR.54, at 8 (1965). "[M]any practical and legal difficulties might arise if compensation was determined simply on the basis of the state whose nationals suffered the damage . . . practice varied from state to state," Soviet representative, UN Doc. No. A/AC.105/C.2/SR.54, at 9 (1965). "[T]he greatest diversity of solutions in the settlement of claims . . .," Austrian representative, UN Doc. No. A/AC.105/C.2/SR.54, at 10 (1965). "[D]id not see how the collective liability of several States could be worked out on the basis of an amount arrived at in accordance with the municipal laws of any one of the States concerned," Australian representative, UN Doc. No. A/AC.105/C.2/SR.54, at 10 (1954).

152

Hungarian draft UN Doc. No. A/AC.105/C.2/L.10, art. 2 and
Rev. 1, art. 2 (1965) supported by Czechoslovakia and Russia,
UN Doc. No. A/AC.105/C.2/SR.54, at 9 (1965).

153

"[T]he anomolous situation of a State determining by its own
national law the extent of its international obligations"

U.K. and Austrian representatives, UN Doc. No. A/AC.105/C.2/SR.54,
at 7, 9 (1965)

154

III Air Laws and Treaties of the World 3147, 3221 (1965).

155

Art. 20.

156

Art. 11.

157

Art. 10-21.

158

II International Legal Materials 727, arts. IV, V, VI (1963).

159

Arts. VIII, XI.

160

Louis B. Sohn & R. R. Baxter, The Harvard Draft Convention on International Responsibility of States for Injuries to Aliens, art. 78 [hereinafter cited as Sohn & Baxter]; (1961) see also art. 2.

161

The Convention on the Settlement of Investment Disputes between States and Nationals of other States, signed Mar. 18, 1965 (IV International Legal Materials 532, art. 42 [1965]) provides:

"(1) The Tribunal shall decide a dispute in accordance with such rules of law as may be agreed by the parties or in the absence of such agreement, the Tribunal shall apply the law of the Contracting State party to the dispute (including its rules on the conflict of laws) and such rules of international law as may be applicable. (2) The Tribunal may not bring in a finding of non liquet on the ground of silence or obscurity of the law. (3) The provisions of paragraphs (1) and (2) shall not prejudice the power of the power of the Tribunal to decide a dispute ex aequo et bono if the parties so agree."

162

The United States Constitution, art. I, § 8, expressly recognizes the existence of international law: "The Congress shall have Power . . . To define and punish Piracies and Felonies committed on the high Seas, and offenses against the Law of Nations."

163

1 Hackworth, Digest of International Law 24 (1940).

164

See, for example, Berger, "Some Aspects of Civil Liability for Space Craft and Vehicle Accidents," 33 Pa. Bar Assoc. Q. 301, 303-4 (1962): "A Case involving damage caused by crashing aircraft seems

164(continued)

to offer a situation similar to that of a wayward space vehicle and an analysis of the law applicable to this type of situation would be of some aid from the standpoint of possible precedent." See also Tager, "Liability for Space Activities" 25 (mimeo, McGill Univ., 1963);

"[O]perationally and in consideration of the legal effects that flow from these operations, airspace and space are one, perhaps designable as 'aerospace,' and as one, are amenable to an existing regime of international law--air law." But see UN ^{Gen. Assem.} Res. 1348 (XIII) 1958, para. 1(d): "[N]o international standards regarding safety and precautionary measures governing the launching and control of space vehicles has yet been formulated, and the fact could also be taken into account in studying analogies based on existing conventions."

McCullum, "Tort Aspects of Space Technology," 8 Clev. Mar. L. Rev. 292, 298 (1959): "If aviation is so different from land movement that a new body of law was deemed necessary, then certainly satellite movement is so different from that of aircraft that new law is necessary for this type of activity." Osnitskaya, The Conquest of Space and International Law 69 (State Publishing House of Legal Literature, Moscow, 1962); "While the principle of state responsibility for injury and damage can be applied, we cannot mechanically apply the concept of responsibility from air law. The cases in which responsibility will be recognized and what the scope of such responsibility will be, all need further study."

165

See Jessup & Taubenfeld, Controls for Outer Space and the Antarctic Analogy 242 (1959); "In the case of space vehicles used for

165(continued)

peaceful purposes it is not to be anticipated that the damage from an accident would have the catastrophic proportions of one involving an atomic power plant, except perhaps when space vehicles are propelled by atomic power."

166

See Goldie, "Some Problems of Liability Arising Out of Space Activities," Sixth Colloquium on the Law of Outer Space 17(Paris, 1963): "The development of international law analogies to enterprise liability of operators of nuclear facilities, would assure to individuals due compensation for injuries and loss from falling "space garbage' burnt up in the atmosphere thus creating a climate of confidence." The Treaty on Principles, ^{article} ~~III~~, states only that activities in space are to be carried on in accordance with international law, including the charter of the UN.

167

Erie R.R. v. Tompkins, 304 U.S. 64, 58 Sup. Ct. 817 (1938)

would make it necessary to utilize the law of the District of Columbia
to avoid variations in accordance with the laws of different states.

168

See Goldie, "Liability for Damage and the Progressive Development of International Law," 14 Int'l & Comp. L.Q. 1189, n.1 (1965): "Just as nuclear and space disasters provide examples of" transnational laws. These transnational laws, in their turn call for a greater degree of precision, amore rigorous standard of liability and a greater range of possible alternative rules than has been traditionally provided by public international law. "...While the one [international law] is suffiçiently wide in its geographical scope to cover the extent of such a disaster, it is too impoverished in concepts, power and reach against individuals, and the other [municipal law] is too parochial both in policy and jurisdiction."

See I Lauterpacht, Oppenheim's International Law 533, n. 1 (8th ed., 1955). "Measure of Damages and Interest. Great diversity of practice at present prevails amongst international tribunals upon these matters, and any general rules which might be laid down at present would need to be qualified by many exceptions." For a comprehensive discussion of all aspects of damages see Whiteman, Damages in International Law, 3 vols. (1937-43).

169

U.S. drafts submitted in connection with UN discussions for a treaty on liability suggested claims should be presented within a year (UN Doc. No. A/AC.105/C.2/L.4 [1962], arts; ^{art. IV} id. at L.8 [1964] art. IV L.7, [1964]; ^{id.} art. V L.10, [1964] art. X), but doubts were expressed that this was a long enough period for "cases in which the damage caused or the nature of the damage could not be immediately apparent." UN Doc. No. A/AC.105/C.2/SR.29-37, at 54 (1964).

170 UN Doc. No. A/AC.105/C.2/L.8/Rev. 1, art. IV (1964); ^{id. at} Rev. 2¹/₃

UN Doc. No. WG II/29 (1964) in UN Doc. No. A/AC.105/21, Annex II,
at 32 (1964); UN Doc. No. A/AC.105/C.2/L.8/Rev. 3 (1965); ^{id. at} UN Doc. No.
~~A/AC.105/C.2/L.7/Rev. 2 (1964).~~

171

UN Doc. No. WG V/17 in UN Doc. No. A/AC.105/19, Annex II, at 27 (1964); UN Doc. No. A/AC.105/C.2/SR.29-37, at 64 (1964).

172

The Brussels Convention on Liability for Nuclear Ships (57 Am. J. Int'l L. 268 [1962]) and the Vienna Convention on Liability for Nuclear Damage ^(II) International Legal Materials 727 [1963]) provide ten-year periods. The Japanese suggested that the period commence when knowledge of the damage is or should reasonably be known.

UN Doc. No. WGII/17 at UN Doc. No. A/AC.105/19 Annex II, at 27 (1964).

173

UN Doc. No. WG II/28 in UN Doc. No. A/AC.105/21, Annex II, at 31 (1964).

174

Hungarian draft, UN Doc. No. A/AC.105/C.2/L.10/Rev. 1, art. I, para. 1 (1964). The Treaty on Principles does not mention the point. It "is internationally liable for damage--by such object or its component parts" which would almost certainly include nuclear radiation damage.

175

Convention on the Liability of Operators of Nuclear Ships (Brussels, 1962) (57 Am. J. Int'l L. 268 [1962]); OEEC Convention on Third Party Liability in the Field of Nuclear Energy (Paris, July 1960), (55 Am. J. Int'l L. 1082 [1960]); Convention of January, 1963, Supplementary to the Paris Convention of July, 1960, on Third Party Liability in the Field of Nuclear Energy (II International Legal Materials 685¹²¹ [1963])

See Goldie, "Liability for Damage and the Progressive Development of International Law," 14 Int'l & Comp. L. Q. 1189, 1216, 1242 (1965) for brief discussion.

176

See Harvard Law School and Atomic Industrial Forum, Inc., International Problems of Financial Protection Against Nuclear Risk,

176(continued)

1959, 10: "It is characteristic of many radiation injuries that they may delay for many years in manifesting themselves. Thus the traditional periods which obtain in the United States may deprive a substantial percentage of plaintiffs of the chance to secure compensation." Compare Stason, Estep, & Pierce, Atoms and the Law 512 (1959) where favorable reference is made to a "contingent injury fund" plan which enables a claimant to be compensated from a special fund even after a long period but without reopening litigation between the claimant and respondent. The Treaty on Principles makes no reference to periods of limitation.

177 All drafts submitted in the course of UN negotiations so provide:

UN Doc. No. A/AC.105/C.2/L.8/Rev. 3, art. IV, para. 3 (1965):

id. at L.7/Rev. 2, art. ^{IV}4(a) (1964); *id. at*

L.10, art. X (1964). The Treaty on Principles follows

the state liability theory and, implication from silence, the concept that diplomatic channels will be the initial channel of communication.

178. See Sohn & Baxter,

art. 22, (Draft 12^①)

UN Doc. No. A/AC.105/C.2/L.4, art. 3(c) (1964); but see Sohn & Baxter, art. 1, para. 2(b), (Draft 12/1961) which requires exhaustion of local remedies as a method of limiting the number of situations in which a state becomes internationally responsible. The same problem is resolved in an opposite manner for space activities by making states primarily liable in all instances. Sohn & Baxter suggested that "If direct remedies should be made available to individuals, it may be expected that restrictions would be imposed upon the types of claims which might be submitted and that claims for insubstantial amounts might in particular be excluded." The Italian representative favored allowing the claimant access to municipal courts on the basis of simplicity of procedure and cost. UN Doc. No. A/AC.105/C.2/SR.29-37 at 68 (1965).

180/
5 Hackworth, Digest of International Law 501-26 (1943). See Poulantzas, "The Rule of Exhaustion of Local Remedies and Liability for Space Vehicle Accidents," Sixth Colloquium on the Law of Outer Space 3-6 (International Institute of Space Law of the International Astronautical Federation, Paris, 1963).

Latin American sensitivity to intervention by foreign governments in international claims has resulted in many of the constitutions containing provisions intended to prohibit or minimize assistance of foreign governments in such matters. Citations following are to OAS translations of constitutions available in 1965. Bolivia (1961) art. 20; Columbia (1886), art. 11; Costa Rica (1949), art. 19;

180 (cont.)

Ecuador (1946), art. 177; El Salvador (1950), arts. 19, 20, 21;
Guatemala (1956), art. 59; Honduras (1957), art. 27; Mexico (1917),
art. 27 (1); and Venezuela (1961), arts. 45 and 52.

181

The U S position has been to bar other remedies as soon as adjudication under the terms of the proposed liability treaty were commenced. The Treaty on Principles is silent on the subject. UN Doc. No. A/AC.105/C.2/L.8, art. VI (1964); but a 1965 draft, *id. at*

L.8/Rev. 3, forecloses use of the proposed convention if alternate remedies are pursued. A Belgian draft did not permit simultaneous pursuit of alternate remedies. *Id. at*

L.7/Rev. 2 (1964) and the U.K suggested an amendment to the U.S. draft similar in principle to the Belgian proposal.

UN Doc. No. A/AC.105/19, Annex II, at 27 (1964).

182

This will frequently not be possible for technical and political reasons. Thus, it seems unlikely that the United States and Communist China could be persuaded to join as claimants where both nations suffered damage as a result of a single incident. In situations where normal damage and also radiation damage occurred, the difference in the time in which damage became apparent would likely make it impossible to determine all claims in a single action. In some instances the same state may be at the same time both a claimant and a respondent.

183

See supra pp. 000-00 and Horsford, "Liability for Damage Caused by Space Operations" in II International Relations 657, 667 (1963): "It is likely that many claims will be multinational in character, since an object struck in orbit does not immediately fall to Earth as in aircraft collisions, but will continue to circle the Earth until in the case of the larger fragments which are able to withstand reentry heat, these fall to Earth over a wide area involving many countries. International procedures could ensure the consolidation of actions in this event, except where they arise from different incidents or causation." The Treaty on Principles, being silent on the point, must be presumed to call for the application of general rules of international law in accordance with art. III.

184

Belgian proposals called for joinder. "There shall be joinder of claims where there is more than one applicant in respect of the damage due to the same event or where more than one state is liable and the damage was caused by more than one space device." UN Doc. No. A/AC.105/C.2/L.7/Rev. 2, art. 4 (1964). Other proposals did not require joinder but some recognized the possibility. U.S. draft in UN Doc. No. A/AC.105/C.2/L.8/Rev. 3, art. VII, para. 2 (1965).

185. This problem was recognized in a U S draft providing for collective appointment of the arbiter. UN Doc. No. A/AC.105/C.2/L.8/ Rev.3, art. VII, para.1 (1965).

186

Lipson & Katzenbach, The Law of Outer Space 87 (1961).

187

le/ The Belgian and Hungarian drafts were rather narrow. UN Doc. No. A/AC.105/C.2/L.10/Rev. 1, Art. I (1965), the Hungarian draft, suggested "an object launched into outer space--caused in outer space, in the atmosphere or on the ground by any manned or unmanned space vehicle or any object after being launched, or conveyed into outer space . . . even if . . . the space vehicle or other object has not yet reached outer space." UN Doc. No. A/AC.105/C.2/L.7, art. 1 (1964), the Belgian draft suggested "any device which is intended to move in space, remaining there by means other than the reaction of the air."

188

A revised U S draft, UN Doc. No. A/AC.105/C.2/L.8/Revs. 2 and 3 (1964 and 1965, respectively), Art. II, para. 1, provided "for damage on the earth, in air space, or in outer space, which is caused by the launching of an object into outer space, regardless whether such damage occurs during launching, after the object has gone into orbit, or during the process of re-entry, including damage caused by apparatus or equipment used in such launching." An Indian amendment endeavored to clarify the distinction between spacecraft and aircraft. UN Doc. No. W.B. II/20 (1964) at UN Doc. No. A/AC.105/21, annex II, at 28. Earlier U.S. drafts were neither so broad nor so detailed: UN Doc. No. A/AC.105/C.2/L.8 (1964); UN Doc. No. WG II/1 (1964) Art. II, para. 1. A revised Belgian draft (UN Doc. No. A/AC.105/C.2/L.7/Revs. 1 and 2 [1964]) with Italian amendments (UN Doc. No. W.G. II/2 [1964] at A/AC.105/19, Annex II, at 13), while not as detailed, was about as broad as the later U.S. drafts.

189

In the general articles of the treaty the phrase "the exploration and use of outer space" is used. Art. [#] 7 ^{icle} refers to "the launching of an object into outer space--by such object or its component parts on the earth, in air space or in outer space" The lack of clarity reflects the difficulty of obtaining agreement.

190

A meteorite or other natural phenomena could be the cause. A nation might for propaganda or for obtaining foreign currency, present unsubstantiated claims. Too, less developed countries may not have the scientific and technical ability to make the necessary tests.

191

See Crane, "Soviet Attitud^e Toward International Space Law," 56 Am. J. Int'l L. 685, 708 (1962): "[I]t might [be] that the Soviets recognize liability for any damages their space ships might cause, contingent, however, upon the recognition by other states of a Soviet right to the return of any and all Soviet space equipment and crew which enter the territory of these states in connection with the incident causing the damage or at any other time."

192

Christol, The International Law of Outer Space 308 (1966): "The serious difficulties attendant upon the verification and inspection of nuclear tests conducted by one state are similar to the problems in the launching of space vehicles. Thus, for reasons of sovereignty, security and self-defense, seasoned by the Soviet's large passion for secrecy, it has not been possible to arrive at a process for prelaunch inspection and identification of artificial satellites."

193 ^{Gen. Assem.} Res. 1721 (XVI), UN Doc. No. A/5100 (1961).

194 See UN Doc. No. WB II/19, at A/AC.105/21, Annex II, at 28 (1964); UN Doc. No. A/AC.105/C.2/L.8/Rev. 1 (1964) in which a launching state is identified as a "state which has notified the Secretary-General of the United Nations of the launching of a space device and given the data necessary for its identification" The draft suggested that a state failing to give notice of a launching "may not take advantage of the limitation of liability referred to in the following article."

195 UN Doc. No. A/AC.105/C.2/SR.51, at 5,6 (1965).

196

Goldie, supra n. 168, at

1189, 1216, 1229, 1240-41

(1965) suggests a general trend in all areas of international law toward the principle of absolute liability and notes "absolute liability has been imposed in four recent international agreements on liability to third parties in the field of nuclear energy. These agreements incorporate the concept of 'channelling,' which traces liability back to the nuclear operator, no matter how long the claim of causation, nor how novel the intervening factors [other than a limited number of exculpatory facts]." At 1231 he argues that the Trail Smelter and Corfu Channel cases represent a trend toward strict liability where one state creates unnecessary hazards for others and suggests that creation of risk may be likened to expropriation. Sohn & Baxter,

Draft 12 with Explanatory Notes, 1961 suggest that there are insufficient cases to justify an attempt to formulate any rigid principles purporting to govern cases which may arise in the future.

197 UN Res. 1348 (XIII) (1958), para. 1(d); Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, Rome, Oct., 1952, III Air Laws and Treaties of the World 3221 (1965); Meyer, "Legal Problems of Outer Space," 28 J. Air L. & Comm. 339, 345 (1961-62) reports a German Legal Committee has recommended that: "Compensation should be paid upon proof only that the damage was caused by a spacecraft in flight or persons or things falling therefrom, or by collisions between aircraft and spacecraft."

198 UN Res. 1962 (XVIII) *para. 8 (1963)* provides that "each State which launches or procures the launching of an object into outer space, and each State from whose territory or facility an object is launched is internationally liable for damage to a foreign State or to its natural or juridical persons by such object or its component parts on the Earth in air space, or in outer space." See also draft proposals in UN Doc. No. A/AC.105/C.2/L.7/Rev. 2, Art. 1(b) (1964); UN Doc. No. A/AC.105/C.2/L.8/Rev. 3, Art. II, 1 (1965); UN Doc. No. A/AC.105/C.2/L.10/Rev. 1 (1965); and comments in UN Doc. No. A/AC.105/C.2/SR.50 (1965), all of which support the general concept of absolute liability.

199 See for example, para. 13 of the Resolution on the Legal Regime of Outer Space, Institute of International Law, Brussels, (1963), reprinted in Jenks, Space Law 416, App. 9 (1965); Hyman, Magna Carta of Space 304a, Art. 13 (1966); Csabafi, "The Questions of International Responsibility of States before the United Nations Committee on the Peaceful Uses of Outer Space and Some Suggestions," Sixth Colloquium on the Law of Outer Space 21 (1963); McMahon, "Legal Aspects of Outer Space," 38 Brit. Yr. ^{bk.} Int'l L. 389 (1962).

200

Sperry, "Space Law: Surface Impact Liability of Space Vehicles,"

14 Okla. L. Rev. 89, 93-94 (1961).

201

Vasquez, Cosmic International Law 115 (Malloy trans. 1965)

citing the 1919 Paris and the 1944 Chicago conventions relative to aircraft liability.

202

Rinck, "Damage Caused by Foreign Aircraft to Third Parties,"

28 J. Air L. & Com. 405, 407 (1961-62); Haley, "Space Vehicle Torts,"

36 U. Det. L. J. 294, 294 (1959): "With the growth of the machine

age which produced more numerous instances of serious property damage

and personal injury it was felt necessary to extend the doctrine of

absolute liability in order to place the loss on those who, though

free from negligence or tortious intent, had control over the

instrumentality causing the harm and who, in most cases, were better

able to foresee the possibility of financial loss and protect against

it." Harvard Law School Study, International Problems of Financial

Protection Against Nuclear Risk 10 (1959). "[I]nsofar as any

precautions and protective measures can be taken, those in charge

of an atomic facility are in a position to take them whereas potential

victims have relatively ^{little} ability to protect themselves."

203 supra n. 2, at 139, 149;

Schrader,

Haley, "Space Vehicle Torts," 36

U. Det. L. J. 294, 298 (1959): "as technology advances and rockets

become less of a novelty it is probable that the rule will be changed

and that, as in the case of aircraft, liability will be based solely

on fault"; Jessup & Taubenfeld, Controls for Outer Space and the

[hereinafter cited as Jessup & Taubenfeld];

Antarctic Analogy 243-44 (1959); Goldie, supra n. 1, at

203 (continued)

1189, 1197 (1965).

204

supra n. 203, at

Haley,

294, 298 (1959);

de Rode-Vershoor, "The Responsibility of the States for the Damage Caused by the Launched Space Bodies," Legal Problems of Space Exploration, A Symposium, S. Doc. No. 26, at 460 (1961); de Rode-Verschoor, "Recent Developments Regarding Liability for Damage Caused by Spacecraft," Seventh Colloquium on the Law of Outer Space 251 (1964); Harvard Law School Study, International Problems of Financial Protection Against Nuclear Risk 19 (1959); Schrader, supra n. 2, at

139, 153;

Csabafi, "The Question of International Responsibility of States Before the United Nations Committee on the Peaceful Uses of Outer Space and Some Suggestions," Sixth Colloquium on the Law of Outer Space 15 (1963); Vasquez, Cosmic International Law 115, 123 (Malley trans. 1965); Goldie, supra n. 1, at

1189, 1212,

1214. "[T]heories of risk creation as expropriation. . ."; UN Doc. No. A/AC.105/C.2/SR.50, at 6 (1965): "[H]azardous activities were tolerated only on condition that the person engaging in such activities assumed responsibility for any damage resulting, whether attributable to fault on his part or to mere accident"; and at pp. 9 and 10: . . . the question of civil liability for handling a very dangerous or potentially dangerous object" . . . any one undertaking a dangerous activity had to accept absolute liability for the results."

205

"An activity is ultrahazardous if it necessarily involves a risk of serious harm to the land, chattels or person of others which cannot be eliminated by the exercise of the utmost care, and if it is not a matter of common usage." Restatement, Torts § 835 and § 520.

206

Berger, "Some Aspects of Civil Liability for Spacecraft and Vehicle Accidents," 3 Pa. B. Ass'n. Q. 301, 304-5 (1962).

207

A revised Hungarian draft, UN Doc. No. A/AC.105/C.2/L.10/Rev. 1, art. V (1965), read: "The State shall assume liability for damage . . . if the damage occurred while exercising an unlawful activity in outer space or the space vehicle or object was launched for unlawful purposes, or if the damage has otherwise resulted from an unlawful activity" See to the same effect UN Doc. No. A/AC.105/C.2/SR.29-37,86 (1964) representing the Russian view. See comment by Crane, "Soviet Attitude Toward International Space Law," 56 Am. J. Int'l L. 685, 709 (1962).

208

McMahon, "Legal Aspects of Outer Space," 38 Brit. Int'l L. 339, 387 (1963): "A third suggestion is that liability may well depend on the nature and character of the activity that is being pursued. If it is primarily of a military nature and for the benefit of one country, no doubt liability should be absolute. If it is of a commercial nature and such as to benefit a large number of States, liability may well be imposed only for negligent conduct However . . . the insoluble difficulty is to disengage a commercial from a military activity for this purpose."

209

UN Doc. No. A/AC./C.2/SR.50, passim (1965).

210

For discussions of the general principle see, Keeton, "Conditional Fault in the Law of Torts," 72 Harv. L.Rev. 401, 405 (1959): "[T]he gist of the argument is that in this way a loss will be spread more generally in the community among those who benefit from the activity out of which the loss arises." Stason, Estep, & Pierce, Atoms and the Law 772 (1959): "In our society there is a definite trend toward the establishment of enterprise liability in conjunction with the sale of products in our economy . . . the supplier is more likely, than is the injured person, to be able to suffer the economic losses or to take steps to minimize them." Calabresi, "The Decision for Accidents: An Approach to Nonfault Allocation of Costs," 78 Harv. L. Rev. 713, 714 (1965). Keeton & O'Connell, "Basic Protection--A Proposal for Improving Automobile Claims Systems," 78 Harv. L. Rev. 329 (1964): "As the definition of negligence is broadened to include instances of conduct not morally blameworthy, the argument becomes stronger for treating such losses as costs of motoring to be distributed equitably among motorists through insurance, rather than to be borne by either of the parties to the particular accident." The analogy here is obviously not very strong as there is substantial difference between an individual driving a car and a state launching a space vehicle.

211 Compare Goldie, supra n. 1, at

1189, 1200:

"As a general rule of policy for compensating harms caused by extrahazardous or security-cloaked activities, resort to making

211 (continued)

ex gratia payments on compassionate grounds constitutes a most unsatisfactory situation. At law fault liability would, in all probability remain the governing principle. But in practice this would mean little more than a legal fiction which closes the doors of the courts to injured parties and encourages them to seek redress from the legislature But if a standard akin to a principle of strict liability is developed de facto in administrative practice, why not accept the form of liability de jure to be applied by the courts as a rule of law."

212

Compare Horsford, "Liability for Damage Caused by Space Operations," II International Relations 657, 659 (1964): "Where liability is readily attached legal procedures could ensure a swift settlement of claims, and in the present state of the art absolute liability would seem to be a reasonable proposition, especially if combined with a limitation on the amount of damages."

213
See Calabresi, supra n. 210, at

713,

715: "There are ways to reduce the primary cost of accidents--their number and severity--that can, indeed must, be an important aim of whatever system of law governs the field. One way is to discourage those activities that result in accidents and to substitute safer ones. Another is to encourage care in the course of an activity." Keeton, "Conditional Fault in the Law of Torts," 72 Harv. L. Rev. 401, 439 (1959): "Responsibility for injuries caused to others serves as a selector of socially useful activities and methods Though economic incentive is only one factor among many in the complex motivation for accident prevention, it can be an important one. In the absence of responsibility for injuries caused, it tends to work against safety." De Rode-Verschoor, "Recent Developments Regarding Liability for Damage Caused by Spacecraft," Seventh Colloquium on the Law of Outer Space 251, 252-53 (1965): "This effort [to avoid accidents] will also be furthered by the adoption of the principle of absolute liability." UN Doc. No. A/AC.105/C.2/SR.50, at 9 (1965). See generally Lipson & Katzenbach, abstracts

411-18

214

See Blum & Kalven, "Public Law Perspectives on a Private Law Problem--Auto Compensation Plans," 31 U. Chi. L. Rev. 641, 701 (1965): "Whatever little we may know about deterrence, it seems plausible that liability rules will have a more marked impact on accidents due to fault than on those not caused by fault."

215

See the early statement of McDougal, ⁱⁿ "Legal Problems of Space Exploration, ~~A Symposium~~, ^{included in} Proceedings, American Society of International Law at its Fiftieth Annual Meeting 1956, Senaté Doc. 26, at 87 (1961): "If the purposes here are so advantageous that everybody wants to secure them, then Rylands v. Fletcher will not be the answer. There will not be absolute liability. Reasonableness will be the key to decision."

216

Haley, supra n. 203, at 294, 299;

Berger, supra n. 206, at

301, 303; Jessup & Taubenfeld, 243;

UN Doc. No. A/AC.105/C.2/SR.1 (1962); Schra der, supra n. 203, ibid.;

Crane, "Soviet Attitude Toward International Space Law," 56 Am. J. Int'l L. 685, 709 (1962): "[O]ne might expect that the Soviets' opposition to inspection would influence them to accept absolute liability for any harm caused by their space vehicles, in order to avoid any investigations concerning the existence or absence of due care of negligence on their part." Many details of U.S. space activity are also highly classified.

217

See for example, UN Doc. No. A/AC.105/C.2/SR.29-37 at 107 (1964). The Indian representative suggested: "It [absolute liability] was hedged by concepts of negligence, fault and vis major which virtually nullified the recognition of absolute liability." See Canada to the same effect in UN Doc. No. A/AC.105/19, Annex II, 23 (1964).

218

UN Doc. No. A/AC.105/C.2/L.7/Rev. 2 (1964); UN Doc. No. A/AC.105/C.2/L.8/Rev. 3 (1965); UN Doc. No. A.C. 105/C.2/L.10/Rev. 1 (1965).

219

UN Doc. No. A/AC.105/19, Annex II, 23 (1964).

220

The value of human life as such varies greatly in different cultures, and it is quite possible that in some areas authorities might be willing to trade lives for foreign exchange.

221

See Prosser, Law of Torts 443-49 (1964) for a discussion of comparative and contributory negligence and of the lack of uniform usage of terms.

222

Canada suggested: "[W]illfully and recklessly exposed himself to dangers of which he was warned and which he could have avoided."

UN Doc. No. A/AC.105/19, Annex II, at 23 (1964). The U.S stressed
 AA "[W]illful or reckless act or omission" . . . did not mean mere negligence but was rather tantamount to 'gross negligence.'"

UN Doc. No. A/AC.105/C.2/SR.50, at 6 (1965).

223

Belgian comment to UN Doc. No. A/AC.105/C.2/SR.50, at 5 (1965) but see U S -U K comments to the contrary at p. 8.

224

C A Hungarian proposal specifically so provided, UN Doc. No. A/AC.105/C.2/L.10/Rev. 1, Art. III (1965); and the Hungarian representative suggested that the other proposed drafts indirectly did the same, UN Doc. No. A/AC.105/C.2/SR.50, at 7 (1965). U.S. and Belgian representative indicated their drafts were not intended to exonerate a respondent on the basis of force majeure; UN Doc. No. A/AC.105/C.2/SR.50, at 5-6 (1965). The U.K. representative indicate: "In his view the possibility of natural disaster was a risk which should be borne by the launching State" But for the launching would the damage have occurred? The Czechoslovak and Russian representatives favored at least partial exoneration in case of force majeure.

224 (continued)

UN Doc. No. A/AC.105/C.2/SR.25, at 9 (1964) and /SR.50, at 5 (1965).

Osnitskaya, The Conquest of Space and International Law 5 (1962).

Id. at 65 favors exoneration in cases involving force majeure.

Vasquez, Cosmic International Law 114 (Malley trans. 1965) distinguishes between rockets intended to leave earth and those intended to return to earth and would apply a force majeure exception only as to the first category. The Treaty on Principles does not mention an exception for force majeure or any other reason.

225

In UN Doc. No. W.G.II/9 (1964) at UN Doc. No. A/AC.105/19, Annex II, at 14-15 (1964) Italy suggested no exception in the case of force majeure when the damage is on the surface of the earth because the victims have "no possibility of protecting themselves," but fault principles should apply when two space activities are involved. Canada agreed. UN Doc. No. A/AC.105/19, Annex II, at 23 (1964).

226

A Hungarian proposal suggested that as between space activities there should be joint and several liability where a third state was a claimant for liability, UN Doc. No. A/AC.105/C.2/SR.50, at 7 (1965). But a Czech statement suggested a respondent should be "relieved of liability if the damage was due to harmful acts of other states," UN Doc. No. A/AC.105/C.2/SR.25, at 9 (1964). The Soviets supported the Hungarian position, UN Doc. No. A/AC.105/C.2/SR.50, at 3-4 (1965). The U.S. proposals imposed absolute liability on the launching state for any accident whatever, UN Doc. A/AC.105/C.2/L.8 Rev. 3, Art. II (1965). See, for general discussion, McDougal, Laswell, & Vlasic, 606-20.

227

"In the case of collision of space vehicles in outer space, the idea of the absolute liability of the launching state made no sense at all" Mexican comment in UN Doc. No. A/AC.105/C.2/SR.50, at 3-4 (1965). For comments see McDougal, Laswell, & Vlasic, 623-24:

"[I]t would seem a sound policy to dispense in such situations [collisions] with the principle of absolute liability, recommended for surface impact damage" Ghabafi, "The Question of International Responsibility of States before the United Nations Committee on the Peaceful Uses of Outer Space and Some Suggestions," Sixth Colloquium on the Law of Outer Space 17 (1963): "In this case the application of the principle of absolute liability would result in the absurdity that the parties should be bound to refund mutually each other's damages."

228

UN Doc. No. A/AC.105/C.2/L.8/Rev. 3, Art. II (1965).

229

U.S. Comments in UN Doc. No. A/AC.105/C.2/SR.50, at 4-5 (1965), where it was also noted that: "If some willful or reckless act or omission was involved, the liability of one state would be wholly or partially extinguished under the United States proposal." The Austrians, supported by the British, pointed out the difficulty a claimant state would have in establishing negligence and questioned the advisability of including a provision likely to be unworkable in practice. UN Doc. No. A/AC.105/C.2/SR.50, at 708 (1965). Under the Treaty on Principles it would seem that each state would have to pay the damage caused the other state in the event of a collision, etc.

230

Liability arising from interference with communications will be discussed in Chap. 6. In general, no justification is seen for establishing a set of liability rules for space communications separate from rules for radio communications generally, as both airspace and outer space have been used for radio communications for some time.

231

See Eagleton, "Measure of Damages in International Law," 39 Yale L.J. 53, 53 (1929): "The ideal form of reparation, doubtless, is the restoration of the situation exactly as it was before the injury Such a solution, however, is rarely possible in international law. . . . The usual, and almost exclusive, method of reparation . . . is pecuniary payment." See also Csabafi, "The Question of International Responsibility of States Before the United Nations Committee on the Peaceful Uses of Outer Space and Some Suggestions," Sixth Colloquium on the Law of Outer Space 19 (1963).

232

Fitzgibbons, "Compensation for Intangible Elements of Value of Expropriated Property Under International Law" Harv. Int'l L. Club J. 177, 179 (1963).

233

Cooper, "Memorandum of Suggestions for an International Convention on Third Party Damage Caused by Space Vehicles," Problems of Space Exploration, S. Doc. No. 26, 87th Cong., 1st Sess. 680, 683 (1961).

234

UN Doc. No. A/AC.105/C.2/L.8/Rev.3, art. I(a) (USA).

235

UN Doc. No. A/AC.105/C.2/L.10/Rev.1, arts. I, II (1965) (Hungary).

236

UN Doc. No. A/AC.105/C.2/L.7/Rev.2, art. 2 (1965) (Belgium).

237

UN Doc. No. A/AC.105/C.2/SR.48, at 708 (1965). The Mexican representative suggested that inclusion of damage in air or outer space raised complicated issues of fault whereas liability for damage on the surface would be absolute. Demarcation of airspace and outer space was also raised.

238

UN Doc. No. A/AC.105/C.2/L.8/Rev.3, Art. II (1965).
 UN Doc. No. A/AC.105/C.2/L.8/Rev.3, Art. 1 (1965). UN Doc. No. A/AC.105/C.2/L.7/Rev. 2 and Corr. 1, 2, and 3 and W.G. II/27, Art. II (1965).
 See comments in UN Doc. No. A/AC.105/C.2/SR.48, at 8, 9, 13 (1965).

239

UN Doc. No. A/AC.105/C.2/SR.49, at 3, 4, 5 (1965).

240

UN Doc. No. A/AC.105/C.2/SR.48, at 3-13 (1965).

241

Stason, Estep, & Pierce, Atoms and the Law 8-36 (1959);
 O'Toole, "Radiation, Causation, and Compensation," 54 Geo. L.J. 751-76 (1966); UN Doc. No. A/AC.105/C.2/SR.48, at 2-12 (1965).

242 The decision as to how to cover liability for nuclear damage is primarily a policy rather than a legal question, but the Vienna Convention might well be used as a model.

243 The Hungarian draft, by implication, would probably have excluded such damages unless they were covered by the law of the respondent. UN Doc. No. A/AC.105/C.2/L.10/Rev.1, Art. II (1964). Emphasis has consistently been on physical damage caused by physical impact, although there are numerous situations under which damage other than that of physical impact might be suffered.

244 See Gsovski & Ruis, "Liability under Soviet Law for Damages or Personal Injury Caused by Space Vehicles," Library of Congress mimeo, 17- (1959). "The Soviet courts consistently followed the principle that compensation for non-property damage may not be adjudicated, and the same opinion prevails among Soviet writers. Compensation may not be granted for mental anguish, pain or other suffering not accompanied by material loss."

245.

UN Doc. No. A/AC.105/C.2/L.7, Aat. I(b) (1964).

246

Compare Sohn & Baxter, "Responsibility of States for Injuries to the Economic Interests of Aliens," 55 Am. J. Int'l L. 545, 583 (1961) where articles 36 and 38 of the proposed convention make provisions for interest and costs.

247

Amounts set by International agreement are frequently very difficult to revise. To obtain agreement to increase the liability for deaths resulting from aircraft accidents from less than \$10,000 to \$75,000, coupled with absolute liability, it was necessary for the United States to denounce the 1929 Warsaw Convention on the Unification of Certain Rules Relating to International Transportation by Air, 49 stat. 3000 (1934); TS876, 53 Dept. of State Bull. 923 (Dec. 6, 1965). Washington Post, May 1, 1966, at p. A3. The negotiations are continuing and sharp disagreement between the U.S. government and U.S. airlines is quite apparent. The Treaty on Principles makes no reference to limitations on amounts which may be recovered.

248

The amount of compensation paid in the U.S. as a result of deaths from air accidents varies greatly. In a 1964 case, a N.Y. court found Sabena guilty of "willful misconduct" on an international flight under the Warsaw Pact and awarded \$207,705 to the estate of Leroy. New York Times, Mar. 19, 1964, at 66, col. 2. A 1960 case involving Kamlet's death called for a \$600,000 settlement, with many other cases settled out of court. New York Times, Feb. 25, 1964, at 33, col. 7. Congress voted \$25,000 to the estate of each member of a U.S.N. band killed Feb. 20, 1960, in a plane crash in Brazil. Brazilian law permitted a very small recovery of less than \$200. New York Times, Aug. 3, 1966, at 16, col. 8 and Oct. 6, 1966, at 14 col. 2. Other awards have exceeded one-and-three-quarters million dollars. The three astronauts killed in a Cape Kennedy mishap Jan. 27, 1967, carried \$100,000 private insurance in addition to regular military benefits.

248(continued)

However, compare this with 42 U.S.C. 24 73 (13) (Sec. §203[b] [13] of the U.S. NASA Act) which authorized NASA "to consider, ascertain, adjust, determine, settle, and pay, on behalf of the United States, in full satisfaction thereof, any claim for \$5,000 or less against the United States for bodily injury, death, or damage to or loss of real or personal property resulting from the conduct of the Administrations function as specified" Claims for amounts in excess of \$5,000 must be submitted to Congress for consideration. Congressional relief is very slow. See, for example, Public Law 89-757 approved Nov. 5, 1966, authorizing the Secretary of the Army to settle claims for death or personal injury resulting from an ordinance plant explosion on July 8, 1963. Limit per claim was set at \$25,000. An agreement dated Jan. 17, 1967, with the U.K. for a tracking station in Antigua refers to 42 U.S.C. 2473 as the basis on which claims arising from acts or omissions of U.S. personnel connected with NASA "will be considered and settled." Other claims arising from acts or omissions connected with the tracking station "mah" be settled in accordance with applicable provisions of U.S. law.

249

This conclusion is supported by many respected international law authorities. See, for example, Borchard, The Diplomatic Protection of Citizens Abroad 423 (1927): "It is . . . difficult to bring within any established rule the measure of damage in tort cases, inasmuch as each case depends upon its own peculiar facts, and inasmuch as

249(continued)

arbitrators exercise a wide discretion in determining the elements of loss which may enter into the allowance of compensation." Eagleton,

"Measure of Damages in International Law," 39 Yale L.J. 52, 75 (1929):

"A large amount of freedom must be left to the judge"

Fitzgibbons, "Compensation for Intangible Elements of Value of

Expropriated Property Under International Law," 4 Harv. Int'l L. Club J.

177, 211 (1963): "[T]he weighing of evidence of value must inevitably

involve the use of discretion by the decision maker with principle

reliance upon the particular circumstances of the controversy."

250

See Prosser, Selected Topics on the Law of Torts 426 (1963).

251

Compare Fitzgibbons, "Compensation for Intangible Elements of Value of Expropriated Property Under International Law," 4 Harv. Int'l L. Club J. 177, 203-4 (1963): "Through a lump-sum payment, two States can do their compromising in one inclusive negotiation rather than in the course of a multitude of individual arbitrations. The claimant State is then able to distribute the amount received in settlement according to its own concepts of fairness and efficiency."

252

See Eagleton, supra n. 231, at 50, 52, 75:

"Such precedents have fixed with fair accuracy the amount to be allowed for false imprisonment, or the measure of damages in death cases. The only principles which need be stated are that the judge is free to award indirect damages, but that he is limited in the award to damages proximately caused by the illegal act, and in the calculation of the damages to those reasonably capable of estimation."

253

UN Doc. No. A/AC.105/C.2/SR.48, at 5 (1965), where the United States representative suggested, "[I]t was customary to take into account the nature and extent of the bodily injury, loss of earnings, and so on. In death, it was proper to take into account, which the deceased would probably have contributed to members of his family; the value of his personal services and the mental suffering sustained by the members of his family."

254 Compare Fitzgibbons, supra n. 251, at 211, on the practice in the area of expropriation: "The nature of the action of the expropriating State would also seem to have an effect on compensatory evaluation. Individual, and outwardly predatory takings receive less sympathetic treatment" See also Art. V of the proposed Hungarian draft which imposes heavier liability for space accidents caused "while exercising an unlawful activity." UN Doc. A/AC.105/C.2/L.10/Rev.1 (1965).

255 Compare statement by Lowenfeld, chairman of the U.S. delegation to the Special International Civil Aviation Organization Meeting on Limits for Passengers under the Warsaw Convention and the Hague Protocol, Montreal, Canada, Feb. 1-15, 1966, 54 Dept. of State Bull. 580, 584 (1966): "The theory of Compensation is, after all, to restore the survivors, to the extent money can do so, to the position that they would have been in but for the accident. There is no attempt to punish the person responsible for the accident."

256 The U S and Hungarian draft conventions considered by the UN in 1965 included provisions for overall limitations, although the amounts were left open. UN Doc. No. A/AC.105/C.2/L.10/Rev.1, Art. II (1965) and UN Doc. A/AC.105/C.2/L.8/Rev.3, Art. IX (1965). The Belgium representative indicated no objection to the principle, UN Doc. A/AC.105/C.2/SR.55, at 3 (1965). Representatives of several other countries indicated interest and possible agreement although most were uncertain of their position. Czechoslovakia, UN Doc. No. A/AC.105/C.2/SR.29-37, at 80 (1964); Mexico, UN Doc. No. A/AC.105/C.2/SR.48, at 8, 13 (1965); Italy, SR. 29-37, at 69 (1964) and SR.50, at 3 (1965); Goldie, supra n. 1, at

1189, 1218

257 The Price-Anderson Act of 1957, 42 U.S.C. 2210, included a 500-million dollar ceiling.

258 See discussions in UN Doc. No. A/AC.105/C.2/SR.29-37 at 64, 107 (1964); UN Doc. No. A/AC.105/C.2/SR.48, at 8, 9 (1965); UN Doc. No. A/AC.105/C.2/SR.49, at 3-8 (1965); UN Doc. No. A/AC.105/C.2/SR.55, at 3-6 (1965). See also Hinograni, "Damages by Satellite," 30 U. Kan. City L. Rev. 214, 217 (1962).

259
Woods, President, IBRD, in a speech given Sept. 27, 1965, to
the Board of Governors: "It is urgent for many of them [underdeveloped
countries] to cut down some of the biggest items of waste . . .
prestige projects"

260

See Goldie, supra n. 1, at

1189, 1218-1220;

"It would seem consistent with the functional thesis of this article that the actual amounts of these maxima should be calculated upon the basis of types of social situations to which they are applicable. The suggestion is, furthermore, that different classifications of space activities, for example, should be agreed upon by treaty, and the maximum amounts which may be awarded should vary with these classifications. These classifications, and the relevant maximum amounts, should be seen as proportional to the degree of expropriation engendered, and in inverse ratio to the degree of shareability of the activities.... Variations in living standards and of the cost of living among nations, possible balance of payment and other currency problems, all provide political considerations which can best be solved by negotiations...."

261 53 Dept. of State Bull. 924 (1965). McDougal, Lasswell, & Vlasic, Law and Public Order in Space 619 (1963) note that: "[T]he imposition of absolute liability for surface impact damage upon the operator, with limits as to the amount of liability, even though in many respects desirable, does, however, present certain problems. Maximums prescribed may be far from adequate to cover the actual loss suffered." Jessup & Taubenfeld, Controls for Outer Space and Antarctic Analogy 246, 348 (1959) refer to the Warsaw Convention: "In exchange for establishing a prima facie case on behalf of anyone showing a contract of carriage plus injuries sustained, and limiting the defenses available to an aircraft operator, the convention limited

261 (continued)

the maximum claim on behalf of a person injured or killed to . . . about \$8,300 The limitations . . . have been defended on the basis of a need to protect an infant industry against threat of catastrophic losses which would make it impossible to raise capital, uniformity of law, the availability of insurance to passengers--arguments that may be heard when commercial space vehicles for transport purposes become feasible."

262 See Lowenfeld's statements in 54 Dept. of State Bull. 580 (1966) with reference to the Warsaw Convention: "[O]nly when the limit has been very low, as under Warsaw, has the limit tended to be the average--in fact generally the automatic sum at which claims are settled "We propose that the limit of liability under Hague or under Warsaw be increased to \$100,000 per passenger We have no reason to believe that a limit set at \$100,000 per passenger would tend to become the average recovery in the United States or anywhere else."

263

UN Doc. No. A/AC.105/C.2/SR.55, at 3,4 (1965). It may be argued that apportionment between personal injuries and property damage is a moral question, but decisions on such matters are ordinarily based on economic factors and public relations factors.

264

Damage, II International Legal Materials 727 (1963). Art. IV does not include interest or costs which may be added on.

265

UN Doc. No. W.G.II/18 at UN Doc. No. A/AC.105/21, Annex II,
at 28 (1964); and UN Doc. No. A/AC.105/C.2/L.10/Rev. 1, Art. XII
(1965).

266

UN Doc. A/Res/2222 (XXI) (Dec. 19, 1966) contains the
following: "Requests the Committee on the Peaceful Uses of Outer
Space:

(a) To continue its work on the elaboration of an agreement
on liability for damages caused by the launching of objects into outer
space and an agreement on assistance to and return of astronauts and
space vehicles, which are on the agenda of the Committee"

This resolution was in the context of enumerating unfinished
business following UN recommendations for ratification of the
Treaty on Principles Governing the Activities of States in the
Exploration and Use of Outer Space, Including the Moon and Other
Celestial Bodies.

CHAPTER VII

NATURAL RESOURCES , POLLUTION, AND THE LAW OF ACTIVITIES IN SPACE

Resources in Space

The conservation, allocation, and utilization of earth resources affected by activities in space, which includes potentially the resources of airspace, of the earth's surface, of the oceans and as deep beneath the surface as man is able to penetrate, have an impact on many of the legal and political problems of space, but these resources must be considered separately from those in and from space, including celestial bodies. ¹ Although all areas have much in common/they involve relations between nations and problems of enforcing general international law and those special rules which may be agreed on for new situations they have major, technological differences which have a substantial impact on the legal problem. An obvious difference is that land masses of the earth from which natural resources can be taken or observed are, for the most part, physically accessible and subject to the national sovereignty of a single nation. Even the high seas are readily accessible to mankind and have been since long before written history. ²

Resources of space are not accessible in the same way, and are not yet subject to commercial exploitation or to national sovereignty.

There are nevertheless important parallels. National sovereignty is not for example, ³ although there is a lively controversy over now, generally considered applicable to the high seas, the sea bed below. The national ship, submarine, or space vehicle is, nonetheless, considered subject to national sovereignty and ownership, even if located physically outside the bounds of national sovereignty.

Strategic security interests, the rapidly developing capability to work at great depths beneath the surface of the sea, and the potential ability to exploit Antarctica present legal policy, and economic problems similar in some respects to those which, if optimistic hopes are fulfilled, may be presented by activities in space. If so, this will almost certainly induce many changes in the applicable law, including the revision of existing treaties relating to space activities.

Ability to utilize the resources of space for purposes other than sending out spacecraft which can be used for communications, for observation of natural and man-made phenomena, and for impact of objects such as weapons on the earth's surface has not yet been achieved and may not be for a long time, if ever, but economic and strategic utilization of natural resources from space could become feasible as a result of some dramatic technological advance. If this does happen and vital interests of nations become involved, historical precedents indicate that previously asserted positions and views of the proper law for space will be sharply modified. Thus, the concept currently expressed by practically all states that national sovereignty does not and should not extend into space or to celestial bodies might be discarded in favor of concepts for celestial bodies similar to those applied to land masses of the earth.

Scientific information indicates that elements and compounds will be found on nearby celestial bodies generally in about the same proportions as on earth, but none of the celestial bodies of our solar system has an atmosphere comparable to earth's. Smaller celestial bodies also seem to have very little, if any, free water. Presently unknown elements may be found, although scientists do not anticipate finding

any which do not fit within the periodic table of atomic weights nor do they anticipate any exceptional concentrations of elements rare on earth.

Resources have been divided into groups such as: renewable or flow,
6
nonrenewable or stock, and spatial extension; but such differentiation is primarily a matter of degree. More importantly, where a particular resource is in abundant supply, regardless of category and value, there is less likely to be controversy between nations than when a valuable resource is in scarce supply. Utilization of electro-magnetic radiation frequencies in space for communications is an example of a resource requiring extensive consideration and regulation because of overcrowding of the available
7
wave lengths. Solar energy in space is being utilized as a source of power for communications in connection with the investigation of space but it is not presently of commercial value except for communications satellites using it as a source of energy for generating electricity. Solar radiations, including cosmic rays, while possessing enormous energy, are so diffuse that the size of the screen which would be required to collect usable amounts of energy for use on earth is not practical through present
8
technology even if a way could be devised to place such a screen in space. There is no known method of collecting energy in space and transmitting it to earth for use. Gases in space are in the same category as are the
9
atmospheres of celestial bodies. However, for scientific reasons nations and writers have indicated a considerable interest in the application of rules which will prevent the contamination of space, celestial bodies, and earth, a subject discussed hereafter under pollution.
10
Resources such as water, nonpoisonous atmosphere containing oxygen (even if only one or two

percent of earth's concentration), and other necessities for the support of earth-type life may have to be subjected to international regulation if they are not so diffused over and around celestial bodies as to render regulation of use impractical and unnecessary.

If commercial exploitation of minerals, ores, or other substances from celestial bodies becomes feasible, such striking technological advances will probably have occurred that it is also probable that radically new and presently unforeseeable economic, political, and legal factors will have developed just as in the development of the resources of the sea bed. For reasons noted earlier in this volume, the legal analogy with the sea is neither precise nor broadly accepted. The probabilities of using space or celestial bodies for residence, even temporarily, are extremely small in the short run when the necessity of recreating earth's atmosphere and environment is considered.

Conflicts in connection with the utilization of resources of space and celestial bodies will be extensions of rivalries on earth. It may eventually be necessary to negotiate detailed agreements, but until the direction that developing technology will take is reasonably certain, general agreements on the conduct of the relations between nations are all that appear possible and may perhaps be all that is ever necessary. Where sufficient information is available, agreements can and are being negotiated. The space treaties to date and UN Resolution 1962 (XVIII) are as specific as the Antarctic Treaty. Some long-standing fisheries treaties provide for little more than that fishing boats shall not interfere in each others' operations on the high seas. Numerous writers and spokesmen of some governments have idealistically called for comprehensive international controls, yet the concept that all nations should share equally in resources found or developed by any nation has never been applied to resources on earth,

and none of the space powers has indicated any inclination to surrender control or benefits of expensive space projects. While the United States, and Soviet Union, and other powers have thus far disclaimed any intent of making national claims to celestial bodies the bases for such claims exist.

Even without formal claims to sovereignty, history also confirms that extensive control of areas and resources has often been achieved by states unilaterally and in combination. Even though detailed rules of law relating to acquisition of resources from space and celestial bodies may not now be needed, we cannot ignore the fact that the generally expressed desires of some members of the community of nations have not to date normally overridden the desires of powerful states for exclusive control.

The general rules of international law, the United Nations resolution, and the general agreements relating to the conduct of activities in space furnish broad guidelines of conduct which should be adequate to avoid a dangerous confrontation over disputes arising from initial efforts to exploit spatial resources. It is essential, however, that the lawyers and statesmen of the world keep abreast of technological developments and press continually for negotiation of new agreements as scientific information indicating what problems are likely to arise becomes available.

The detailed rules, when drafted, must be acceptable to the great powers. They will probably provide that the first nation commencing to exploit a particular resource is not to be interfered with by other nations. This is already expressed in general terms in the various existing resolutions and treaties. What will constitute commencement of exploitation, the extent of the area protected, and how continuous the exploitation must be will depend on physical conditions and the terms of international agreements, which should be subject to frequent revisions or at least review.

Space Activities and Natural Resources of the Earth

The less than promising prospects of immediate economic exploitation of natural resources from celestial bodies are far overbalanced by the potential and actual uses of space in connection with resources of the earth. Surveys, studies, and actual experience suggest a panorama of ways in which space vehicles carrying a variety of sensors aimed at the earth can and are helping us learn about conditions on and under the earth's surface. The legal implications of the development have received comparatively limited attention except as related to military intelligence. Use of space in connection with navigational aids, cartography, geodesy, meteorology, oceanography, hydrography, physical geography, and geology is already clear.

Where it can be established that spacecraft engaged in any of the activities just referred to cause damage to interests across international boundaries, it would seem that the nation from which the activity had originated would be absolutely liable in accordance with the provisions of Article VI of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies. However, the interpretation of the treaty language is open to substantial uncertainty and the records of debates in the United Nations committee cast no light on the subject. Must the injury be caused by a physical piece of the spacecraft or may the injury result from the use of information acquired by a satellite and used to the economic, political, or military injury of the subjacent country? With various kinds of space-borne sensors, it may be possible to obtain more detailed information about some of a nation's resources and economic and military

activities than could be obtained by a slower and perhaps more expensive
²⁶
 air or surface survey. From a practical point of view, it is impossible
 to draw a sharp line of distinction between information gathered for
 military purposes and information collected for commercial and economic
 reasons; consequently, the legal rules likely to be applied for both
 purposes will probably be similar, although possibly gathering military
 information will be more sensitive politically. Historically, even in
 time of war or serious international tension, it has generally been accepted
 that nations not at war can legitimately obtain by radar, radio, photography,
 direct viewing, and other observational means any information possible
 about another country, as long as the curious nation did not trespass
 into the territory or defensive sea and air frontier of the observed
²⁷
 state. The Soviets have tended to espouse a right to complete secrecy
²⁸
 of all events within their borders but since 1964 they have said com-
²⁹
 paratively little about this aspect of activity in space. The changed
 emphasis possibly reflects a growing realization on the part of the Soviets
 that such a policy would severely restrict their own space activities and
 would be extremely difficult to implement without seriously hampering
³⁰
 all space activity. If the Russian claim to the right of secrecy within
 its borders is being de facto modified as far as observation from space is
 concerned due to the advent of activities in space, additional relaxations
 may slowly follow but only as a part of a general easing of tensions between
 East and West and not because of activities in space.

There is no question that space vehicles passing above the earth at
 varying altitudes above the claimed sovereignty of the subjacent state have
 created difficult new factual situations to which rules of conduct of
³¹
 nations must be applied.

No formal protests have been made even about satellites engaged in military reconnaissance and it presently seems doubtful that protests will be made as a result of economic and commercial information collection space activities.

If this proves so, then international law appears to be developing in such a way as to allow the acquiring nation to utilize information gathered for its own economic and commercial purposes. Basic scientific information, when not in a security-suffused field, tends to be widely shared by most nations, but there is no equivalent sharing of strategically or economically valuable information. In the absence of agreements requiring the sharing of commercial and economic information obtained through reconnaissance from space, it is doubtful that any legal obligation to share exists. The moral issue is entirely subjective. If this interpretation is correct, the space powers have in their possession a marked potential advantage in the exploitation of the natural resources of the earth and sea and in the planning of their own economies based on a knowledge of what is available and what is being done in other countries. Good neighborliness, altruism, and the tradition of scientific cooperation, some of which has been organized internationally for many years, as in WMO and WHO, and some of which may be organized on the basis of satellite acquired information, as, perhaps, with storm control in the future, may result in a sharing of information, particularly where it may assist in averting damage from natural forces such as hurricanes, volcanoes, tidal waves, etc. Lacking formal international undertakings, it might be argued that a moral, rather than a legal obligation exists to make such information generally available.

In those situations where the acquired information related to the existence of natural resources on land masses, the observing state would ordinarily be unable to exploit them except by entering into an agreement with the observed state on mutually acceptable terms or by acquiring the territory. Despite the intimation to the contrary by McDougal, Lasswell and Vlasic it would appear that the observing state would be subject to no enforceable obligation to share its knowledge in order that the nations could bargain on an equal basis, for the law concerning taking unfair economic advantage of one state by another remains at best embryonic.

As technology advances and economically valuable information is routinely available from activities in space, nonspace powers will almost certainly clamor for sharing. Based on precedent alone, the prospects are poor, particularly for the underdeveloped nations, but there are possibilities that the Space Powers will share their knowledge either for altruistic reasons or for reasons of international prestige. Nonspace powers may find it helpful to enter into advance cost-sharing agreements with one of the space powers, or consortiums may find it possible to develop cooperatively their own satellite systems for collecting economic information. Another possibility is to have information gathered by internationally controlled satellites, and then have it made available to all nations or to the specific nations concerned. These suggestions for internationalization require far more cooperative effort and sharing than states have thus far proven willing to undertake, but consideration of them before national interests become vested in the fruits of the new technology appears highly desirable.

The legal questions relating to injury and damages resulting from the through the use of space-going capabilities modification of weather to the detriment of a neighboring state are even less clear. This situation is not specifically covered by the treaties which have been approved to date, or by the most recent drafts of the proposed liability treaty. Consequently, it is suggested that customary rules of international law, probably influenced by the terms of the Treaty on Principles, could well be interpreted as imposing absolute liability, for intentional acts at least, providing that the major hurdle of proof of causation could be overcome. Other space activities resulting in a physical damage to a foreign state would presumably follow this pattern. It might be noted that claims resulting from nuclear tests which involved airspace have been made and that damages have been reimbursed, but without admission of liability. ³⁵ Liability under such circumstances would be consistent with concepts of fairness and with the provisions of the space treaties, but problems of evidence and proof present major difficulties beyond the answers technology can now provide with certainty.

A space power now has no legal obligation to collect and disseminate weather information, although the United States does so now, to position navigational satellites, to provide ocean current information, or to provide any general information of great value to other nations. If the space power does make such information available and it proves to be erroneous, is that power liable for losses suffered as a result of reliance on the information? Treaty provisions to date do not cover this situation, and the very practical aspects of it must be taken into consideration. In all probability, the nation using the information provided by the space power will be on notice that accuracy is limited by the technology and will

proceed at his own risk. The space power might not make the information available if it thought there would be claims for errors beyond prevention by the technology. This reasoning leads to the conclusion that there should be no liability for information sharing in the absence of evidence of deliberate efforts to mislead.

Pollution

Pollution or contamination constitutes a special aspect of the conservation and, to a lesser extent the allocation, of resources of outer space. Present concern is partly practical but primarily scientific, although it is theoretically possible that pollution of earth from space might result in disaster to the human race. Pollution from earth might also be disastrous to life on a celestial body, if any exists. Note that it is now considered doubtful that intelligent life exists anywhere else within the solar system than on earth.

Contamination may result from the introduction of living organisms, radioactive materials, fuel residues, or debris left in space or on celestial bodies as a consequence of man's activities in space. The dangers of pollution have received a considerable amount of attention from nongovernmental agencies as well as from governments and the United Nations.

As we have noted earlier, the United States West Ford Project, involving tiny orbiting copper dipoles for use in communications and other experiments, caused scientific concern which was heavily augmented by Soviet propaganda efforts and contributed to the adoption of a provision in a UN resolution calling for international consultations prior to space activities or

experiments which could cause potentially harmful interference.

High-altitude nuclear tests by Russia and the United States caused controversy, not only because of the threat to peace but also because of the creation of radiation belts which interfered with all types of radio

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communications. In fact, some months after the explosions the interference was sufficiently high to be of concern to radio astronomy.

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The Nuclear Test Ban Treaty⁴² should prevent further contamination of space from this kind of activity by Treaty members, but it will not prevent other contaminants from being introduced into space.

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The COSPAR Consultative Group has also concerned itself with the general question of contamination or pollution of outer space, the upper atmosphere, the moon, and planets.⁴⁴ It has proposed classifying effects

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in the upper atmosphere which seem equally appropriate for the lower reaches of outer space.⁴⁵ The classes of effects are:

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1. Harmless, short-term, and observable localized changes.
2. Noninterfering, long-term, and worldwide changes that can be identified.
3. Changes causing extensive interference with experiments or other human activities.
4. Changes in the atmosphere that may change man's environment.

The first two classes are of limited concern and are characteristic of many space activities.⁴⁶ The third group is well represented by high-altitude

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nuclear explosions⁴⁷ which, in addition to interfering with communications,

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have also interfered with studies of upper atmospheric regions and for several hundred miles above the earth. The Consultative Group on Potentially Harmful Effects of Space reported that it found no indication of changes

of the fourth variety. It may be too early to ascertain if this is correct, since changes resulting from nuclear explosions, for example, may be very subtle and slow in manifestation.

The COSPAR Consultative Group and others have also considered other phenomena such as the exchange rates of the upper atmosphere, the effects of rocket contamination, possible catalytic effects which might trigger chemical and photochemical processes, and radiation imbalances.⁴⁸ Such phenomena may also be classed as or involve potential pollutants. The possible consequences of nuclear power in space activities, high-flying supersonic aircraft, and the extensive use of completely disintegrating meteorological rockets have also been the subject of concern, but no detailed rules have been formulated by the states. A related problem is the increasing amount of useless debris continuing in orbit as a result of various activities in space.⁴⁹ Extensive consideration has been given to sterilization of spacecraft which might approach celestial bodies, such as the moon, Mars, or Venus, with a suggestion that there be only fly-by missions until more extensive studies have been made and general standards for sterilization of spacecraft have been suggested. The recommendations of the consultative group were adopted by COSPAR,⁵¹ but have essentially moral rather than legal force.

The Treaty on Principles provides that space activities are to be conducted "with due regard to the corresponding interests of all other States... and conduct exploration of them [celestial bodies] 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...."⁵² The article continues with provisions for international

consultations where "potentially harmful interference with activities in the peaceful exploration and use..." is feared. This language is very general and subject to varied interpretations, but it is surely not much less definite than the "general welfare" clause of the United States

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Constitution. It is interesting to note that the provisions for consultation relate to "interference...in the peaceful exploration and use of outer space..." but do not technically apply to potential contamination of the earth from extraterrestrial matter. If the state engaging in an activity in space does not initiate consultations, any other state party to the treaty "which has reason to believe that an activity or experiment...would cause potentially harmful interference...may request consultation concerning the activity or experiment." This language is a compromise, for the Soviets had wished to make consultation mandatory prior to initiation of a space activity, whereas the United States had feared that a mandatory provision might be used as a veto.

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The numerous conventions relating to pollution of the sea give useful examples of the types of treaties which can be negotiated if developing technology provides the need. It would be useful to keep under continuing consideration the kinds of arrangements which will be needed as technology advances. The policy suggested in the UN resolutions and discussions and in the Treaty on Principles seems to require a showing that a particular activity will be harmful before it is appropriate to bar it. This is clearly the situation relative to the high seas where disparate theories of scientists are seldom accepted without practical proof of harm. In the 1960's, the necessity for extensive modification of the rules relating to pollution of the seas demonstrates that advancing

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technology and increasing and changing use will probably require frequent updating of rules relative to contamination of space.

Natural Resources: Summary

The allocation, control, conservation, and protection of resources and the prevention of pollution are the subject of general regulation by the terms of treaties and the recommendations of the United Nations resolutions. These controls are a beginning and may be as specific as can be devised until additional technical knowledge is acquired, and, with luck and good will on the part of the space powers, they should provide a substantial amount of protection to earth from extraterrestrial contamination and should also prevent space and celestial bodies from becoming seriously contaminated with living organisms from earth. The Nuclear Test Ban Treaty, which is specific in its prohibitions, gives some protection against nuclear contamination of earth, airspace, space, and celestial bodies, but a number of nations including France, Communist China, and Cuba are not parties to that agreement. As technology progresses and additional knowledge is acquired, it can be hoped that self-interest of nations will be persuasive enough to cause them to agree on additional details of regulations and possibly of enforcement.

The space powers have unilaterally, by treaty and by United Nations resolution, indicated their willingness and intent to conduct their activities in space in such a manner as to avoid interference with others seeking to investigate and possibly to exploit the resources of space and to utilize space in exploiting the resources of earth. Continuing and determined efforts must be made to negotiate detailed agreements as rapidly

as the problems and satisfactory solutions can be identified, but it would be injudicious to negotiate additional details of agreements based only on surmise instead of facts. It must be kept in mind that international law relating to space is but one part of international law and it is not likely that a space law regime substantially at variance from other areas of international law will gain wide acceptance among nations.

Nations will almost certainly continue to acquire information about all areas of the earth by all means at their disposal, including observation from satellites. Nonspace powers are at a substantial disadvantage, but no agreement limiting the right of information acquisition could be enforced now except by placing all space activities under the control of an international organization or by granting unlimited rights of inspection at all installations having to do with space activities. Neither is probable until a world full of distrustful nations is ready to accept a form of world government, a prospect that does not seem the least bit imminent.

FOOTNOTES

CHAPTER VII

¹ Chapters 2 and 3 discuss the legal status of space, which includes the use of space for satellites of all varieties. The use of space to orbit satellites for communications is discussed in detail in Chapter 5. See also A Survey of Space Applications, Chap. 2 (NASA Sp. 142; 1967), which gives a summary of communications utilizing satellites and includes a 23 item bibliography. The NASA report also has chapters covering earth resources, geodesy, meteorology, navigation, and future applications of space. Each unit has its own bibliography for a total of about 250 entries. The use of space vehicles for such purposes as weather reporting, navigational aids, military intelligence, science, etc., is discussed commencing page 000. Chapter 2 analyzes the problems of liability and references to various uses of space are to be found throughout.

² See Chap. 3 at 000.

³ See Appendix 000 for texts of: The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, which provides in articles VI and VII for national control of all activities in space. The Agreement on the Rescue of Astronauts, The Return of Astronauts, and the Return of Objects Launched Into Outer Orbit, reiterates throughout the concept of national authority and control over all space activities and vehicles. The draft treaty on Liability for Damage Caused by Objects Launched into Outer Space is based on the concept of national ownership and control over all activities in space. All United Nations resolutions including those reproduced

in Appendix 000 (1721 XVI of Dec. 20, 1961; 1884 XVIII of Oct. 17, 1963; 1962 XVIII of Dec. 13, 1963; 1963 XVIII of Dec. 13, 1963) are based on the same concept. The location in space of the space craft or where the activity is taking place is not subject to national ownership or sovereignty, which is generally consistent with the law of the high seas.

⁴McDougal, Lasswell, & Vlasic, Law and Public Order in Space (1963), Chap. 7, at 749, deals with "Claims Relating to the Enjoyment and Acquisition of Resources." Also published in 111 Pa. L. Rev. 521 (1963). Many other writers have devoted attention to the subject. See for example Christol, The International Law of Outer Space 109 (1966). Peacetime Uses of Outer Space (Ramo ed. 1961) wherein Teller at 261 suggests the thing of value to be brought back from space is knowledge; not gold, uranium, or diamonds. If exploitation of resources does become feasible, there are analogies from which ideas may profitably be drawn. See Chap. 3 supra. See Jessup & Taubenfeld, Controls for Outer Space, chaps. 5, 6 (1959), [hereinafter cited as Jessup & Taubenfeld], which analyze^S the Antarctic and space problems in comparative terms. National sovereignty claims have been made in Antarctica (and the Arctic), but they are not universally recognized; Antarctic claims are supposed to be more or less in abeyance for at least thirty years under the Antarctic Treaty of 1959 (12 UST 794). On conservation and control of the living resources of the high seas, the literature is voluminous and there have been a great number of international agreements negotiated. Problems relating to resources of the sea-bed are receiving ever-increasing attention from governments and scholars of all disciplines. Garcia Amador, The Exploitation and Conservation of the Resources of the Sea, 86-167 (1963). Burke in his

monograph, Ocean Sciences, Technology, and the Future International Law of the Sea (Ohio State U. Press, 1966) poses many of the legal and policy problems likely to arise as ability to exploit resources of the sea and sea bed are developed. See also McDougal & Burke, The Public Order of the Oceans; a Contemporary International Law of the Sea chap. 7 (1962) which covers the problem of exploitation of resources in some detail. This interest is generated by the possibility that the seas may become an even more valuable source of foodstuffs for a continually increasing population. It presently seems unlikely, unless there is an unanticipated technological development, that space will provide any supplement to animal, vegetable, or mineral resources of the human race. If this supposition is correct, then, aside from space as a resource into which to send spacecraft for communications, for intelligence gathering, and for destruction, Teller is doubtless correct that the thing to be brought from space is knowledge.

⁵ It would be injudicious to assert that man cannot develop the ability to exploit resources from celestial bodies, but it will require a scientific breakthrough in new means of propulsion to give any hope of commercial exploitation. Present estimates suggest costs of several hundred thousand dollars an ounce to bring materials from the moon to the earth with known methods of operation. Articles such as Cole's "Application of Planetary Resources" (AIAA International Aerospace Abstracts, Accession No. A66-13577; 1966) and articles on establishing colonies on celestial bodies are presently in the category of space science fiction rather than serious scientific literature. A display at the dedication of the Allied Chemical Tower in

Times Square, New York, showed an animated model of a press agent's imaginary city called Copernicus on the moon as it might appear in the year 2000. New York Times, Dec. 3, 1965, at 3, Magazine Section.

⁶Ciriacy-Wantrup, Resources, Conservation, Economics, and Policies 25 (1963). McDougal, Lasswell, & Vlasic, Law and Public Order in Space 779 (1963).

⁷ See Chap. 5. While communications technology is making great advances, the demand for frequencies has been increasing even more rapidly. Satellites may make possible the utilization of an entirely new series of frequencies and thus alleviate an already existing shortage.

⁸ The Marine II Venus probe indicated a rather constant radiation intensity of approximately 3.0 particles per square centimeter per second throughout the flight. Cosmic rays, x-rays, and other radiations in space are presently phenomena to be shielded from rather than phenomena to be utilized. They can be expected to raise no legal question³ as long as this condition persists.

⁹ See Dauvillier, Cosmic Dust 18 (1963).

¹⁰ See p. 000. Article 9 of the Treaty on the Exploration of Space (signed Jan. 27, 1967 and reproduced in Appendix 000 as item 2) provides in part that the parties shall: "conduct exploration of them [celestial bodies] 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."

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The capacity of celestial bodies other than earth in the solar system to support earth-type life is doubted, although still subject to interminable discussion. Scientists think it will be necessary to take along or manufacture an environment suitable for human life in areas likely to be visited from earth. The task is infinitely more difficult than supporting life in the Antarctic or far beneath the surface of the sea. In addition to the distances, the radiation hazards, and the lack of atmosphere, the temperature ranges are vastly greater than anywhere on earth. For discussion see, Snider, "New Case for Life on Mars," Chicago Daily News, Oct. 13, 1965, p. 9; and "Scientist Says Life Could Not Exist on Mars." Washington Post, Oct. 13, 1965, p. 7; Glasstone, Sourcebook on Space Sciences 717 (1965). [hereinafter cited as Sourcebook].

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See Handbook of Geophysics and Space Environments (S. & H. Valley, eds. 1965), which indicates asteroidal meteorites are about 93% stone. The conclusions of Middlehurst & Kniper, eds. in 41 The Solar System, "The Moon, Meteorites and Comets" (1963) are consistent.

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See John Cobb Cooper, "The Manned Orbiting Laboratory: A Major Legal and Political Decision," 51 A.B.A.J. 1137, 1139 (Dec. 1965): "Slowly and inexorably we are coming to accept the fact that the legal status of outer space and the high seas differs very little, if at all. Historically, it should be noted that air space above the high seas has long been accepted as having the same legal status as the seas themselves."

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See for example, the Nuclear Test Ban Treaty of Oct. 10, 1963, 14 UST 1313, although not all nations are parties. Also, it might be noted that this treaty may bar the use of nuclear explosions for peaceful purposes,

such as digging a second canal between the Atlantic and the Pacific Oceans. See the series of agreements referred to in Chap. 5 and the series of cooperative agreements between the US and other powers, referred to in Chap. 4. See also the comprehensive Outer Space Treaty discussed in detail in chap. 4, passim, described by Ambassador Goldberg as offering an opportunity to states "to lift themselves out and above current issues and interests and build a framework--if only skeletal in form--for the future pattern of mankind's activity." The relevant treaties are reproduced in Appendix ~~are~~.

¹⁵ June 23, 1961; 12 UST 794.

¹⁶ See for example, the Convention (between Great Britain, Belgium, Denmark, France, Germany, and the Netherlands), for Regulating the Police of the North Sea Fisheries, signed at the Hague, May 6, 1882; Ratifications deposited at the Hague, Mar. 15, 1884; 73 British and Foreign State Papers--1881-82, 39, 43 (1889), (Articles XIV and XV in translation read, XIV):

"It is prohibited to any fishing boat to let down its nets, between sunset and sunrise, in the vicinity of other fishermen with nets already out.

"However, this ban does not apply to castings which may have happened due to accidents or to any other circumstances of force majeure.

"XV Boats arriving upon fishing spots are forbidden to place themselves or to cast their nets in such a manner as to interfere with each other or to disturb the fishermen who have already begun their operations."

Art. IX of the Space Treaty provides that States shall conduct their space activities "with due regard to the corresponding interests of other States." Lack of adequate controls has resulted in the practical elimination of whales and other denizens of the sea as resources.

¹⁷ See, for example: Hyman, The Magna Carta of Space (1965). The David Davies Memorial Institute of International Studies, The Draft Code of Rules on the Exploration and Uses of Outer Space (1962); Smirnoff, MS, Report of Working Group III, Proceedings, Fourth Colloquium on the Law of Outer Space 361 (1963) proposing that all space activities be under the control of the UN and that any resources found in space be made available to all nations on an equal basis. These proposals encompass the whole of space activities, not just the problems relating to resources; Jessup and Taubenfeld, Chaps. I-IV.

¹⁸ International law and the UN Charter are based on concepts of sovereignty of states. A collection of excerpts from speeches of various UN delegates emphasizing this point is included in the paper given by Fasan, "Law and Peace for the Celestial Bodies," Proceedings, Fifth Colloquium on the Law of Outer Space 3-4 (1962) at the International Institute of Space Law of the International Astronautical Federation. The Jan. 27, 1967 Treaty on the Exploration of Space, article I expresses the pious hope that the exploration and use of outer space "shall be carried out for the benefit and in the interest of all countries. . . ."

¹⁹ See p. 000 and article II of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Space, reproduced in Appendix 000 as item 2.

²⁰ See UN Resolution, paragraph 2, on Legal Principles Governing Activities in Outer Space, A/Res/1962 (XVIII) (Dec. 13, 1963).

"Outer space and celestial bodies are free for exploration and use by all states on a basis of equality and in accordance with international

law. Outer Space and celestial bodies are not subject to national appropriation by claim of sovereignty, by means of use or occupation or by any other means." Text of the resolution is reproduced as item 5, Appendix 000. See other related resolutions in that Appendix.

²¹ See Chap. 4 supra ~~0110610~~ and the Treaty on the Principles Governing the Activities of States in the Exploration and Use of Space, signed Jan. 27, 1967, reproduced in Appendix 000 as item 2.

²² We have been using the resources of the sea for hundreds of years, but hardly a decade passes without at least one major new multilateral treaty on the subject. Within the decade just passed, four major multilateral conventions relating to the sea were negotiated, and there are still dangerous controversies over such a seemingly simple matter as the width of territorial waters.

²³ For a discussion of the nature of man's activities in space related to earth resources see pp. 000-00. See pp. 000-00 for a discussion of military use of space.

²⁴ The legal implications of these activities are as yet undefined, although there has been some speculation on the subject, primarily related to national law and surveys made by air planes. See for example, Jack D. Oppenheimer, Exec. Sec'y Special Commission on Weather Modification, NSF, "Legal Aspects of Weather Modification". (Mimeo, Western Snow Conference, Apr. 21, 1965). The legal problems of depriving one party of precipitation and giving too much to another would appear to apply equally to weather modification achieved from outer space or from airspace. The damage resulting from the hurricane or typhoon storm systems can be enormous in both lives

and property. What will be the liability if one nation diverts the storm from its territory to that of another nation?

Glasstone in Sourcebook at 240 devotes about 20 pages to meteorology and 10 pages to navigational and geodetic satellites, but legal problems are not discussed. Significant Achievements in Satellite Meteorology 1958-1964, (DASA Sp. 96; 1966) reviews progress of those years and includes a 97-entry bibliography, primarily of government publications. See also Report of NSF Special Committee on Weather Modifications (1967); Taubenfeld, Weather Modification: Law, Controls, Operations (NSF, 1966).

²⁵ Article VII provides for absolute liability of nations for "damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the moon and other celestial bodies." The proposed drafts of a treaty on liability (reproduced in Appendix 000 at 000) also appear to refer to physical and related injury caused by a satellite or pieces thereof.

²⁶ The utility of satellites for such purposes has been demonstrated by photographs taken by Gemini 4 and 5 astronauts, among others. See New York Times, Jan. 9, 1966; 218 Scientific American 54 (Jan. 1968). See also RAND publications; Buckheim, New Space Handbook: Astronautics and its Applications, chap. 21 at 217 ff. (1963); RAND Monographs, RM-2620-NASA "Weather Information and Economic Decisions: a Preliminary Report." RM-3412-NASA Automatic Pattern Recognition of Meteorological Satellite Cloud Photography. RM-3536-NASA Some Satellite Orbits For the World Magnetic Survey. RM-3986-NASA The Satellite Determination of High Altitude Prospects.

R-365 Inquiry Into the Feasibility of Weather Reconnaissance from a Satellite Vehicle. P-2193 The Upper Atmosphere as Observed with Rockets and Satellites. P-2580 Report on a Symposium on Meteorological Rockets. P-2623 Aircraft Navigation by Satellite. P-2635 Review of Proceedings of the International Meteorological Satellites Workshop No. 13-12, 1961. P-2762 Selected Readings in Aerial Reconnaissance; a Reissue of a Collection of Papers from 1946 and 1948. RM-3247-PR Some Implications of the Earth's Gravitational Field for the Internal Structure of the Earth. Michael, Proposed Studies on the Implications of Peaceful Space Activities for Human Affairs 15, 79 (Brookings Institute, 1961), implications of a space-derived weather-predicting system. For some of the specific programs, see NASA Authorization for Fiscal Year 1967. Hearings before the Senate the Committee on Aeronautical and Space Sciences, 89th Cong., 2d Sess., at 144-45 (1966). See also: A Survey of Space Applications (NASA SP 142, Apr. 1967) "for the benefit of all mankind." Chapter 3 deals with earth resources and lists agricultural and forestry resources, geology and mineral resources, geography, cartography, and cultural resources, hydrology and water resources, and oceanography as areas related to the earth's resources suitable for the application of space technology. Each of these subject headings has appended at the end of the discussion a bibliography of 15 or 20 articles and books giving more extensive coverage of the subject. Homer E. Newell & John E. Naugle (of NASA) in 6 Astro & Aero. 78 (Feb. 1968): "Suitable for Space applications: Geodesy, World Geodetic Reference System, Define Gravity Field; Communications and Navigation-Point-to Point Inter-continental, Small Terminal Multiple Access, Navigation-Traffic Control, Data Relay, Earth-Lunar-Planetary, Voice Broadcast, Community Television, Television Broadcast; Meteorology, Observe Day and Night Cloud Cover,

Continuous Observations, Define Atmospheric Structure for Long Range Forecast, Earth Resources Survey, Geography and Cartography, Geology and Minerology, Agriculture and Forestry, Water Resources and Pollution Control, Oceanography." The listed items are examples of the use of space itself as a natural resource in communications and in collecting information about the earth.

R.J. Helberg, Ass't Division Manager Space Division, The Boeing Co. in a paper, "Lunar Orbiter" given at Stanford University at a conference (mimeo, Aug. 16-18, 1967) gives a number of examples of intelligence gathered from space used for the economic benefit of mankind. Fault structures extending from Swedish iron ore deposits into Finland and Norway were identified from about 1,000 miles up and are being explored for iron deposits. Photographs taken from about 125 miles up have assisted in Australian oil exploration. Much of the equipment utilized for gathering information about the moon is equally useful for earth. Work has been divided into the field of agriculture/forestry resources, geology/hydrology (mineral and water resources), geography (cultural resources), and oceanography (marine resources). References to these programs are scattered throughout the NASA authorizations for Fiscal Year, 1967 ^{and} Hearings Before the ^{Senate} Com^m on Aeronautical and Space Sciences, 89th Cong., 2d Sess. (1966). See pp. 338, 352, 378, 387 (meteorological satellite program), 376, 637, 659 (geodetic program), 377 (weather services), 290, 321 (navigational aids), 146, 154-57, 260, 636-37 and 660 (manned orbiting laboratory) as examples of the types of space activity aimed at acquiring information about the earth or providing improved facilities for activities on earth. See Time, Mar. 15, 1966, at 88 for an

article noting the location of fresh water through the use of air-borne infra-red sensors, and the plans to use EROS (Earth Resources Observation Satellites) for worldwide fresh-water studies by 1969. Carl Q. Christol, The International Law of Outer Space 277 (1966) [hereinafter cited as Christol], gives a brief discussion of observational activities. According to the New York Times, Dec. 29, 1965, disease patterns in timber can be detected from aerial or space reconnaissance as much as three years before difficulty can be observed from the ground. If extensive materials in this area are desired, see the AIAA International Aerospace Abstracts index and the NASA index of abstracts and articles, both of which over the past several years have listed a substantial number of papers given at the numerous technical conferences held throughout the world.

²⁷In time of war or international tension, nations with the power to do so are prone to declare defensive zones from which foreign observers are excluded by force regardless of legal protests. McDougal, Lasswell & Vlasic, Law and Public Order in Space, 283 ff. (1963) discuss the potential for intelligence-gathering by spacecraft and note the activities likely to provoke controversy. Johnson, then General Counsel of NASA, noted that "The disturbing or threatening nature of an activity in outer space does not depend upon its being directly over the nation affected." NASA News Release, Aug. 4, 1962, of an address before the ABA Section on Internat. and Comp. Law, San Francisco, Cal. See to the same effect, Mankiewicz, "The Regulation of Activities in Extra-Aeronautical Space, and Some Related Problems," 8 McGill L.J. 193-95 (1961-62). Christol at

95-103, 271, 274-75, 277-95, 368 (1962) discusses the subject and notes the problems of an open versus a closed society in relation to the United States and Russia.

²⁸Rusk, "U.S. Again Calls for Action on Drafting Disarmament Treaty," 47 Dept. of State Bull. 245 (1962); Rusk, "Basic Issues Underlying the Present Crisis," 47 Dept. of State Bull. 870 (1962). Kislov & Krylov, "State Sovereignty in Airspace," Int'l Aff. 34 (Moscow, Mar. 1956); Legal Problems of Space Exploration, A Symposium, Senate Document 26, 87th Cong., 1st Sess., 1037 (1961); Lissitzyn, "Some Legal Implications of the U-2 and RB-47 Incidents," 56 Am. J. Int'l L. (1962). Wright, "Legal Aspects of the U-2 Incident," 54 Am. J. Int'l L. 836 (1960). Soviet drafts, "The use of artificial satellites for the collection of intelligence information in the territory of a foreign state is incompatible with the objectives of mankind in its conquest of outer space." UN Doc. A/Ac.105/12, Annex 1, 2 (1963). "Space vehicles abroad on which devices have been discovered for the collection of intelligence information in the territory of another state shall not be returned." UN Doc. A/AC.105/12, Annex 1, 4 (1963). However, see the Agreement on the Rescue of Astronauts, and the Return of Objects Launched into Outer Space (reproduced in Appendix 000) which makes no reference to the limitation proposed by the Soviets.

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See: Staff of Senate Comm. on Aeronautical and Space Sciences, 89th Cong., 2d Sess., Space Treaty Proposals by the United States and USSR . Soviet Draft which makes no 12ff (Comm. Print 1966); specific reference to observational activities from space. UN Doc. A/6352 (June 16, 1966). The general treaty on space activities makes no reference to observational activities but has the general requirement of peaceful purposes.

³⁰ Photographs of clouds for weather forecasting purposes might include views of the surface of the earth. Magnetic surveys for navigational purposes might indicate the presence of ore deposits. Infra-red surveys intended to study volcanic activity might reveal concentrations of industry, etc. Even if the technical aspects of the problem of avoiding surveillance as a by-product of other activities could be surmounted, mutual inspection of facilities would be needed to insure compliance. "According to published reports, the Soviets developed their own reconnaissance satellite capacity early in 1964. Shortly after this, Soviet propaganda attacks on United States reconnaissance satellites ceased and the public concessions reflected in the most recent United Nations documents indicate that the Soviets no longer object to this activity." (Paper delivered by Morenoff, "Communications in Orbit: A Prognosis for World Peace," Ninth Colloquium on the Law of Outer Space 11 [Madrid, Oct. 1966].) Morenoff's book, World Peace Through Space Law (1967) is devoted almost entirely to the problems of surveillance by satellite.

³¹ Chap. 4 supra discusses the problem. See, as an example of the efforts to formulate rules, Space Treaty Proposals by the US and the USSR. UN Docs. A/AC.105/32 (June 17, 1966) and A/6 52 (June 16, 1966).

³² See Frutkin, International Cooperation in Space, passim (1965).

³³ Obviously, this advantage will depend on the amount of worthwhile information collected and collectible only through activities in space.

G. Bylinski, "From a High-Flying Technology, A Fresh View of Earth," 87 Fortune 100 (June 1, 1968). (Remote sensors in planes and satellites are bringing a big new market into focus).

³⁴ If there is an obligation on the space power to make such information available, then the benefitting nation would surely be under a reciprocal obligation to participate in the cost of the space activity on a ratio based on relative use of the information tempered perhaps by ability to pay, as is done in the United Nations.

³⁵ See Chap. 6 supra for further discussion.

³⁶ In a meeting with NASA, representatives of the Dept. of Agriculture warned that without precautions insects, diseases, and other plagues from outer space could conceivably be brought to earth on returning spacecraft and multiply in an atmosphere that could not control them. New York Times, Jan. 9, 1966, at 58.

³⁷ The Ad Hoc Committee on Contamination by Extra-terrestrial Exploration (CETEX) organized by the International Council of Scientific Unions (ICSU) at a meeting held in 1958 and ceased to exist after making a report in 1959. See John A. Johnson, "Pollution and Contamination in Space," Law and Politics in Space 39 (First McGill Conference on the Law of Outer Space, Law, and Politics in Space, Cohen ed. 1964). CETEX proposed general principles as follows:

1. Freedom of action for experimentation and limitations of this freedom for compelling reasons:
2. The Committee on Space Research (COSPAR), established by ICSU in 1958 should be informed at the earliest possible date of any proposed experiments in outer space so that the committee could study such plans for any possible conflicts and make recommendations for minimizing any possible harmful effects:
3. Experiments in space should be carried out only if capable of gathering useful scientific data.

The committee also recommended that no "soft" landings requiring the use of large quantities of gas be made on the moon prior to the completion of extensive studies of the nature and composition of the moon's atmosphere and that no nuclear explosions be set off near the surface of

the moon or planets, and that great care be taken through sterilization to prevent the introduction of living organisms from earth to the other planets.

³⁸The UN Ad Hoc Committee on Peaceful Uses of Outer Space (June 1959) urged further study in the preservation of the existing environment of the moon and planets. UN Res. 1962 (XVIII), para. 6 (Dec. 13, 1963). UN Res. 1963 (XVIII), *art. II*, para. 1 (Dec. 13, 1963). UN Doc A/5785 para. B32 (Nov. 13, 1964). See International Cooperation and Organization for Outer Space, Staff Report for the Committee on Aeronautical and Space Sciences, US Senate, 89th Cong., 1st Sess., at 229, 231, 233, 238, 239, 248-49, 322, 351, 390-99, 401, 407 (1965). Most books on space law or space activities contain some references to pollution caused by space activities. See, for example, McDougal, Lasswell, & Vlasic, Law and Public Order in Space 285, 531, 534-36, 539n, 625-32, 652n, 653, 655, 704, 734, (1963). Haley, Space Law and Government 142, 150, 269, 277, 281-93, 314. (1963).

³⁹A/Res/1962 (XVIII), para. 6 (Dec. 24, 1963). See also Space Science Board, U.S. Space Science Program: Report to COSPAR 153-54 (1964).

⁴⁰H.J. Taubenfeld, "Nuclear Testing and International Law," 16 *S.W.L.J.* 365, 397 (1962). Nuclear propulsion may also be a source of contamination; 2.2 lbs of plutonium 238 on board a satellite as fuel was vaporized on re-entry into the earth's atmosphere. Washington Post, May 24, 1964, at 8.

⁴¹Sir H. Massey, Space Physics 208 (1964).

⁴²14 UST 1313; TIAS 5433.

⁴³See, for example, the story in the Washington Post, Jan. 18, 1966, at 6, col. 6, relative to colored vapor clouds ejected by Nike Apache rockets at elevations up to 125 miles over Wallops Island, Va. The Soviet Union has been criticized for inadequate sterilization of the space vehicle claimed to have landed on Venus. See Dallas News, Mar. 6, 1966, at 18, col. 2.

The Soviets say they have observed careful sterilization procedures utilizing a powerful disinfectant gas. New York Times, May 12, 1966, at 22, col. 3.

⁴⁴ See International Cooperation and Organization for Outer Space Staff Report of ^{Senate} Committee on Aeronautical and Space Sciences, 89th Cong., 1st Sess., 391 (1965). At a 1964 session of COSPAR, a resolution was adopted to the effect that no spacecraft should be landed on Mars if there were more than one chance in 10,000 that it was carrying earthly micro-organisms that could contaminate. 2 Astro. & Aero. 185 (May 1964).

⁴⁵ No attempt is made here to draw a line of demarcation between air-space and outer space. For a discussion of this problem see pp. 000-00.

⁴⁶ Perhaps the continued transmission of radio signals by a space craft should be considered in this category. Vanguard I, launched on Mar. 17, 1968, continued transmitting until at least May 1964; 3 Aero. & Astro. 99 (Apr. 1965). Devices to shut off such signals should be included routinely.

⁴⁷ See International Cooperation and Organization for Outer Space Staff Report of ^{Senate} Committee on Aeronautical and Space Sciences, 89th Cong., 1st Sess., 391 (1963).

⁴⁸ There is no possibility of a soft landing on any celestial body without contaminating it with the exhaust of retro-rockets. See article, "Moon's Air Called Foul by Scientist," Dallas News, May 24, 1966, at A10, col. 4. G.J.F. MacDonald, UCLA planetary and space physicist suggests supersonic aircraft and spacecraft may leave enough hydrocarbons in the

atmosphere to result in a substantial increase of temperature of the earth. Getze, Los Angeles Times, Apr. 18, 1966, at 3.

⁴⁹ Various speculative solutions have been proposed, such as using a manned space vehicle to "sweep the skies" by gathering in the derelicts of space. Considering the limited maneuverability of space vehicles in orbit, none of the proposals put forward is presently practical.

Lipson & Katzenbach, Space Law, n. at 29 (1961) suggests that, "There is scientific opinion to the effect that a state with space capabilities could propel into orbit a large quantity of "junk" (for example, radioactive waste), the effect of which would be to preclude much further scientific experimentation and increase the hazards of space travel and the possibility of surprise missile attack. Such a program would overload tracking facilities and could distort communications. Presumably an effort would be made to justify it as a measure of self-defense. Steps to limit the number of satellites that can be put into orbit and to furnish some assurances that each serves a useful function would be constructive contributions to the law of space . . . "

⁵⁰ Supra n. 43, Space Science Program: Report to COSPAR (1964) at 397-98. The USSR has been criticized for inadequate sterilization procedures in connection with the spacecraft claimed to have been landed on Venus.

See Opfell, Miller, Kovar, Natón, & Allen, Sterilization Handbook, Final Report (Dynamic Science Corp. IN-65-24296, Aug. 1964) containing a substantial amount of technical material on methods of sterilization. Numerous press articles have been published: for example, Lederberg,

Washington Post, Aug. 7, 1966, comments that an American flag bootlegged aboard Surveyer I, which soft-landed on the moon, was a violation of international space policy. See also Haggerty, Journal of The Armed Forces, Apr. 9, 1966, at 9 discussing some of the problems of sterilization.

⁵¹ Space Science Program: Report to COSPAR (1964) at 391.

⁵² Article IX, UN Res. 1962 (XVIII) (Dec. 13, 1965) contains almost identical language. The resolution is, of course, only a recommendation, whereas the treaty is binding on the parties to it.

⁵³ Art. I, Sec. 8, "The Congress shall have power to levy and collect taxes, duties, imposts, and excises to pay the debts and provide for the common defense and general welfare of the United States . . . "

⁵⁴ It is probably not safe to assume that this distinction represents a carefully considered opinion that dangers on Earth from extraterrestrial contamination are nonexistent, but as evidence mounts against the probability of extraterrestrial life in the solar system, the danger of contamination of earth seems less.

⁵⁵ See the collection of treaties contained in Treaties and Other International Agreements Containing Provisions on Commercial Fisheries, Marine Resources, Sport Fisheries, and Wildlife to Which the United States is Party, prepared for the use of the Senate Committee on Commerce, 89th Cong., 1st Sess. (Comm. Print, Jan. 1965) by the Legislative Reference Service, the Library of Congress. See particularly at 327, Amendments of the International Convention for the Prevention of Pollution of the Sea by Oil, 1954; adopted at London Apr. 11, 1962, 88th Cong., 1st Sess., Senate Exec. Comm., for detailed rules relating to the discharge of oily substances at sea.

CONCLUSIONS

This study of that part of public international law which relates to the activities of man in space shows that even in areas where the major space powers might be expected to disagree, there has been a worthwhile and even rapid development of a law specifically directed to new problems and to old problems carried over into this new milieu. Moreover, it is now the consensus that traditional international law applies, in all appropriate contexts, to man's activities in space. Questions involving economic, political and strategic interests of the United States, the Soviet Union, and other nations, such as the extent of air space, the right of surveillance of earth from space, and the use and sharing of radio frequencies, remain unresolved and it is unlikely that comprehensive and detailed solutions of these most difficult issues will be forthcoming in the near future. Yet, there are already numerous examples of fruitful cooperation in lawmaking and in functional cooperation. Future arrangements may well be along such functional lines as well with "spatial" concepts of less importance. The fact that control over superjacent outer space would give little additional security protection to a subjacent state provides a strong practical argument in favor of agreements and controls of this functional type. Practical problems of identifying and protecting "national" blocks of space add to the attractiveness of functional controls and guidelines.

The answers to such questions as the legal status of space ownership and control of the celestial bodies and space craft, and of the duties owed to astronauts have been developed along broad policy lines which leave many

details to be resolved when more adequate knowledge is acquired and when and if specific problems arise. Generally speaking, nations have insisted on retention of control and jurisdiction over their own space vehicles and astronauts. Other states have acquiesced and have also accepted an affirmative duty to give appropriate assistance in the event of difficulties.

Of substantial importance is the now widely accepted rule that no state may acquire sovereignty over a celestial body or block of space beyond its superjacent air space by any means whatever. ^{This} is, to date, a self-policed, self-denying rule. No international machinery for regulation or control exists. Under this present regime, nations have retained ^{almost total} control over their own space activities and are entitled to any benefits which may arise from their exploitation of resources of space and celestial bodies. While numerous suggestions have been made by writers and even some government spokesmen that the exploration and exploitation of space and celestial bodies should be by or under the control of the United Nations or some other international institution functioning for the benefit of all nations, there is little basis to believe that nations having the ability to explore and exploit space and celestial bodies are now or will soon be prepared to subject their activities to international control.

The criteria for a "just" allocation of and control over activities in space and of resources of space and the celestial bodies, including the use of space for communications vehicles and for the orbiting and maneuvering of space vehicles of all varieties for all purposes, have to date been established on the basis of political policy considerations as seen by the space powers and other nations. This pattern seems likely to persist. In the event that broad inter-

national agreement ^{or} ~~as to~~ the appropriate criteria can eventually be reached, international institutions, existing or new, can readily be devised to interpret and apply the criteria for the allocation and control of activities in space and resources of space on agreed standards. Adequate technological information about the nature, extent, and exploitability of these resources is just beginning to become available and may not be fully developed for many years. Even such comparatively advanced utilizations of space, as for communications and information gathering about the earth, are as yet technological infants. The international institutions established to administer commercial communications utilizing space are not yet stabilized and the agreements which established IntelSat, the international telecommunications consortium, are already being renegotiated and will probably require review every few years if the international managerial structure is to be kept responsive to economic, political, and technological conditions. The overall effects of the reported Soviet proposal to form an international communications consortium on the basis of one state, one vote, for example, cannot now be determined.

There do not exist supranational international institutions with authority to control any of man's activities in space but the United Nations, the International Telecommunications Union, and other similar organizations have proven valuable and effective as ~~forms~~^{forums} for the exchange of ideas and for the development of understanding. Numerous General Assembly resolutions and the negotiation within the halls of the UN of formal treaties enunciating general and specific rules relating to activities of man in space give witness to this fact. The extent to which either resolutions or treaties may be legally binding on non-members of the United Nations and/or on non-parties to treaties is a facet of the overall interpretation and application of international law and depends in part on the extent to which the resolution or treaty represents

a restatement of customary international law. These problems are no different at base than they are for other critical areas of international concern in such fields as the law of war, disarmament, fisheries, or air traffic control and regulation.

Years ago at least a few authors and government spokesmen suggested, perhaps for dramatic emphasis, that an international legal vacuum existed with respect to man's activities in outer space. As this study makes clear, there has never been a legal vacuum; international law as developed to date is no less applicable to the activities of states in outer space and on the celestial bodies than to their actions in more familiar spheres.

This existing regime has been increased in the space age by numerous United Nations resolutions relating to activities in space. In addition, there are presently in force the ¹⁹⁶⁷ 1967 General Treaty of Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies; the 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space, and Underwater; the Agreement Establishing Interim Arrangements for a Global Commercial Communications Satellite System and the two subordinate agreements relating to satellite communications. In 1968, an Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space was signed by all the major space powers and most other nations. There are also perhaps two hundred minor bilateral agreements to which the United States is a party, relating to a great variety of cooperative activities in the exploration of space.

There are treaties for Western European and for Communist bloc cooperative activities. Even of the question of liability, where a specific Treaty for Liability for Damages Caused by Objects Launched into Outer Space is in the draft stage at the moment of this writing, the Treaty on Principles contains as part of its general terms provisions for absolute state liability for all activities in space. Peripherally, it should also be noted that all major states, including the United States and the Soviet Union, and apparently many smaller states have enacted legislation governing their domestic and international space activities. If as the French are fond of pointing out c'est le premier pas qui coûte, the space powers, with most nations joining, have already taken steps forward, indeed several lengthy strides, toward the mutual accommodation of their claims to the use of outer space.

In time there will probably be a need to develop international institutions to complement the self-policed, self-denying approach of present treaties and UN resolutions to ownership and control over space resources and to conflicts over those resources. Negotiation of detailed agreements concerning most space activities will become necessary as adequate technical knowledge becomes available in order to assure the peaceful, orderly exploration and utilization of space. Detailed regulations remain to be worked out/consistent which will be with the broad general rules of already developed international law and the patterns already accepted for outer space activities. Revisions will be required to keep the law abreast of technological advances and major political power changes, just as in all other fields.

Man's ability to use outer space is of recent origin and the valuable

activities and resources which may lie there are still unallocated among the states. Clearly, to the extent that space activities and resources prove politically, strategically, and economically important, a great challenge exists to develop political policy strategies to govern and regulate these new capabilities in order to minimize the conflicts between nations which may arise. The techniques adopted may even provide relevant precedent and experience for the settlement of similar types of distributive disputes arising from man's activities in the air, on the surface of the earth, and on and under the surface of the seas. To recall President Kennedy's words, space must be "a sea of peace" and not a "new terrifying treater of war." If we achieve this mission, space may also become an important classroom for peaceful international conflict adjustment in other theaters of contest, contributing significant precedent, experience, and good will to the larger task.