Regulation of Stratospheric Flights in Order to Control Adverse Environmental Effects

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INTRODUCTION

THE CLIMATIC Impact Assessment Program (CIAP) is a study by the Department of Transportation of the environmental effects of stratospheric flight. Until the jet age almost all flights occurred in the lower air masses of the troposphere. However, modern aircraft tend increasingly to fly in the stratospheric layer of air, above the troposphere. The border between the stratosphere and the troposphere fluctuates. Aircraft enter the stratosphere at approximately 36,000 feet, although the border changes up or down depending on latitude, season of the year and the weather. Transit of the stratosphere began to become common with the advent of jet aircraft. Subsonic long haul jets frequently cruise in the stratosphere. Supersonic aircraft penetrate more deeply into the stratosphere than subsonic jets and their operations will predominantly be in the stratosphere.

While the troposphere is regularly cleaned and emptied of pollutants by rain and thunderstorms the stratosphere tends to retain pollutants for long periods of time. The explosion of nuclear devices during 1959-63 showed this stratospheric characteristic. For instance, the explosion of a 340 megaton nuclear device by USSR in 1963 substantially increased the carbon 14 and strontium 90

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contents of the stratosphere and it did not return to its normal state until two years later.\(^1\) The main sources of stratospheric pollution from aircraft are nitrogen oxide and sulphur dioxide. Nitrogen dioxide initiates chemical reactions which may deteriorate the Ozone belt that protects the earth from the sun’s ultraviolet rays. Sulphur dioxide creates sulphuric acid which when combined with water vapors become suspended particles which may inhibit the heat of the sun from reaching the surface of the earth. The preliminary conclusion of CIAP is that stratospheric contamination may reduce the temperature of the earth’s surface. Even a one degree drop in mean temperature in important agricultural areas will have significant impact on the agricultural production. Stratospheric pollution could for instance severely affect wheat and rice production in the Northern hemisphere.\(^2\)

The purpose of this paper is to examine the significant national and international law applicable to attaining the objective of the CIAP. Our aim is to identify where the legal authority to regulate the flight of aircraft in the upper atmosphere resides so that with proper regulation, flight in the stratosphere will not result in adverse environmental impact.

There are both international and domestic legal regimes which can be applied to control the environmental problems spawned from aircraft flights in the stratosphere. This may mean stretching the broad wording in laws which were created to cover the problems of tropospheric flight; it may mean working from laws covering such analogous situations as drifting industrial pollution or sonic boom; it may mean putting to work in a new way laws developed for the very different purpose of controlling technical and economic entry of foreign aircraft into U.S. airspace. Some additional supporting regulations will undoubtedly be needed. There is, however, a definite legal foundation which is strong enough to carry whatever may have to be constructed upon it.

I. THE APPLICABLE LAW AND ITS EVALUATION

A. Sovereign Rights in Airspace.

In the infancy of air transport there was considerable discussion

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\(^1\) Grobecker, The United States Department of Transportation Research Program for Assessment of Stratospheric Pollution 12 (1973).

\(^2\) Id. at 16-17.
about whether the air was free for passage of aircraft of all nations. But even while that discussion was in progress, States quickly began to regulate air navigation and to claim sovereign rights in airspace above their territories. Thus, when the spectacular development of aviation occurred during the First World War it was well-settled customary international law that States had sovereign rights in the airspace. The 1919 Paris Convention expressed customary law when it said in Article 1 that:

The High Contracting Parties recognize that every Power has complete and exclusive sovereignty over the air space above its territory.

The principle of exclusive sovereignty over airspace above a State's territory was restated in the 1944 Chicago Convention which replaced the Paris Convention. The Chicago Convention has been ratified by 128 States, including the United States. Thus, 128 States have accepted the air sovereignty principle as a matter of treaty law. Since this is also customary international law, however, even those few states which have not ratified the Chicago Convention must also respect the airspace over foreign States, because one of the principles of international law is that laws of custom are universally applicable and therefore binding.

The outer limits of sovereign airspace are not entirely settled because that authority rests on sovereignty over territorial waters. The Chicago Convention delimits its extension over the seas to the territorial waters of a State.

While the United States still maintains a 3-mile territorial sea, most other States are drifting towards a 12-mile territorial sea. The United States in its law of the seas negotiations appears to be willing to accept such an extension if certain conditions and trade-offs are met. At the other extreme are such States as Ecuador and Peru which have claimed a territorial sea of 200 miles. Under the so-called Archipelago principle, large island States such as Indonesia and the Philippines would include the high sea area among their islands within their sovereign territory. If this principle is accepted in the law of the seas negotiations, another potential and substan-

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5 Note that 135 States have ratified the U.N. Charter.
6 Chicago Convention, supra note 4, at Art. 2.
tial extension of sovereign rights over the high seas would occur. Such extension might in turn include the substantial airspace over this part of the present high seas.7

The upper limit to airspace was roughly defined by customary international law during the first decade of the space age. It was recognized that the U-2 aircraft flying reconnaissance flights at 60,000 feet was in sovereign airspace. States have accepted that as sovereign because it was navigable by aircraft.8 On the other hand, States have tacitly permitted spacecraft satellites to orbit over their territory without claims of violation of sovereign rights.9 Supersonic aircraft will be flying at a height below the maximum flying height of the U-2 and certainly far below the lowest minimum orbiting level of satellites. The altitude for supersonic flight will be between 45-50,000 feet compared with the 35-40,000 feet which is a normal altitude for subsonic flight.

The right to dispose over the sovereign airspace described above is nearly absolute. The exception is grant of right under international agreement to an international organization or another State to exercise control.

The United States claimed sovereignty in airspace in the Air Commerce Act of 1926.10 This claim was restated in the Civil Aeronautics Act of 1938,11 and incorporated into the 1958 Federal Aviation Act, section 1108(a) as follows:

The United States of America is hereby declared to possess and exercise complete and exclusive national sovereignty in the airspace of the United States, including the airspace above all inland waters and the airspace above those portions of the adjacent marginal high seas, bays, and lakes, over which by international law or treaty or Convention the United States exercises national jurisdiction.

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7 Because of the earth’s roundness the seaward limits of sovereign airspace do not rise in a straight vertical line from the outer edge. Rather, the seaward boundary line leans outward as it ascends.

8 The X-15 experimental aircraft has flown as high as 50 miles.


11 52 Stat. 973 (1938).
B. United States Domestic Law.

In the law of the United States there are the necessary mechanisms for minimizing environmental problems resulting from aircraft flight in the stratosphere. The matter must be viewed as one requiring the control of environmental problems at their source—aircraft—because of the behavior of pollutants in the stratosphere. New major legislation is not required, nor is extensive modification of existing regulations necessary, in order for the federal government to limit environmental harm; the problem does not necessitate a unique legal approach simply because the aircraft are flown at high altitudes. The objective of the Climatic Impact Assessment Program can be achieved by vigorous application of existing law and a modicum of regulatory additions by those federal agencies charged with promoting aviation safety and a healthier environment.

In the Clean Air Amendments of 1970, Congress created a regulatory scheme adaptable to the control of aircraft emissions in the stratosphere. The Clean Air Amendments significantly increased the authority of the federal government to limit air pollution by establishing the power to regulate pollution sources. The federal government gained authority to set performance standards for new stationary sources of pollution and to enforce these standards di-

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14 Prior to the Clean Air Act of 1963, the federal government's role was restricted to supplying research support and grant assistance. Air Pollution Control Act, 69 Stat. 322 (1955). The Clean Air Act of 1963, 77 Stat. 392, and the Air Quality Act of 1967, 81 Stat. 485, provided increased federal involvement and laid the groundwork for the 1970 Act. The 1967 Act provided the Department of Health, Education and Welfare with authority to delineate broad atmospheric areas based on climate, meteorology and topography, authority to designate air quality control regions, authority to develop air quality criteria to indicate the extent to which air pollution is harmful to health and damaging to property, authority to require the States to develop ambient air quality standards and plans for implementation of the standards in the air quality control regions, authority to review and evaluate State standards and plans, and authority to initiate federal abatement procedures if State efforts failed.

142 U.S.C. § 1857c-6 (1970). The performance standards have been applied to new fossil fuel fired steam generators, incinerators, portland cement plants, nitric acid plants and sulphuric acid plants. See generally 40 C.F.R. § 60 (1973). Old stationary sources (those not constructed or modified after the publication of regulations, 42 U.S.C. § 1857c-6(2) (1970)), are subject to State standards. The States may enforce the federal emission standards or stricter standards. 40 C.F.R. § 60.10 (1973).
directly. Additional power to limit emissions from moving sources was provided. And, the Clean Air Amendments of 1970 added new section 231 to the Clean Air Act, introducing federal emission standards for aircraft.

Section 231 of the Clean Air Act directs the Administrator of the United States Environmental Protection Agency (hereinafter EPA) to investigate the emission of air pollutants from aircraft and to propose emission standards "applicable to emissions of any air pollutant from any class or classes of aircraft, or aircraft engines which in his judgment cause or contribute to or, are likely to cause or contribute to air pollution which endangers the public health or welfare."\(^{16}\) Pursuant to this specific authority the EPA in July 1973, promulgated Part 87, "Control of Air Pollution from Aircraft and Aircraft Engines"\(^{18}\) (hereinafter Part 87) thereby establishing emission standards and test procedures for aircraft\(^{19}\) and aircraft en-

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18 40 C.F.R. § 87, 38 Fed. Reg. 19087 (1973), Part 87 is premised upon the need to control emissions occurring under 3,000 feet to protect the ambient air quality in urban areas by improving the quality of air around major air terminals. The EPA made the following statement at the time Part 87 was adopted:

In judging the need for the regulations, the Administrator has determined (1) that the public health and welfare is endangered in several air quality control regions by violations of one or more of the national ambient air quality standards for carbon monoxide, hydrocarbons, nitrogen oxides, and photochemical oxidants, and that the public welfare is likely to be endangered by smoke emissions; (2) that airports and aircraft are now or are projected to be, significant sources of emissions of carbon monoxide, hydrocarbons, and nitrogen oxides in some of the air quality control regions in which the national ambient air quality standards are being violated, as well as being significant sources of smoke; and therefore (3) that maintenance of the national ambient air quality standards and reduced impact of smoke emissions requires that aircraft and aircraft engines be subject to a program of control compatible with their significance as pollution sources. Accordingly, the Administrator has determined that emissions from aircraft and aircraft engines should be reduced to the extent practicable with present and developing technology. The standards proposed herein . . . reflect EPA's judgment as to what reduced emission levels are or will be practicable to achieve for turbine and piston engines.


The emissions standards are applicable to pollution at any altitude since there is no limiting language in Part 87 or other regulation.

19 "Aircraft" means any airplane for which a U.S. standard airworthiness certificate or foreign equivalent is issued. 40 C.F.R. § 87.1(3), 38 Fed. Reg. 19090 (1973). Though purporting to include foreign aircraft, the regulation also pro-
gines. The standards govern both fuel venting and exhaust emissions for new and in-use aircraft gas turbine engines, exhaust emissions from new and in-use piston engines, and test procedures for exhaust gaseous emissions and smoke emissions from gas turbine engines and exhaust gaseous emissions from piston engines. The regulation establishes maximum pollutant levels from these sources for hydrocarbons, carbon monoxide, oxides of nitrogen and smoke.

The part 87 standards are applicable to aircraft engines classified by type (turbine or piston) and thrust or power level (e.g., above or below rated power of 8,000 lbs. thrust). For example, class T1 means “all aircraft turbofan or turbojet engines except engines of class T5 of rated power less than 8,000 pounds thrust.” Classification T5 applies to “all aircraft gas turbine engines employed for propulsion of aircraft designed to operate at supersonic flight speeds.” Class P1 means all aircraft piston engines except radial engines and P2 applies to turboprops. There are seven such classifications covering all prevailing aircraft engines including the engines of aircraft that operate in the stratosphere and engines to be used on future aircraft. EPA designed the classification to effectively group engines of similar emission potential. Also EPA considers the costs and effectiveness of control methods to be similar for engine models within each class.

For class T5 (supersonic engines) fuel venting emissions standards have been set. The standards will control the discharge of all raw fuel from gas turbine engines, exclusive of hydrocarbons in the exhaust, during all normal ground and flight operations. As for

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20 A “new” engine is one which has never been in service. An “in-use” engine is one which is in service. 40 C.F.R. § 87.1, 38 Fed. Reg. 19090 (1973).
exhaust emissions for T5, the EPA announced in the preamble to Part 87 that "standards for this class will be based on the best available combustor design technology expected in 1979 and later."

As is apparent from the emission standard for class T5 engines that looks to 1979 technology, Part 87 does not designate one date as the deadline by which all standards established therein must be met. Rather, Part 87 provides that the various standards for the several engine classifications must be achieved over a period of January 1, 1974, to January 1, 1981. Elasticity in the application of emission standards to some engine classifications is necessitated by available technology and the research and development schedule for more advanced technology. For example, EPA estimates that approximately six years are needed to translate combustion research findings into production engines for large aircraft which are fully certified and flight tested for safe usage in aircraft. The more strict standards for emissions from engines of large aircraft are timed to coincide with the availability of the requisite technology.

The legal basis for delaying the effective date of some aircraft emission standards is section 231(b).

Any regulation prescribed under this section (and any revision thereof) shall take effect after such period as the Administrator finds necessary (after consultation with the Secretary of Transportation) to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.

In the opinion of EPA, the Act contemplates continuing adjustments in emission standards responsive to technological progress. In the preamble to Part 87, EPA responded to public comments criticizing the long term standards set beyond present capability. EPA stated that section 231(b) of the Act expressly contemplates development of the requisite technology. The EPA believes that standards "will have a significant effect on stimulating the rate of

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26 38 Fed. Reg. 19088 (1973). EPA also stated that standards for exhaust emissions will be proposed for this class of engine "within 60 days." As yet, these standards for class T5 engines have not been published.


progress of technological development and spur its rapid introduction into flight applications." The EPA position is that if it should become evident that the standards cannot be achieved and applied safely to aircraft by the effective date of the standard, then "additional rule making action will be considered to ensure that the best technology available is reflected in the standards."39

The Clean Air Amendments also added section 232 of the Clean Air Act.30 This section provides for the enforcement of the EPA standards. Sound enforcement provisions give meaningful application to the standards. Section 232(a) vests in the Secretary of Transportation the responsibility to "insure compliance with all standards prescribed under section 231 by the Administrator" of EPA. The Secretary must make the emission standards "applicable in the issuance, amendment, modification, suspension, or revocation of any certificate authorized by the Federal Aviation Act or the Department of Transportation Act."31

In response to the EPA regulations the FAA has promulgated Special Federal Aviation Regulation (SFAR) No. 27" to give effect to the EPA requirements that became applicable to aircraft engines on February 1, 1974. Under the SFAR no operating certificates will be issued by FAA for an engine or for an aircraft powered by an engine to which EPA standards are applicable on February 1, 1974, unless the engine complies with the fuel venting requirements,33 exhaust emission requirements34 and related test procedures

31 The Secretary's functions have been delegated to the Administrator of the FAA. 36 Fed. Reg. 8733 (1971). The certificates that the Administrator is authorized to issue are original and supplemental type certificates, airworthiness certificates, airworthiness approval tags, and approval of return to service after maintenance. Federal Aviation Act of 1958 as amended, §§ 601-12, 49 U.S.C. §§ 1421-1532 (1970).
33 EPA has advised FAA, with regard to fuel venting, that EPA recognizes that the containment of fluid in any pump or other device to which mechanical power is provided through a shaft and seals can never be total and that some slight seepage may occur. 38 Fed. Reg. 30278 (1973). EPA has clarified that Part 87 is designed to eliminate intentional discharge of fuel drained from fuel nozzle manifolds after engine shutdown and does not apply to normal seepage from shaft seals. 39 Fed. Reg. 4884-85 (1974). Therefore, FAA will permit, within normal engineering tolerances for seepage, the discharge of fuel other than intentional discharge.
34 The only exhaust emissions requirement applicable on February 1, 1974, were for smoke by class T4 (JT8D) (B-727) engines.
of EPA Part 87. The effect of the SFAR is to prohibit the operation of aircraft on or after February 1, 1974, that fail to comply with the fuel venting requirements of Part 87 and the exhaust emission requirements and related test procedures applicable on that date.\(^6\)

The reference in section 232 to FAA's authority to take certificate action is a direct invocation of Federal Aviation Act Section 609. Section 609 provides:

> The Administrator may, from time to time, reinspect any civil aircraft, aircraft engine, propeller . . . or may reexamine any civil airman. If, as a result of any such reinspections or reexaminations, or if, as a result of any other investigation made by the Administrator, he determines that safety in air commerce or air transportation and the public interest requires, the Administrator may issue an order amending, modifying, suspending, or revoking, in whole or in part, any type certificate, production certificate, airworthiness certificate, airman certificate, air carrier operating certificate, air navigation facility certificate, . . . or aid agency certificate.\(^6\)

The authority to take action vis-a-vis the above described certificates extends to all classes of aircraft for violations of SFAR No. 27.

There are two points to be made about section 232 which show how that section strengthens FAA's authority to enforce environmental regulation of the navigable airspace. First, as emphasized in the quoted portion, "Safety in air commerce or air transportation" is the FAA's traditional mission and safety regulation and enforcement thereof is directly related to this mission. However, even prior to passage of the Clean Air Amendments the FAA had taken the position that its authority to regulate in the interests of air safety is broad enough to encompass regulation of aircraft emissions."\(^7\) Consistently the FAA relied on section 307(c) and other provisions of the Federal Aviation Act,\(^8\) as well as the Clean

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Air Act, as authority for the SFAR. Section 307(c) authorizes the FAA Administrator to prescribe air traffic rules and regulations governing the flight of aircraft for the "protection of persons and property on the ground." This language, not found in the original Civil Aeronautics Act of 1938, was added in 1958 when the FAA assumed the responsibilities of the Civil Aeronautics Administration. Indeed, section 307(c) was adopted out of concern for the problem of aircraft emissions, specifically to protect against chemicals improperly disseminated through crop dusting activities. The legislative history reveals that section 307(c) was not designed only to protect against the hazards of falling aircraft. The purpose of section 307(c) is to protect persons and property on the ground from injury or damage from aircraft flight whenever such protection is possible and it reasonably extends to protection against aircraft emissions.

Although it is not specific authority, it is suggested that through 307(c), the FAA possesses the authority under its own Act to promulgate and enforce emission standards. However, FAA has never issued emission standards or enforcement rules exclusively under the Federal Aviation Act and, in any case, section 232 of the Clean Air Act is clear authority for the SFAR. Section 232 enables

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40 The following excerpt is from a statement by Representative Oren Harris, Chairman of the Committee on Interstate and Foreign Commerce, made at the time of enactment of the Federal Aviation Act of 1958:

The Administrator, in subsection 307(c) is authorized and directed to prescribe air traffic rules and regulations for the protection of persons and property on the ground.

This should mean more than prohibiting test flights and acrobatics over thickly populated areas.

The problem of damage done by crop dusting and spraying from aircraft was presented to the committee and considered. It is intended that this legislation give authority to the Administrator to protect persons and property on the ground, not only from the hazards of falling aircraft, but from injury or damage caused by an account of [sic] any flight by aircraft where it is possible to do so. To accomplish that purpose, the Administrator must have authority to make such restrictions concerning the operation of aircraft as are necessary to protect persons and property on the ground from injury caused directly or indirectly by anything sprayed or thrown from an aircraft in flight.

Crop dusting and spraying are of great value and importance in certain agricultural operations but it is important that they be conducted in a safe manner.

104 Cong. Rec. 16081 (1958) (remarks of Representative Harris).
the FAA to act upon emission standards without having to first determine that "safety in air commerce" requires such action.

The second point is that Congress underscored the importance of effective enforcement of emission standards by limiting the scope of review of FAA actions to enforce section 231 standards. Section 232 provides that a certificate holder whose certificate is amended, modified, suspended or revoked for violation of section 231 standards shall have the same notice and appeal rights as are prescribed in the Federal Aviation Act of 1958, i.e., appeal to the National Transportation Safety Board, except that in any appeal to the NTSB the Board may

amend, modify or revoke the order of the Secretary of Transportation only if it finds no violation of such standard or regulation and that such amendment, modification or revocation is consistent with safety in air transportation.4

Normally in appeals from an FAA order of certificate action the Board's discretion is broad. The Federal Aviation Act permits the Board to amend, modify or reverse the FAA if the Board finds that "safety in air commerce or air transportation and the public interest do not require affirmation"4 of the FAA order. However, section 232 of the Clean Air Act requires the Board to find that there was in fact "no violation" of the emission standards before it can amend, modify or reverse the FAA order. This is a clear curtailment of discretion available to the Board and appears to be a Congressional statement to the effect that if a violation of section 231 of the Clean Air Act occurs, the Board is not to be concerned with mitigating circumstances surrounding the violation. This in conjunction with removing the necessity of finding a nexus between "safety in air commerce" and certificate actions should greatly strengthen the FAA's enforcement posture as EPA emissions standards become applicable to aircraft.4

4b Another issue raised by section 232 that may affect FAA enforcement is that the certificate action is the only enforcement method specifically referred to in section 232 of the Clean Air Act yet it is not the sole or even primary enforcement tool utilized by FAA to enforce the Federal Aviation Regulations. The FAA utilizes letters of reprimand or other administrative dispositions, cease and desist orders, and civil penalties of up to $1,000 per violation, in lieu of a certificate action, when appropriate. 14 C.F.R. § 13.15 (1973).
4c The current availability of these alternative actions for enforcement of the
It is clear that the regulatory scheme set forth in the Clean Air Act sections 231 and 232 vests in the EPA and FAA the legal capability to prescribe and enforce standards for aircraft emissions in the interests of public health and welfare. Furthermore, there is no serious question of the applicability of the sections 231-232 regulatory scheme to aircraft and aircraft engines that will operate in the upper atmosphere. The preamble to Part 87 evidences EPA's intent to regulate emissions from engines that power aircraft in the stratosphere, EPA's awareness of high altitude pollution and the Climatic Impact Assessment Program (CIAP) of the Department of Transportation and EPA's knowledge of a possible need to amend Part 87:

It is recognized by the EPA that potential problems have been identified relating to upper atmosphere effects of supersonic aircraft and to a lesser extent subsonic aircraft operations. The work in progress under the Department of Transportation Climatic Impact Assessment Program will be closely monitored by the EPA, in order that the present regulations can be adjusted if necessary. The present regulations are based on the need to control emissions under 3,000 feet, to protect ambient air quality in urban areas.  

EPA regulations is open to question. For example, the Federal Aviation Act provides for the imposition of a civil penalty for violations of that Act or any rule, regulation or order issued thereunder. If it were decided that section 307(c), 49 U.S.C. § 1348(c) (1970), and other Federal Aviation Act provisions relating to traditional safety concepts do not support FAA regulation of aircraft emission standards on environmental grounds, then the validity of FAA action such as the SFAR would rest solely upon section 232 of the Clean Air Act. Violation of the section 231 standards set by EPA would not be a violation of the Federal Aviation Act nor a rule or order issued thereunder and FAA civil penalties would not be available. Presumably, the certificate action would be the government's exclusive remedy. However, the final expansive sentence of section 232(a), 42 U.S.C. § 1857f-10(a) (1970), provides that the FAA Administrator "may execute any power or duty vested in him by any other provision of law in the execution of all powers and duties vested in him under this section." The duties vested in the FAA "under this section" are enforcement of EPA standards. Though admittedly speculative, this provision authorizing use of powers from other provisions of law in the execution of these duties supports the use of other FAA enforcement mechanisms in addition to certificate action to enforce EPA standards. As so interpreted, section 232(a) of the Clean Air Act permits administrative dispositions such as letters of reprimand and cease and desist orders. This interpretation, however, does not resolve the question of whether a civil penalty could be imposed without violation of the Federal Aviation Act or a rule issued under it. The section 232 authority given to the FAA Administrator to execute power vested in him by "any other provisions of law" does not alter those other provisions of law; and the civil penalty provision states only that they may be imposed for violations of Federal Aviation Act provisions or rules, regulations or orders issued thereunder.

Clearly EPA views its authority under the Clean Air Act as extending to the establishment of emission standards for aircraft that operate in the stratosphere.

Two additional provisions of the Clean Air Amendments of 1970 deserve mention. The first relates to the brief discussion of state regulation of aircraft emission. Congress specifically focused on the issue of the role of state and local governments in the effort to control aircraft emissions. In section 233 of the Clean Air Act Congress clearly stated its intent that emission standards set by the federal government be preemptive:

No State or political subdivision thereof may adopt or attempt to enforce any standard respecting emissions of any air pollutant from any aircraft or engine thereof unless such standard is identical to a standard applicable to such aircraft under this part.45

As of this writing no states have adopted such standards.

The second provision deserves mention due to its potentially great significance in relation to the objective of CIAP. Congress amended the Federal Aviation Act and granted the FAA Administrator authority to prescribe and enforce regulations establishing standards governing the composition or the chemical or physical properties of any aircraft fuel or fuel additive for the purpose of controlling or eliminating aircraft emissions which the EPA determines, pursuant to section 231, endanger the public health and welfare.46 Congress also made it unlawful for any person to manufacture, deliver, sell or offer for sale any fuel or additive in violation of the FAA regulations.47 Thereby Congress has authorized control of the pollutants in the fuel itself. By providing a cleaner fuel input to the engine, higher section 231 engine emission standards should become more attainable.

The preceding review indicates that there already exists a domestic structure intended solely for the control of aircraft emissions. There remains the task of adapting the structure to meet the par-

44 Federal Aviation Act of 1958, 49 U.S.C. § 1421 (1970). The regulation of fuel additives is not totally discretionary with the FAA. From the terms of the statute the Administrator of the FAA is required to establish standards for the pollutants found by the EPA to endanger the public health and welfare. However, the standard and its implementation are properly discretionary with the Administrator in keeping with his responsibilities under the Federal Aviation Act.
ticular problems of upper atmospheric pollution. Here again we need look no further for a model than the Clean Air Act and specifically the provisions for establishing national ambient air quality standards.\(^9\)

The first step is to identify the problem, the pollutant, and issue air quality criteria reflecting the latest scientific knowledge indicating the nature and extent of all identifiable effects on health and welfare which may be expected from the presence of a pollutant or combination of pollutants in varying quantities.

The second step is to establish stratospheric air quality standards for these pollutants. That is, establish tolerance levels which, if exceeded, would pose a danger to health and welfare. In effect the stratosphere, or some defined portion of the atmosphere where the pollutant is emitted, should be viewed as a massive air quality control region under federal control. The objective is to utilize all available resources of the federal government to achieve the air quality within that region. Of course, international standards and obligations must play a significant role here.

Application of controls is the third step. Primarily this will take the form of engine emission standards and control of fuel additives pursuant to the scheme discussed above. Further refinement may be required prior to application of such measures to the particular problem of stratospheric pollution. It may be necessary to apply the emission standards not only by type and design of engine, but also by the altitude at which the aircraft is intended to operate and to employ altitude restrictions on aircraft in accordance with their emission control capability. It may even be necessary to designate high altitude jet routes so as to avoid concentration of pollutants in any one area.

The enforcement of the standards and the monitoring of the atmosphere are the final steps. The aforementioned FAA enforcement machinery is the keystone in the enforcement program. The Federal Aviation Act and regulations promulgated thereunder already provide for periodic inspection of aircraft and aircraft engines to assure compliance with applicable FAA requirements.\(^49\) Auxiliary


\(^{49}\) 49 U.S.C. § 1429 (1970). Section 232(a) of the Clean Air Act is also inspection authority. It requires the FAA Administrator to "insure that all necessary inspections are accomplished" 42 U.S.C. § 1857f-10(a) (1970).
power rests with the Administrator of EPA. He possesses emergency powers enabling him to bring court action to restrain any person causing or contributing to alleged pollution to halt the emission of air pollutants when the pollution source or combination of sources present an imminent and substantial endangerment to the health of persons. 49

Finally, it may be necessary to utilize a permanent atmospheric monitor with the capability of detecting and reporting even slight variations in the atmospheric makeup. In this regard, the National Oceanic and Atmospheric Administration of the Department of Commerce possesses the authority and capability to research and develop such a monitoring system in coordination with the operational capabilities of EPA and FAA. 51 NOAA has the capability of measuring, through a network of ground station and aircraft, the day-to-day variability and the long term trends of air composition and atmospheric properties that are likely to be affected by upper atmospheric aviation activities. The National Weather Service, which is part of NOAA, has broad authority to “promote the safety and efficiency in air navigation to highest possible degree” by performing numerous meteorological services including studies of atmospheric phenomena, exchanging international meteorological information, establishing a network for meteorological reporting and promoting research and development. 52 Clearly a basis for such activity exists; some specific additional legislative authority to carry out the monitoring function may be necessary to establish the most suitable system.

C. International Law Regulating Civilian Stratospheric Flights.

Military supersonic aircraft are not regulated by the international


51 NOAA was created by Reorganization Plan No. 4 of 1970, 35 Fed. Reg. 15627 (1970), 84 Stat. 2090 (1970). Environmental Science Service Administration was merged into NOAA by that plan. ESSA’s responsibility for observation of the global environment from Earth-orbiting satellites and monitoring of atmospheric, oceanic and geophysical phenomena on a global basis was assumed by NOAA. NOAA does not possess extensive regulatory authority. By a recent act of Congress, P.L. 92-205, 15 U.S.C. §§ 330-30e (1971), NOAA acquired limited regulatory authority over intentional weather modification activities. NOAA’s authority is to impose reporting and record keeping requirements upon those who set out to intentionally modify weather. It is unlikely that NOAA’s regulatory authority would extend to inadvertent weather modification by aircraft in flight. See generally 15 C.F.R. § 908 (1974).

agreements that will be discussed below. Although military supersonic aircraft are generally smaller and at least in peacetime present a lesser problem, it is recognized that they should not be left out of any study which is concerned with environmental effects of supersonic flight to the stratosphere.

**1. The 1944 Chicago Convention on International Civil Aviation.**

The Chicago Convention on International Civil Aviation, which created the International Civil Aviation Organization (ICAO), recognized the existing concepts of air sovereignty and it generally provided for all aviation problem areas except the most important one, the right of entry into sovereign airspace by foreign scheduled aircraft. The Chicago Convention makes a basic distinction between scheduled and non-scheduled flight. In Article 5 it is provided that airspace of a contracting State shall have the right:

- to make flights into or in transit non-stop across its territory and make stops for non-traffic purposes without the necessity of obtaining prior permission, and subject to the right of the State flown over to require landing. Each contracting State nevertheless reserves the right, for reasons of safety of flight, to require aircraft desiring to proceed over regions which are inaccessible or without adequate air navigation facilities to follow prescribed routes, or to obtain special permission for such flights.

The essence of Article 5 is that no prior permission is necessary for entry into airspace of a Contracting State. On this blanket authority it would appear that non-scheduled aircraft may enter U.S. airspace without permission. However, Article 5 is not a reliable basis for right of entry. In practice, a number of States have tended to require prior permission, or prior notification. It should also be noted that Article 5 enables States to restrict the flights of foreign aircraft if a State decides that air safety requires certain routes be followed or special permission to be obtained.

Article 6 of the Convention provides that no aircraft in scheduled service may be operated into Contracting States except by special permission. Rights of entry of scheduled aircraft is separately regulated by the Two and Five Freedoms Agreements and bilateral air transport agreements described below.

Under Article 9(a) of the Chicago Convention, restrictions on entry into the airspace of a Contracting State may be imposed if
military necessity or public safety requires prohibition of flight over certain parts of its territory. It should be noted (i) that this restriction must be of temporary nature; (ii) it must be applied without discrimination to aircraft of all States, including the aircraft of the State whose territory is involved; (iii) the restriction must not unnecessarily interfere with civil aviation; and (iv) this restriction applies both to scheduled and non-scheduled aviation.

Article 9(b) affords even wider authority to exclude entry of all aircraft, both scheduled and non-scheduled, into all or any part of a Contracting State's territory. This Article may only be invoked when a need for public safety has arisen from an emergency or exceptional circumstances. This provision must be applied without discrimination to aircraft of all States including the aircraft of the State whose territory is involved.

2. International Air Services Transit Agreement
   (Two Freedoms Agreement).

Although the Chicago Convention did not solve problems of right of entry by scheduled carriers, the Chicago Conference did develop and approve the International Air Services Transit Agreement granting first and second freedom privileges among parties. These privileges are the technical freedoms: (i) the privilege to fly across the territory of another Contracting State without landing, and (ii) the privilege to land for non-traffic purposes, as for engine repair or refueling.

Since the International Air Services Transit Agreement is specifically made subject to the Chicago Convention, these two freedoms are subject to its Chapter II, Flight over the Territory of Contracting States (Articles 5-16), and thus may be restricted by the Contracting States. Under Article 4 the State may designate the routes and the airports to be used, and may also impose reasonable charges for the use of its air navigation facilities.

The International Air Services Transit Agreement provides right of entry for aircraft of Contracting States, which would include supersonic aircraft. However, if a State feels it is suffering from objectionable after-effects of foreign supersonic operation it may invoke the broad hardship language of Art. 11, Sec. 1 and request

the ICAO Council to look into the matter and call the States concerned to a consultation. If the consultation fails to remove the complaints, the Council may recommend that the "difficulty" be resolved. If a Contracting State unreasonably fails to take corrective action, the Council may recommend to the ICAO Assembly to suspend a Contracting State from the rights and privileges under the Agreement.

Eighty-five States are at the present parties to the International Air Services Transit Agreement. They include France, the United Kingdom and the United States.

3. The International Air Transport Agreement
(Five Freedoms Agreement).

One more multilateral agreement was negotiated at the 1944 Chicago Conference: The International Air Transport Agreement, also known as the Five Freedoms Agreement. In addition to the two technical freedoms exchanged among the parties to the International Air Services Transit Agreement, the International Air Transport Agreement added three economic freedoms: (i) the privilege to carry passengers, mail and cargo from the State whose nationality the aircraft has, to another Contracting State; (ii) the privilege to carry passengers, mail and cargo from a Contracting State to the State whose nationality the aircraft has; and (iii) the privilege of carrying passengers, cargo and mail from one Contracting State to another Contracting State. These three traffic freedoms are limited to routes that form "a reasonable direct line out from and back to the homeland of the State whose nationality the aircraft has." The extensive right of entry into the airspace of contracting parties granted by the Five Freedoms Agreement are subject to the same qualifications as described above under the Two Freedoms Agreement.

The Five Freedoms Agreement was promoted by the United States at the Chicago Conference. However, neither the United Kingdom nor any of the other important aviation powers expressed interest in joining the Agreement so the United States withdrew.

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55 Id. at Art. 1.
Its withdrawal entered into effect as of July 25, 1947. At the present time, only a small number of States are parties to the Agreement. Its importance for stratospheric flight is therefore negligible.

4. Bilateral Air Transport Agreements.

Since the Chicago Conference could not agree on a general multilateral exchange of traffic rights, the Conference in its final act made a recommendation for adoption by the States of a standard bilateral agreement on air routes. In this way each State could agree on exchange of economic traffic rights. At the time the United States was the greatest air power in the world and it naturally wanted liberal rights to offer air traffic services throughout the world. Other States, prime among them the United Kingdom, wanted to preserve their bargaining position until they had had time to build up an air fleet effectively competitive with the U.S. airlines. The 1946 Bermuda Agreement between United States and the United Kingdom reached a compromise which formed the sequel to the Chicago Conference, by becoming the model for exchange of traffic rights with other States. On this bilateral philosophy basic world air routes were established as they exist today. Each bilateral agreement details the routes that may be used by the airlines from party-States. These are the routes that may be used in flying into the United States and into other States.

The United States Standard Form of Bilateral Air Transport Agreement (1960) is here used for the purpose of illustrating typical conditions attached to traffic rights under a bilateral. Airlines may be required to qualify under the laws and regulations of each Contracting State. In the United States this means that a foreign carrier has to go through a section 402 proceeding in order to obtain a permit. The Civil Aeronautics Board may attach reasonable

56 9 M. WHITEMAN, DIGEST OF INTERNATIONAL LAW 414 (1968).
58 Winston Churchill favored free entry for all airlines and appears to be in line with the U.S. position of open skies, but contrary to the U.K. position; see W. CHURCHILL, CLOSING OF THE RING 554 (1962).
59 60 Stat. 1499 (1946).
terms and conditions to the issuance of a foreign air carrier permit. Under Article 4 no foreign air carrier may operate aircraft under a bilateral agreement unless the designated carrier is substantially owned and controlled by nationals of that foreign contracting country. Very important to all aircraft operation is Article 5 which states:

The laws and regulations of one contracting party relating to the admission to or departure from its territory of aircraft engaged in international air navigation, or to the operation and navigation of such aircraft while within its territory, shall be applied to the aircraft of the airline or airlines designated by the other contracting party, and shall be complied with by such aircraft upon entering or departing, from and while within the territory of the first contracting party.

This provision effectively subjects foreign aircraft to U.S. federal and local laws. Thus, the United States may control the environmental effects of stratospheric flight provided that local or federal law authorizes such control.

Also important is Article 6 which provides for reciprocity in recognition of certificates of airworthiness, certificates of competency and other licenses related to stratospheric flight. Certificates and licenses issued by one Contracting State will be recognized by another Contracting State if they conform with the ICAO minimum standards.\(^5\)

Article 8 provides that there shall be fair and equal opportunity for air carriers of the Contracting States to provide service on the routes granted in the bilateral agreement. Thus, if one Contracting State should commence supersonic operation in the stratosphere on the permitted routes, the other contracting party's airlines would also be permitted similar operation.

Certain limitations are placed on the amount of scheduled service that may be provided by airlines. Article 10 establishes that the services shall not exceed the capacity "adequate to the traffic demands" between an airline's flag state and the ultimate destination of traffic. The right to embark or disembark third country passen-

\(^5\) The United States has entered into special bilateral agreements on airworthiness with some countries, for instance with U.K. and France; however, aircraft emissions and noise are specifically excluded from the application of these special agreements leaving these areas to be regulated by ICAO or by unilateral regulation.
gers on the routes granted in a bilateral must be in accordance with "orderly development" governed by the following three rules of thumb: (i) the amount of capacity must not exceed the traffic requirements between the country of origin and the ultimate destination; (ii) it must conform with the traffic requirements of through airline operations; and (iii) it must conform with the traffic requirements of the areas that an airline traverses, although local and regional traffic requirements are taken into consideration.\footnote{Supra note 60. Art. 10(c) requires that capacity be related "to the traffic requirements of the area through which the airline passes after taking account of local and regional services."}

A basic principle of the Bermuda Agreement is that capacity should, to the extent possible, be regulated by the demand for service. This may be used to curb airline operation. Thus, if there is no demand for service, there is good reason for the host State to require the foreign State to cease or curtail operation of the service into its territory. However, this control of capacity is loose and works only on a retroactive basis, for before the complaint arises, experience must show excess capacity.

Whereas the loose \textit{ex post facto} traffic capacity requirement is characteristic of U.S. bilateral agreements, predetermination of capacity is the rule in bilaterals among other States. Not only the capacity that may be offered but also the kind of service, the kind of aircraft and many other details are subject to predetermination and agreement. Under these agreements the Contracting States are able to maintain fairly good control over the provision of air service by foreign carriers. In fact, introduction of new aircraft on existing agreed routes often must await the time when airlines of both Contracting States are in possession of the new aircraft so that a foreign carrier does not use new aircraft to displace local flag carriers from the market.

Even the United States has, in times of tough competition with foreign carriers over a stagnant market, thought about the feasibility of predetermining capacity and thereby controlling the amount of air traffic. An example of such interest was the 1961 CAB \textit{Investigation of the Terms, Conditions, and Limitations of Foreign Air Carrier Permits}.\footnote{Investigation of the Terms, Conditions and Limitations of Foreign Air Carriers Permits, Docket 12063, CAB Order No. E-16288 (Jan. 18, 1961).} The CAB suggested that foreign carriers be required to file traffic data disclosing the nature and extent of their
transportation between the United States and foreign countries. If the Board should, on the basis of submitted data, decide that excess capacity were provided by a foreign carrier, then the Board would notify the carrier of disapproval of the carrier’s schedules. This approach was not then adopted by the Board, but recently the United States adopted Part 213-Terms, Conditions and Limitations of Foreign Air Carrier Permits,\(^4\) which authorizes the Board, at its discretion, to require any foreign carrier to file traffic data with the Board to show the extent of the carrier’s transportation between the United States and foreign countries. This authority, however, is intended for use in reprisal for a foreign Contracting State’s impairment, limitation or termination of traffic rights of U.S. carriers. On the basis of data filed by the foreign carrier, the Board may notify it that its operations are contrary to the public interest. Part 213 is yet another indication that the United States is not totally committed to letting the market itself regulate the supply of services by foreign carriers.

5. *International Law Regulating Flight in Stratospheric Airspace Over the High Seas.*

International law, allows occasional exercise of national authority over airspace above the high seas outside of the described sovereign airspace. Canada in the Canadian Air Defense Identification Zone (CADIZ) over the high seas requires identification of all approaching aircraft. The United States likewise requires identification of all aircraft approaching it over the high seas in the Air Defense Identification Zone (ADIZ). States may exercise such occasional authority over airspace outside of their territorial airspace when necessitated by their safety, health, and welfare. Such authority may, of course, only be exercised when it is in the genuine interest of the adjacent State and does not unreasonably interfere with the interests of other States in their use of the airspace.\(^5\) FAA regulations require aircraft headed for the United States to report their positions to designated stations when the aircraft is between one and two hours flight time from the reporting station.\(^6\) For in-

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stance a BOAC or Air France supersonic Concorde would be re-
quired to identify itself and report its position approximately 1300
miles from U.S. territory while flying over the high seas.

Limited national authority over foreign stratospheric flight over
the high seas could be exercised based on this principle of right to
exercise occasional authority. However, the right is further circum-
scribed by Article 12 of the Chicago Convention by which Con-
tracting States have agreed to apply the ICAO rules over the high
seas, and to prosecute violators of these rules. It provides that:

Over the high seas, the rules in force shall be those established
under this Convention. Each Contracting State undertakes to insure
the prosecution of all persons violating the regulations applicable.

Therefore under Article 12, if ICAO issues rules regarding aircraft
emissions in the stratosphere such rules will be enforced by ICAO
Members and unilateral authority conflicting with the ICAO rules
may not be used.

It is interesting that the ICAO Sonic Boom Committee\(^8\) came to
the conclusion that "States have no power to prohibit supersonic
flights of foreign aircraft outside their territory." Support for this
very sweeping conclusion is drawn from Article 2(4) of the 1958
Geneva Convention on the High Seas\(^9\) which provides for freedom
of flight over the high seas. This conclusion certainly must be con-
sidered in evaluating unilateral claims of authority over supersonic
flights over the high seas. It should be noted however, that the
ICAO Committee did not conclude that regulation short of flight
prohibition was illegal. Consequently, there appears to be no con-
flict between the theory of occasional claim of authority and the
Committee's conclusion.

A second source of authority over stratospheric flight above the
high seas is that possessed by a State over aircraft of its own na-
tionality. States may attach any conditions to the award of its na-
tionality, and the Chicago Convention recognizes this authority
over national aircraft wherever they may be located.\(^10\) Thus, if a

\(^8\) ICAO Sonic Boom Committee, Second Meeting, Montreal, 19-29 June 1973,
Report on Legal Operational Aspects, ICAO Doc. 9064 at 3-2 (1973), [hereinafter
cited as ICAO Sonic Boom Committee].

No. 5200, 450 U.N.T.S. 82.

\(^10\) Chicago Convention, Arts. 17-21. For discussion see M. WHITEMAN, supra
note 56, at 319-21.
State should determine that stratospheric flights over a certain high seas area were dangerous or undesirable, then it could prohibit aircraft of its nationality from flying into or over such area. National prohibitions of this kind would depend entirely on the existence of local law authorizing such prohibition. The United States under such authority may determine that stratospheric flight over the high seas has such adverse public welfare consequences that it is undesirable for U.S. registered aircraft to fly there, or that they may only engage in stratospheric flight under certain conditions, or at certain times when U.S. territory would not be adversely affected by emissions.

A third source of control over the high seas airspace is that States adjacent to the high seas may impose air traffic control restrictions over flight to its territory. Article 11 of the Chicago Convention recognizes the authority of States to control aircraft entry to and departure from sovereign territory. This authority can be used to regulate the position and speed of aircraft over the high seas which are to land in the United States.

A fourth approach is to draw an analogy to sonic boom regulation. This approach is becoming increasingly attractive to States. The Federal Aviation Administration in 14 CFR Part 91.55 (1974) has prohibited the operation over U.S. territory of aircraft at a “true flight mach number greater than one.” This speed may only be exceeded in certain limited circumstances. It is now recognized that supersonic aircraft will fly subsonically overland. But what yet lacks universal acceptance is the principle that a State has the right to be free from the effects of sonic boom even when there is no actual aircraft intrusion into sovereign airspace. Thus, a State may provide that its territory including its territorial waters, which may be 12 or more miles wide, shall not be bombarded by sonic booms. This authority may be used not only to control approaching supersonic aircraft but also to keep supersonic aircraft flying along the coast line 75-100 miles away from the coastal territory.

72 ICAO Sonic Boom Committee, supra note 68, at 3-2.
73 This is the United States' point of view. Other States have questioned the right to exclude SSTs from unusually wide territorial waters; see ICAO Sonic Boom Committee, supra note 68, at 3-2.
By using a sonic boom analogy it may be argued that a State has the right to keep its sovereign territory free from the effects of emissions in the stratosphere, if they are harmful. Further support for this claim may be found in the Chicago Convention itself, because it is inconsistent with the principle of air sovereignty to let one State interfere with the sovereign airspace and territory of another State by permitting harmful substances to be emitted over the high seas by aircraft of its nationality. Furthermore, under the principle of *Trail Smelter Arbitration,* discussed immediately below, it may effectively be argued that pollution caused by one State, carried into another State, is contrary to international law.


The international law on pollution includes a good deal of the law of nuisance as it exists in common law countries. One State may not use or permit the use of its territory so as to unreasonably interfere with the neighboring country's use of its territory. In the *Trail Smelter Arbitration* between the United States and Canada smoke pollution was carried from privately owned smelters in Canada into the United States. Canada was not only required to pay compensation to the United States for damage caused but also to cease causing future damage. The Arbitration Tribunal found that national law on air pollution could properly be taken as a guide to what international law on air pollution was. The Tribunal concluded that

under the principles of international law, as well as the law of the United States, no State has the right to use or permit the use of its territory of another or the properties therein, when the case is of serious consequences and the injury is established by clear and convincing evidence.

Therefore, by analogy and under this case, if a State permits strato-
stratospheric emissions over its territory to interfere unreasonably with the territory of a neighboring State, then damages and injunctive relief would be available to the injured State.

In the Trail Smelter Arbitration the claim had to be brought at the Government to Government level. This is a cumbersome but often necessary dispute settlement method under which the injured party has to persuade his Government to take up his claim and press it as his Government's own against a foreign country. Recognition that a State may be liable for injury caused by its citizens to the interests of another State is increasingly becoming a basis for awarding compensation for damage and injury. In this way, when a State becomes financially responsible for the harmful activities of its citizens it may feel pressure to control those activities. This international legal technique is expressed in the 1966 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies. Article VI states that States Parties are responsible for national activities in outer space regardless of whether activities are conducted by private parties or by Government; furthermore, Governments must supervise activity by non-governmental parties. This approach may serve as a model, if new international law on compensation should be necessary by aircraft operation in the stratosphere.


The Warsaw Convention regulates the aircraft operator's responsibility for the international transportation of persons, baggage and goods. This Convention protects the passenger against the hazards of flight in the stratosphere and anywhere else. Under the 1972 Guatemala Protocol to the Warsaw Convention the air carrier is

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strictly liable for death or personal injury of a passenger while he is onboard the aircraft. The carrier's liability is limited to $120,000 per person. However, U.S. ratification of the Protocol is delayed pending the negotiation of a plan to supplement the Warsaw recovery limits for U.S. Citizens and resident aliens. Until ratification takes place U.S. passengers remain subject to the 1929 original version of the Convention under which the air carrier's liability is presumed unless the carrier shows that it took all necessary measures to avoid the damage or that the danger was unavoidable. Liability for death or injury under the 1929 Convention is limited to $10,000. However, as an interim measure, until the Guatemala Protocol is ratified, the carriers have filed a private agreement with the CAB that they will pay up to $75,000 for death or injury of a passenger and that they will consider themselves strictly liable up to this amount.

Possible effects from radiation, special hazards of flights at high speeds, loss of cabin pressure or temperature control are examples of how the Warsaw Convention may enter into effect due to aircraft operation in the stratosphere. Other protection for U.S. passengers outside of U.S. air space would be such as would be imposed on U.S. carriers by U.S. domestic legislation, or that foreign States would impose on their carriers, or that would be imposed by ICAO by virtue of existing authority in the Chicago Convention,\textsuperscript{63} or that would be imposed by new international agreements on stratospheric flight.


The doctrine of national sovereignty in airspace above the territory of States provides the States with authority to regulate the environmental effects of aircraft flight in their own stratosphere. As will be described below,\textsuperscript{64} the International Civil Aviation Organization (ICAO) may assist the States in providing regulation by making the international regulation applicable to their national airspace. The existing international law on right of entry into sovereign airspace establishes the routes that may be followed by all aircraft. The Chicago Convention provided somewhat tenuous entry

\textsuperscript{63} Infra at 35-41.

\textsuperscript{64} Id.
for non-scheduled aircraft, leaving them subject to national control. The Two Freedoms, the Five Freedoms and the bilateral air transport agreements control right of entry by scheduled flight. These agreements, particularly the bilateral air transport agreements may be negotiated and re-negotiated to delimit entry of aircraft into sovereign airspace. When the existing international agreements and their potential use are added to the existing national U.S. control and its potential, it appears justified to conclude that no new agreements are necessary for the control of flight in the national stratosphere.

Airspace over the high seas is not part of the sovereign territory and stratospheric flight over the high seas is subject to only inadequate national authority because only the control over national aircraft is effective. It would be improper to impose greater operating restrictions with economic consequences on United States carriers than on foreign carriers particularly in highly competitive markets such as the North Atlantic. Consequently, national control is not the sole solution to total control of flight over the high seas. This is why States have agreed that the ICAO rules, in particular the sixteen Annexes to the Chicago Convention, shall be applicable, although enforced by the Member States. It will appear from the following discussion of the ICAO institution and the exercise of its semi-legislative functions, that the authority in Article 12 of the Chicago Convention can be extensively used for international control of stratospheric flight over the high seas. When combined with the obligation on Member States to enforce the ICAO rules applicable over the high seas, it appears that sufficient legal authority exists for effective international regulation. It only remains for ICAO to assume the authority. For ICAO to do so, requires conclusive proof by a Member State that a need exists. Demonstration of that need will be an important function of the CIAP study.

II. INSTITUTIONS AND THEIR EVALUATION

A. Domestic Institutions Concerned with the Objective of the CIAP Study.

The two U.S. Government Agencies with primary authority for the control of aircraft emissions are the Federal Aviation Adminis-
tration of the Department of Transportation and the Environmental Protection Agency. As described in the preceding section, their authority can be applied directly to the problem of upper atmospheric air pollution and to the objective of CIAP.

The FAA was created in 1958 to facilitate transit through the air in a safe and efficient manner. The FAA has direct regulatory authority over the use of the navigable airspace under such terms as the FAA Administrator may deem necessary. The FAA Administrator possesses broad powers to prescribe rules governing the flight of aircraft for the protection of the aircraft, persons and property on the ground, and for the safe and efficient utilization of the navigable airspace. He may promulgate rules on safe altitudes of flight. "Safe" in this context means safe for the crew, passengers, and persons on the ground. Pursuant to this authority, the FAA oversees the establishment of jet routes, the designation of federal airways, and special use of airspace.

The FAA also sets standards governing the design, materials, workmanship, the construction and performance of aircraft, aircraft engines, and propellers. It sets standards for servicing and inspection of aircraft engines. It has well established procedures for legally enforcing its standards and as described supra, it now has specific authority to enforce EPA emission standards.

There is within FAA an Office of Environmental Quality which serves as a focal point for coordination and planning of FAA environmental improvement activities in aircraft operation, sonic boom, smoke, other aircraft ecological pollution and other areas. Altogether, the FAA has the necessary tools to regulate and limit aircraft emissions at the source to control their dissemination over the United States.

The Environmental Protection Agency was established in 1970 as an independent agency of the federal government. The Agency was created to make a coordinated attack on all forms of pollution and is the principal federal agency concerned with air pol-

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The functions of the National Air Pollution Control Administration of the Department of Health, Education, and Welfare with respect to the administration of the Clean Air Act as amended were absorbed by the EPA. The EPA has authority to set emission standards for mobile sources including aircraft and has exercised that authority, as discussed above.

The FAA and EPA have the necessary technical and regulatory authority and expertise to deal with the problem of stratospheric air pollution from aircraft. If there is a weakness, it is not in the agencies or in their respective enabling laws. It lies rather in the pluralistic demands made on the institution of government to achieve the best of all possible worlds. An example in point is the recently amended section 611 of the Federal Aviation Act which provides that the FAA Administrator "shall prescribe and amend such rules and regulations as he may find necessary to provide for the control and abatement of aircraft noise. . . ." Congress confronted by the many competing interests connected with noise regulations enacted sub-section D of section 611, which requires the FAA to exercise its discretion to reconcile the competing interests.

The principle benefit of a statutory provision like section 611 is that it places the deliberative process under one roof to facilitate decision making. Even so, the lengthy decision-making process may appear to some to more nearly resemble paralysis than progress. But even if it were not so specified by statute, a synthesis of

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In prescribing and amending standards and regulations under this section, the FAA shall—

1. consider relevant available data relating to aircraft noise and sonic boom, including the results of research, development, testing and evaluation activities conducted pursuant to this chapter and chapter 23 of this title;
2. consult with such Federal, State and interstate agencies as he deems appropriate;
3. consider whether any proposed standard, rule or regulation is consistent with the highest degree of safety in air commerce or air transportation in the public interest;
4. consider whether any proposed standard, rule, or regulation is economically reasonable, technologically practicable, and appropriate for the particular type of aircraft, aircraft engine, appliance, or certificate to which it will apply; and
5. consider the extent to which such standard, rule or regulation will contribute to carrying out the purposes of this section.

Id.
all of the considerations set forth in section 611(d) could hardly be avoided by responsible Government regulators. That analogous considerations will play a role in regulation of aircraft emissions is assured by the statutory scheme that blends the expertise of FAA and EPA and by a continuous identification of issues by the public.

A word should be said of the role of state and local governments in controlling aircraft emissions. Although the object of a regulation is control of a pollution, a subject matter traditionally the primary concern of municipalities rather than nations, this pollution emanates from aircraft in the navigable airspace which is under federal control. A solution to this problem, therefore, lies not at the local level but at the national level. The courts have repeatedly declared that the federal government has preempted the field of regulating use of the navigable airspace. Congress recognized when it prohibited state and local air pollution standards and controls for aircraft that are not identical to the federal standard that, for a problem of world-wide pollution of the stratosphere, there would be little point to placing the regulating authority below the national level.

B. International Institutions Concerned With the Objective of the CLAP Study.

The International Civil Aviation Organization (ICAO) is the primary international institution concerned with the regulation of aircraft flight. ICAO is a permanent standing body created by the 1944 Chicago Convention, and although the Chicago Convention predates the United Nations Charter in time, it is a specialized agency of the United Nations. ICAO is dedicated to development of “safe, regular, efficient and economical air transport.” It is charged with the duty of insuring “that the rights of contracting States are fully respected. . . .” Recently it has added to the task of aviation development a concern for aviation’s adverse environ-
mental effects focusing mainly on noise effects and the airport environment. But aircraft emissions have also attracted attention, and will be on the agenda of the 1974 ICAO Assembly.

In the future, ICAO's influence on flight in the stratosphere may be shown in study and preparations of international standards and procedures on aircraft noise and emissions. ICAO's regulatory authority over stratospheric as well as other aviation is unique and interesting, for it is one of the few international organizations which is authorized to constantly renew itself from within in a quasi-legislative way. Article 37 of the Chicago Convention gives ICAO the function of adopting new international standards and recommended practices and procedures in order to achieve the objectives of the Organization, of which international uniformity of regulations, standards, procedures and organization is a very important one. Under Article 54 of the Convention the standards and recommended practices become Annexes to the Chicago Convention itself, and become in this way applicable to the Members.

The Annexes are prepared by the ICAO Organization and are approved by the ICAO Council by a two-thirds majority vote. The Council, after approval, submits the Annexes to the Contracting States and they become effective within three months of the submission unless a majority of the 128 States register their disapproval with the Council. This process establishes a presumption of binding application because the States must shoulder the burden of gathering a majority for disapproval if they don't want to be bound. This burden in practice, is almost impossible to carry, and has effectively allowed the Council to establish itself as the creator of new Annexes and the amender of existing Annexes to the Chicago Convention.

After an Annex has entered into effect there is still a chance for a State to deviate from it if there is a special hardship created by its existence. Under Article 38 an ICAO Member State:

which finds it impracticable to comply in all respects with any such international standard of procedure, or to bring its own regulations or practices into full accord with an international standard or procedure after amendment of the latter, or which deems it necessary
to adopt regulations or practices differing in any particular respect from those established by an international standard, shall give immediate notification to the International Civil Aviation Organization of the differences between its own practice and that established by the international standards.

States are given 60 days within which to notify the Council of national variations from an ICAO Annex after which they become bound. This burden of notification again operates in favor of ICAO control of the Annex. It may not be difficult to establish that national regulations vary from the Annex, but it often is a burden that is not assumed because it is easier to conform.101

ICAO Annexes are appreciated by States which have little national regulation of aviation because the Annexes automatically become the basis for the national regulation of aviation. The highly sophisticated aviation States like the United States may often have standards which exceed those of an ICAO Annex, and are thus likely to give ICAO notice of variance. But the general result is that the Annexes are highly successful because States realize that they are likely to become bound by the Annexes, and they tend to pay attention to their formulation. An ICAO Annex on aircraft emissions and/or incorporation of uniform standards into the existing Annexes, would be a substantial step towards control of any adverse environmental problem arising out of aircraft operation in the stratosphere.

In 1972 ICAO adopted Annex 16, Aircraft Noise, in which ICAO essentially accepted the U.S. aircraft noise certification standards, on the theory that the environmental problem is an inherent part of air safety and of the development of aviation.102 ICAO's concern with sonic boom has proceeded on the same basis103 and as problems concerning other adverse environmental effects, including emissions, appear then these will be dealt with in the same way.104

102 Chicago Convention Art. 37 gives ICAO a broad mandate to concern itself with the "safety, regularity and efficiency" of civil aviation.
103 ICAO Sonic Boom Committee, supra note 68.
The entire area of the effect of aviation on the environment will be continuously watched by ICAO, and new Standards, Recommended Practices and Procedures, and guidance materials dealing with environmental matters will be provided as necessary.

Within the ICAO regulatory procedures there is a hierarchy of uniform procedures of differing value. A distinction is created under Article 37 between “standards” and “recommended practices.” “Standards” are intended to establish fully standardized practices, whereas “recommended procedures” do not express an obligation on States to conform. The less obligatory recommendatory practices may grow into more obligatory standards if the need therefore exists.105

Besides standards and recommendatory practices, ICAO establishes even lower level rules. There are Procedures for Air Navigation Services (PANS), and there are Regional Supplementary Procedures (SUPPS). PANS have world-wide application whereas SUPPS apply for a specific Region. Both have to be approved by the ICAO Council.

Stratospheric flight would be subject to all the current ICAO regulations to the extent that such flight is not specifically excluded. All the Annexes with the exception of the most recent one, Annex 16, apply to supersonic flight.106 Annex 16 by definition is made applicable to subsonic flight only, but it could be made to include supersonic aircraft either by adding another chapter on supersonic flight or by changing the existing definition of aircraft to include supersonic aircraft.

The analogy to sonic boom regulation is valuable. The ICAO Sonic Boom Committee has been active in study of supersonic flight and its deliberations and conclusions have bearing on the CIAP project. Both the first and the second meeting of the Committee came to the conclusion that States have the authority to control supersonic flights over their territory and that the most appropriate

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105 B. Cheng, supra note 3, at 68.
106 The annexes to the Convention are: Annex 1—Personnel Licensing; Annex 2—Rules of the Air; Annex 3—Meterology; Annex 4—Aeronautical Charts; Annex 5—Dimensional Units to Be Used in Air-Ground Communications; Annex 6—Operation of Aircraft; Annex 7—Aircraft Nationality and Registration Marks; Annex 8—Airworthiness of Aircraft; Annex 9—Facilitation; Annex 10—Aeronautical Telecommunications; Annex 11—Air Traffic Services; Annex 12—Search and Rescue; Annex 13—Aircraft Accident Inquiry; Annex 14—Aerodromes; Annex 15—Aeronautical Information Services; Annex 16—Aircraft Noise.
means for controlling the adverse noise effects of supersonic flight over the high seas would be the Annex route. There was agreement to amend Annex 2 to the Chicago Convention—Rules of the Air.\textsuperscript{107} The Committee established an interesting set of criteria for such amendment indicating that ICAO not only feels that it can handle the problem of international regulation of supersonic flight, but also that such regulation may be accomplished through an Annex to the Chicago Convention.\textsuperscript{108} It is too early at this point to consider whether a special Annex should be created, or whether supersonic flight may best be regulated through modification of existing Annexes. That will become more clear when more is known about the exact nature of the problems that may be caused by flight in the stratosphere.

An entirely different function of ICAO is to draft international law on new problems. The ICAO Legal Committee is a standing Committee which has successfully drafted such multilateral air law conventions as the 1963 Tokyo Convention on Offences and Cer-

\textsuperscript{107}ICAO Sonic Boom Committee, supra note 68. The Committee also considered amendment of Annex 6 and the ICAO Air Navigation Commission actively weighed this approach, see ICAO Doc. 9011 at SBC12 (1973).

\textsuperscript{108}ICAO Sonic Boom Committee, supra note 68, at 3-3:

(a) it should address itself in general terms to the manner in which an aircraft is to be operated in order to achieve a specified objective;
(b) it should be capable of being adhered to by any type of aircraft capable of supersonic flight on the basis of operational parameters pertaining to the aircraft type and the flight undertaken;
(c) it should not unnecessarily restrict supersonic flight and should therefore;
(i) be phrased in terms of the effects of sonic booms rather than supersonic flight as such;
(ii) address itself not only to total protection from sonic boom, but also apply in cases where a State might accept sonic booms of certain characteristics; and
(iii) permit exemption in individual cases by special permission by the State concerned;
(d) it should respect the sovereignty of a State over its territory and airspace under the terms of the Convention (Articles 1 and 2 of the Convention refer);
(e) it should be phrased in such a manner that it requires an initiative from the State desiring protection in order to make the provision operative for its territory or any portion thereof; and
(f) it should be drafted in a manner compatible with comparable, existing provisions in Annex 2.

In regard to (c) the Committee did not reach consensus about the extension of national control over the territorial sea because of the widely varying claims to breadth of the territorial sea. Regarding (e) it was thought that States should be required to publish information about their national regulations in order to provide due notice.

After a new issue has been placed on the list of subjects for current work and after preliminary discussion, the Legal Committee usually appoints a subcommittee to do the spade work on the drafting of a new convention. The full Committee will debate the subcommittee's work product when it is ripe for finalization or when the subcommittee needs further guidance. After approval by the Legal Committee, the Council submits the draft convention to a diplomatic conference of States.

At this time the environmental effects of flight in the stratosphere is neither on the active nor the inactive working program of the Legal Committee. Related Legal Committee concern is focused on aircraft damage to the surface. This is part of the study of the 1952 Rome Convention on Damage caused by Foreign Aircraft to Third Parties on the Surface. Whether new environmental issues should be placed on the working program would be influenced by CIAP conclusions regarding the existence of adverse environmental effects and a decision that a new convention would be a feasible route.

It is apparent from the above discussion that although international control of aircraft emissions does not yet exist, ICAO is fully equipped to provide international control of stratospheric flight, if that is found to be necessary. ICAO is a dynamic organization.

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112 Supra note 82.
113 Convention, Supplementary to the Warsaw Convention, for the Unification of Certain Rules Relating to International Carriage by Air Performed by a Person Other than the Contracting Carrier, Sept. 18, 1961, AERONAUTICAL STATUTES AND RELATED MATERIALS, supra note 60, at 428.
which has the equivalent of legislative authority to provide standards and recommended practices and procedures. ICAO's Assembly has already given the Organization wide authority to concern itself with all environmental problems caused by aviation. The ICAO Secretariat of the Member States may propose that pertinent aviation problems necessitate study and control. But before it is possible to say exactly what form such control should take it is necessary to know more about the problems. After the conclusion of CIAP the United States may bring problems to ICAO and request that existing committees or new committees study them and that new procedures be established. The new ICAO procedures will become automatically applicable over the high seas, under Article 12 of the Chicago Convention, and ICAO Members will accept such procedures domestically to the extent that is possible. This is a treaty obligation for all the 128 Member States.

The individual States can effectively supplement ICAO under their domestic law. Thus, the United States may provide regulatory control within its territory, and it may regulate U.S. aircraft which fly outside the U.S. territory. It is possible that in the future Member States will give ICAO more regulatory authority if acute problems arise. The United States has begun to control aircraft emissions; and if the analogy to aircraft noise is followed, then it is likely that, as the U.S. aircraft noise standards become adopted into ICAO Annex 16, U.S. aircraft emissions standards may become adopted into an ICAO Annex and thus become a new international standard.

CONCLUSION

There is reason to expect climatic changes from flight in the stratosphere. This paper has shown that the Clean Air Act, enforced by the Federal Aviation Administration, can be used to control stratospheric aircraft emissions. The basic regulatory framework combined with an enforcement machinery has already been created. Internationally the Chicago Convention provides enabling legislation which may be implemented in the form of ICAO Annexes for effective control of emissions at the source: the aircraft.

The national and the international regulations work hand in hand. The CIAP report will have the effect of enlightening both do-
mestic and international regulatory bodies about the dangers of adverse environmental impact. The conclusion of this paper is that both the existing national and international institutions are equipped to protect the world against undue climatic impact of stratospheric flight.
Case
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