

The safety activities of the ICAO and the IAEA

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An aeroplane manufactured in Country A flies between Country B and Country E, passing over Countries C and D en route. If it meets with an accident, the question arises as to whether the cause was pilot error, a defect in the plane, or faulty advice from airport controllers. The public does not say that flying is not safe, or that all travel should be by trains and ships.

An accident occurs in a nuclear plant manufactured in Country A and operating in Country B near the border of Country C. The public says that nuclear power is unsafe, and that fossil fuels and other forms of energy should be used to generate power.

How has the aviation industry been able to build up public confidence in the safety of flight? What can the nuclear community learn from the aviation industry? Manned flight began some 80 years ago; nuclear power has been in use about half that long. In another 40 years, can we expect that nuclear power will be taken for granted as aviation is today?

Perhaps some of the answers to the different public perceptions of the two industries can be found in the differences in their patterns of international co-operation. It is interesting to compare the IAEA with its aviation counterpart, the International Civil Aviation Organization (ICAO), a specialized agency of the United Nations.

The Second World War not only accelerated the technical development of the aeroplane, but facilitated the establishment of international networks for transportation of passengers and freight. In order to continue such services in peacetime, many political, technical and commercial problems had to be resolved — how to control flights across national borders, how to maintain air navigation facilities, how to standardize operational practices. In November 1944, delegates from 52 States met in Chicago to consider the requirements for large-scale international civil aviation. The result of these deliberations was the Convention on International Civil Aviation. In it, the signatory governments "... agreed on certain principles and arrangements in order that international civil aviation may be developed in a safe and orderly manner and that international air transport services may be established on the basis of equality of

opportunity and operated soundly and economically". The permanent body charged with the administration of these principles is the ICAO.

How the ICAO works

The 96 articles of the ICAO Convention establish the privileges and restrictions of all contracting States, provide for the adoption of international standards and recommended practices regulating air navigation, recommend the installation of navigation facilities by Member States, and suggest the facilitation of air transport by the reduction of customs and immigration formalities. In addition to the Convention, two supplementary agreements cover the subject of flying over and landing for technical reasons in the territory of any other signatory, and the carriage of traffic between the State of registration of the aircraft and any other signatory.

The aims and objectives of the ICAO are to be found in article 44 of its Convention. Among them are several that specifically refer to safety:

- to ensure the safe and orderly growth of international civil aviation throughout the world;
- to meet the needs of the peoples of the world for safe, regular, efficient, and economical air transport; and
- to promote safety of flight in international air navigation.

The ICAO has a sovereign body, the Assembly — comparable to the Agency's General Conference; and a governing body, the Council — comparable to the Agency's Board of Governors. One of the major duties of the Council is to adopt international standards and recommended practices and to incorporate these as Annexes to the Convention. International standardization is recognized as essential for the operation of safe, regular, and efficient air services. Standards cover matters such as rules of the air, air traffic control, personnel licensing, and design of aerodromes.

In the ICAO Convention the Member States agree to "co-operate to secure the highest practicable degree of uniformity in regulations, standards and procedures". ICAO Standards are specifications the uniform application of which is necessary (the word used is "shall"). The Council also adopts Recommended Practices, which are agreed to be desirable but not essential (the word used is "should"). Both the Standards and the Recom-

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mended Practices are considered to be binding unless a contracting state notifies the ICAO that compliance is impractical; any differences are then published by the ICAO as supplements to the Annexes. To date 17 Annexes have been approved, and most of them directly or indirectly concern aviation safety.

Standards for safety design and testing of nuclear power plants

In the field of nuclear power, the IAEA issues standards for safe design and testing of nuclear plants. These standards are in the form of Codes and Guides, and they are developed on the basis of consensus. The Codes are similar to the Annexes of the ICAO Convention, but the Guides are more detailed than the Recommended Practices of the aviation industry. The Agency's expectation has been that, sooner or later, the standards would be endorsed by those Member States which have not yet developed their own. Although some Member States have endorsed the standards, their principal use, at present, is as a guideline for Member States in developing their own standards.

Operational safety

Aircraft pilots and navigators are internationally respected professionals. A pilot's ability to handle his aircraft safely needs to be recognized by the countries he overflies and by the countries in which he lands. As a consequence, the Annex of the ICAO Convention which establishes technical requirements for the crew of an aircraft are very detailed and precise. For example, it is established that an airline transport pilot must have an extensive knowledge of such subjects as the theory of flight, operational limitations of aircraft and meteorology. He must also have considerable proven experience and skill (1500 hours of flight time). As a consequence, a pilot license that is in accord with ICAO standards is accepted throughout the world.

The training of nuclear power plant personnel, including the control room operators, and the granting of permits for them to operate a plant, are in accordance with each country's own standards. There is no international uniformity, nor acceptance yet that there should be uniformity, even though the operator's actions can conceivably have trans-boundary implications in the case of an accident, particularly if the plant is located near a border. The IAEA has developed Codes and Guides covering qualifications for plant operators, but the requirements are not as strict and detailed as those for airline crews.

The public's image of a pilot is quite different from its image of a nuclear power plant operator. A pilot and his crew enjoy prestige and recognition of competence, while the public is generally ignorant of the duties of an operator of a nuclear power plant, or of the professional competence required to operate this facility, which is a

machine no less sophisticated and no less potentially dangerous than a jet aeroplane.

Why are these images so different? In part, it may derive from the efficient public relations efforts of the airlines and the ICAO. But it is undoubtedly associated also with the efforts made by the aviation industry in training, and in maintenance of high standards of quality for aircraft personnel. The very high salary received by pilots is another contributing factor.

Incident reporting

For many years the ICAO has maintained an incident reporting system which establishes the type of inquiry to be made by a Member State when an air accident involving damage or casualties occurs in its territory. The reporting is organized in such a way that the information thus collected is disseminated to Member States rapidly and efficiently, so that similar accidents can be avoided. A considerable amount of effort on the part of the ICAO has been devoted towards ensuring that each Member State performs its own analysis rapidly and thoroughly, and that expertise is readily available to perform the analysis.

Within the last two years the IAEA has also started an Incident Reporting System which is directed towards collecting information on accidents from which information important to the safety aspects of a nuclear power plant may be derived. Guidelines for national and international systems have been developed, and it appears that most Member States with power reactors in operation will agree to participate in this initiative.

International co-ordination on safety

In comparing the safety activities of the two international organizations, it may be noted that ICAO was founded in 1944, while IAEA began its work in 1957. Perhaps in the field of safety, the Agency's evolution will be similar to that of the ICAO. It should be noted also that the two organizations each deal with promotional and safety activities; this has not damaged the image of either.

The need for international co-ordination in safety is recognized in both fields. They each have a very high technological content; thus their typical end-products — aircraft and nuclear power plants — are produced in only a few countries but used by many. The safe operation of a civil aircraft in international flight involves the knowledge, assistance, and recognition of other countries. On the other hand, safe operation of a nuclear power plant involves only the country in which it is located. Also, its impact on the environment is usually restricted to its own country, but radioactive releases in normal and accidental conditions, particularly where reactors are located near a country's boundary, may cross national borders. The services provided by civil aviation (transport of persons and goods) are often

international in scope, while the service provided by the nuclear energy industry (production of power for a region) is typically restricted to one nation. Normal development in both activities depends on the public perception of their level of safety. However, there are today virtually no alternatives to air transport, while for power production there are various alternatives. Thus it can be seen that the international character of safety aspects is in the very nature of civil aviation, while for nuclear power it is only an important component.

Conclusions

What can the IAEA learn from the activities of the ICAO? It appears that the ICAO has directed its efforts towards those areas of the safety of civil aviation where international co-ordination is most needed, and that it has recognized that in certain areas achievement of results could be very difficult. The basic question asked before a specification is accorded the status of a standard is whether a uniform application by all Member States is necessary. As a consequence, the ICAO issues many different types of documents: standards, recommended practices, and manuals. There are only general standards for the safe design of aircraft, but guidelines have been prepared to assist Member States in developing their own detailed standards for safe design. By contrast, in the area of personnel, the standards are very strict and detailed. This is also the case for landing facilities, radio communications, etc. In selecting subjects for standards

the IAEA, on the other hand, has not always used the criterion of whether standards are necessary; only recently have efforts been concentrated in a few areas where international co-ordination is most needed.

The tool which allows ICAO to operate so efficiently in the safety field is its Convention, which is accepted by its Member States, and which permits inclusion in Annexes of technical recommendations that can be approved and amended with a two-thirds majority of the Council. The IAEA has not yet developed a Convention on safety matters. Decisions on standards are usually taken on the basis of consensus by the different advisory groups or by the Board of Governors. The ICAO also has an Air Navigation Commission which meets on a regular basis to discuss broad technical matters, some of which are related to safety. There is no such body for nuclear safety. The Senior Advisory Group in the Agency's Nuclear Safety Standards (NUSS) programme supervises development of standards for nuclear power plants, but does not deal with other fields such as research reactors, safety research, incident reporting or training of personnel. Recently, however, the question of an international nuclear safety body has been discussed. This body might well be somewhat comparable to the ICAO's Air Navigation Commission.

The nuclear energy community may well profit from some of the initiatives undertaken by its sister UN organization. Some of the devices used in regulating the airline industry may provide solutions to problems faced by the nuclear community.

