Agency Staff on Special Missions

The IAEA Secretariat includes 190 scientists and engineers whose special qualifications cover most of the branches of nuclear science and applications of nuclear energy. This gives it a unique international concentration of specialized skills and knowledge, but increasingly this know-how is being taken straight to Member States. While the nucleus of the work of the technical Divisions is at the IAEA Headquarters, the Agency is sending out more and more of its specialists for short-term assignments "in the field" to help and advise Member governments. These assignments are distinct from the longer-term technical assistance projects, for which specialists are recruited from outside the Secretariat and only occasionally from its staff.

The different types of help that the Agency's Secretariat gives to Member States covers a wide range of subjects. The legal staff gives advice on basic laws and on safety regulations, and has done so in 35 countries. It has also accepted more than 30 trainees from Member States to work in its offices at headquarters since 1961. Scientists, economists and engineers go out to Member States to advise on problems linked to the planning of nuclear power programmes or to the building and commissioning of their first nuclear power plants. Inspectors from the Department of Safeguards and Inspection help to set up systems of nuclear materials management and control which are essential for safe and efficient operation of nuclear plants and for governmental surveillance of nuclear industry. Specialists in nuclear medicine have helped calibrate instruments and to advise the setting up of clinics. Staff geologists have advised many countries about the development of uranium ore.

The list of specialities covered is very wide. We have singled out one type of mission as an example of the help that the IAEA can give in a field of particular importance. This is the safety and siting mission:

Since its inception, the Agency has assisted more than 30 developing countries in making safety assessments of their research reactors and nuclear power plants both before and after installation. It does this by sending special missions to the countries concerned, to consult with and assist the national regulatory authority or the special authorities charged with the licensing of nuclear installations. The missions are composed of Agency staff members together with internationally recognized nuclear safety experts. One to three weeks has usually been needed for making a complete review.

In all, 48 such special nuclear safety missions have taken place – 18 siting missions, 22 safety missions, and 8 missions to review the level of safety at operating nuclear installations. Let us consider these one by one:


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SITING MISSIONS: The siting mission, which entails about 1 1/2 weeks of work, reviews the various siting parameters for the installation of a nuclear plant.

The three factors taken into consideration are:

1. Characteristics of the reactor design;
2. The population density in the vicinity of the reactor; and
3. The physical characteristics of the site.

The characteristics of the reactor design are considered in the light of its proposed use, the maximum power level of the reactor, and also the extent to which generally accepted engineering codes and standards are to be followed in the design and construction of the reactor. Design safety features, proposed to reduce the likelihood and consequences of reactor accidents, are also considered in assessing the suitability of the site.

In looking at the population density, it is necessary to know the amount of land under the control of the reactor operator, the distance to the boundary and to the nearest large population centre, as well as the density of the population between the reactor site and the population centre.

The physical characteristics of the site would entail a review of the geology, cooling water availability, the site accessability, the nearness to power transmission lines, the meteorology, the hydrology, and the seismology of the area.

The need for the mission to view the site or sites can be met most satisfactorily by a flight over the area in either a helicopter or light plane.

SAFETY MISSIONS: The safety assessments tend to be much more complicated, and as such require more careful preparation and a longer time.

In most cases a developing country will have chosen to buy a nuclear plant nearly identical with one which is already licensed by the country from which it is being purchased. The plant in the supplier's country is often referred to as a reference plant. The safety mission then reviews the differences between the proposed plant and the reference plant to determine the level of safety that is likely to be reached with the new plant. The main topics that require review are the general description of the plant, its lay-out and site characteristics, the description of the nuclear reactor, the proposed quality assurance programme, the containment, the protection system, the seismic characteristics, the waste management, and the safety analysis including accident analyses. For example, with a light water reactor, a detailed review is made of the containment system. Particular attention is paid to the features provided to insure leak tightness, to systems provided for suppressing or reducing the post-accident pressure in the containment vessel and to containment vessel atmosphere clean-up systems. Hydrogen can be generated

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▲ The siting review mission sent by the IAEA to Thailand needed a helicopter to visit the proposed area at Sri Racha.

◀ A Philippine scientist points out a geological fault in the ground at Bataan to the IAEA siting review team.

▼ The safety mission examines the coastline at Bataan, Philippines, before recommending a site for the first nuclear power reactor.

after a loss-of-coolant accident, both by metal-water reaction and by radiolysis. Therefore, not only would an adequate monitoring system be necessary for detecting dangerous concentrations of hydrogen, but also a system to cope with such a situation.

The accident analyses for the reactor have to be studied to ensure that the estimated radiological consequences of a design basis accident would be acceptably small. The analyses of the design basis accident and the experimental investigations on which they are based have to be reviewed in some detail. A review needs to be made of the nuclear steam supply system and identification of the safety design bases and the design criteria. The design codes and standards for all of the plant's components need to be reviewed. The plan for providing quality assurance is reviewed to determine its adequacy and to be sure that each organization, vendor, architect-engineer, supplier and applicant is required to exercise proper control and checking.

The reactor protection system design is examined. This review would cover the emergency shutdown (scram) system, the off-standard conditions which would cause a scram, the circuit logic for the protection system, the apparent reliability of the system, and applicability of standards to be used. The emergency core cooling system design and in particular its performance analysis, analytical and experimental bases, the predicted post-accident fuel temperature and reliability considerations also needs to be reviewed. Possible problem areas which are examined carefully are inter-faces with related systems such as the electrical power supply and protection containment systems.

Important areas that are scrutinized include the suitability of the components for performing their functions in a post-accident atmosphere. Equipment layout is also examined for possible adverse interaction, such as damage by pipe whipping.

SAFETY REVIEW MISSIONS: **The third category of safety mission is the Health and Safety Inspection Mission, which is sent to those nuclear installations where significant technical assistance is provided by the Agency.**

This assistance is frequently in the form of supplying some of the fuel for research reactors. In accepting this assistance the member states agree to operate the nuclear facility in accordance with the Agency's Code of Practice. The objective of these missions is therefore to check that the applicable Codes of Practice are being followed, and to make suggestions for improving the level of nuclear and radiological safety at the facilities visited.

Safety review missions are a comparatively recent development, the first being sent to Greece, Iran, the Philippines, and Indonesia in September 1972. As the number of nuclear facilities grow and in the light of increasing concern about nuclear safety, their numbers can be expected to increase over the next years.