Better plant performance through better management

by B.J. Csik

Nuclear power can only remain a viable option if the plants are effectively operated in a safe, reliable, and economic way. Direct responsibility for ensuring this lies with the operating organizations and, inside the organizations, with operations management. Past experience indicates that, on the average, nuclear power plants have performed about as well as fossil-fired plants in the same size ranges.

But experience also shows that while there are many nuclear plants which have performed very well indeed, there are others with a comparatively less satisfactory performance record. This shows that there is a substantial potential for improvements that could and should be introduced. Information exchange on experience and open discussion of problems, issues, failures, and solutions is one possible way to promote the achievement of improved nuclear power plant performance both in general and in particular.

With this in mind, IAEA convened a forum for in-depth discussion of key aspects and current issues of nuclear power plant operations management. Held in Vienna, Austria from 26–30 November 1984, the seminar primarily was aimed at executive level personnel of operating organizations, and the professional management staff directly responsible for the operation and maintenance of nuclear power plants.

Additionally, it was expected to benefit those concerned with regulatory aspects, project management, or training activities. While intended for all countries with nuclear power programmes, the seminar was expected to be particularly useful for countries engaged in their first nuclear power projects. Managerial aspects, such as policy, organization, procedures, practice, and practical experience were emphasized.

In all, 78 participants from 31 countries attended, and 26 invited experts from 14 Member States and the Agency contributed presentations. About 55% of participants were from operating organizations, and they included about 20 station superintendents. Another 15% of participants were from regulatory organizations, with the remainder from industry, universities, training establishments, ministries, and research and development organizations.

Highlights of the seminar's eight sessions follow.

Organizational roles and staffing

Definitions of the respective roles and responsibilities of the operating organization, operations management, and the regulatory body are quite clear and unambiguous. They apply all over the world. The ways and means, however, of how these roles and responsibilities are implemented in practice differ according to national approaches, in particular regarding the regulatory body. The regulatory approach and the prevailing regulatory climate constitute one of the principal current issues affecting operations management. In several countries, instead of co-operation, a trend towards adversary attitudes between the regulatory body and the operating organization can be found, which constitutes an undesirable development.

It was emphasized that the respective roles of the organizations can only be fulfilled if competent staff is available. The issue of personnel competence was repeatedly raised both in presentations, and especially during discussions. Qualification of personnel, competence requirements, education, training, experience, verification of competence, examination, testing, retraining, the number of operation and maintenance personnel required, personnel policy and management aspects, national and utility practices, the staffing problems faced by developing countries for a first nuclear plant, among other aspects, all were extensively discussed.

Clearly, matters concerning staffing and personnel competence constitute a subject area of constant preoccupation and great importance for nuclear power plant operations management. Participants showed special interest in exchanging information on these subjects. The recently published Agency Guidebook – *Qualification of Nuclear Power Plant Operations Personnel* (TRS-242) – was referenced frequently.

Performance objectives

Regarding performance objectives and operational procedures and practices, load-following with nuclear plants, as performed in France, was presented and constituted possibly the most important new development in nuclear plant operational practice.

There does not seem to be any conflict between plant safety and reliability objectives, nor between plant reliability and economic operation. In principle, there should not be any conflict between plant safety and economic operation either, but in practice the measures required to implement safety rules and regulations may affect economic operation negatively. The point was raised that excessive and unreasonable safety-oriented measures might even affect the safety goals

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negatively. A proper balance between assuring the implementation of safety objectives and retaining the reliable and economic operational characteristics of nuclear power plants continues to be an issue.

Information exchange among operating organizations on a national level is usually well organized and constitutes a standard practice in most countries. On a broader international level, however, information exchange seems to be only sporadic and rather superficial. The Agency may play an important role by promoting contacts and organizing meetings specially directed to staff of operating organizations. While scientists and R&D professionals are very much aware of the benefits to be obtained from international information exchange meetings, utility management staff and engineers seem to profit rarely from contacts with their foreign counterparts.

At the center of good plant performance: the attitudes and caliber of people in control.

Day-to-day operations

Routine operation is not a matter for concern, except that it might be somewhat boring and unattractive for highly qualified staff. Important advances have been achieved during the last years in taking appropriate measures to handle unusual events and situations which can be foreseen. These measures include improvements in preparing operating instructions; in training and retraining direct operations personnel; in using computers, visual display, simulators; in the design of the plants and in particular their control systems; and in providing outside technical support to the operating team in case of need.

Most if not all these measures are expected to be effective also for situations and plant conditions that are not or cannot be foreseen. How best to prepare for handling unforeseen situations is a matter of concern to operation management everywhere; approaches, however, differ. While some place emphasis on automatic plant response and access to technical back-up staff, others give priority to assuring the highest possible shift personnel competence. The difficulty, of course, is that learning from experience is always a slow process and it may be quite painful. Once again, information exchange seems to be highly advisable to promote learning from the experience of others.

Maintenance & quality control

Proper maintenance is, of course, an essential prerequisite for safe, reliable, and economic operation. Among issues and problem areas emphasized during the seminar: Planning for maintenance has to start at the plant design stage and the involvement of experienced operations people is advisable. In planning for preventive maintenance and major shut-downs, scheduling, radiation exposure of personnel, and the assured availability of services and spares are critical areas. Spares, in particular, have to be available in a much greater extent in developing countries than in highly industrialized ones.

Quality assurance (QA) is being increasingly recognized as an important and very useful management tool. During the last few years in particular, there has been a noticeable trend to organize and emphasize QA not only in plant design, construction, and commissioning, but also in plant operation and maintenance. This trend seems to be welcome by operations management, though caution should be exercised not to pursue QA for its own sake but to use it effectively as a tool to assure quality work. For QA not to become an administrative burden and lose its purpose, it is essential to have it performed by competent personnel with the correct attitudes.

Shaping safety attitudes

Regarding safe operation, it was emphasized that safety is not a technological but a mental attitude. The responsibility for ensuring safe operation is clearly in the hands of the operating organization and has to be shared by all operations personnel. An attitude of interpreting safety as compliance with regulatory requirements is regarded as a dangerous practice, which should never be allowed to develop. If such attitudes nevertheless appear, they must not be permitted to persist.

Participants also reviewed the systematic use of experience to improve safety, reliability, and economic operation. The benefits to be obtained are obvious. Problem areas where improvements could be introduced seem to be: screening of available information for relevancy; channelling the relevant information to operations management and staff; independent expert reviews of operating practices; gathering and analysing information related to reliability aspects in addition to safety-related events; obtaining information on human error and mistakes committed; effectively introducing changes into established practices as a result of lessons learned from experience – especially if learned from the experience of others.

The Agency's efforts towards promoting the systematic use of experience on an international level, such as the Power Reactor Information System (PRIS); operating experience statistical reports; NUSS publications; the Incident Reporting System (IRS); and technical guidebooks and meetings, are well appreciated and being increasingly used.