

Training the Agency's inspectors

by B. Pontes, G. Bates, and G. Dixon*

As the world's need for energy continues to increase, it is inevitable that there will be an increasing dependence on nuclear facilities to meet that need. One of the limiting factors is concern about the potential misuse of the nuclear material in these facilities. International safeguards have been established between the IAEA and states to deter possible misuse. The Agency's inspectors perform a critical role in safeguards. Equipping these inspectors with the specialized knowledge they must have to carry out their duties is viewed with extreme seriousness by the IAEA as well as by Member States. The importance attached to training inspectors is demonstrated by the IAEA which formed a Training Unit to organize and conduct training, and by the Member States who provide strong support for this training.

Although the Department of Safeguards recruits highly qualified professional staff, the Department's work is a unique and specialized branch of knowledge and it is necessary, therefore, to train those about to engage on it. Safeguards concepts, methods, practices, and techniques are developing rapidly as more, and more varied, facilities come under international safeguards, needing more inspectors and other professional staff. Experienced inspectors, who may be affected by these developments, also have to update their knowledge and skills. To meet these needs, the Safeguards Training Unit, answerable directly to the Deputy Director General, Department of Safeguards, was formed in February 1980.

The function of the Training Unit is to analyse the requirements of the operational sections in the Safeguards Department, to assess the qualifications and needs of each trainee, and to decide, in consultation with the operational sections, the skills and knowledge each will need to carry out his work. With this knowledge, the Unit can plan its courses to fit its students for their work in the operational sections.

The next step is to estimate the resources needed to carry out the plan. Educational materials in the form of books, other publications, and audio-visual aids; human resources in the shape of tutors with technical and teaching expertise, and assistance from other branches of the Agency or outside organizations, may all be required and have to be assembled, time-tabled, and engaged for as long as needed.

After each course, the Safeguards Training Unit (STU) critically evaluates its quality and relevance and the

improvement in knowledge, skill and capability displayed by the trainee. The evaluation is based upon feedback from the students, from personal observation, and from objective testing. If there are any short-comings, a revision of some or all of the previous steps must be undertaken.

The contents of all courses have to be fully documented and organized into separate sessions and lectures. Subsequently these sections are developed into a form which can be utilized for self-instruction. The forms include video-taped and slide/sound instruction covering a substantial part of each course of training for inspectors.

Curriculum

An integrated and progressive training programme has been organized for new inspectors, experienced inspectors and to a limited extent for other safeguards professional staff. This training programme is based on the following assumptions.

- Newly recruited inspectors are expected to be trained for a short period, immediately after arrival, so that they can reach an entry-level skill allowing them to carry out inspections at simple facilities and routine Headquarters work,
- After the inspectors have performed a few inspections, some further instructions on more complex facilities should be given;
- To bring the inspectors' skills to a level which will permit them effectively to carry out and lead inspections of all types, they should receive some advanced courses; and
- An experienced inspector is one who has performed a reasonable number of inspections and has successfully completed all the basic training.

Objectives of the Safeguards Training Unit

Organize and carry out the training of Agency safeguards inspectors,
Organize and carry out, as necessary, the training of other staff of the Department of Safeguards,
Organize and carry out the training of personnel from Member States in selected subjects such as state system of accountancy and control (SSAC) and other matters of specific relevance to Member States,
Prepare, or co-ordinate the preparation of, documentation required for training,
Provide training aids, and
Evaluate the results of the training programme.

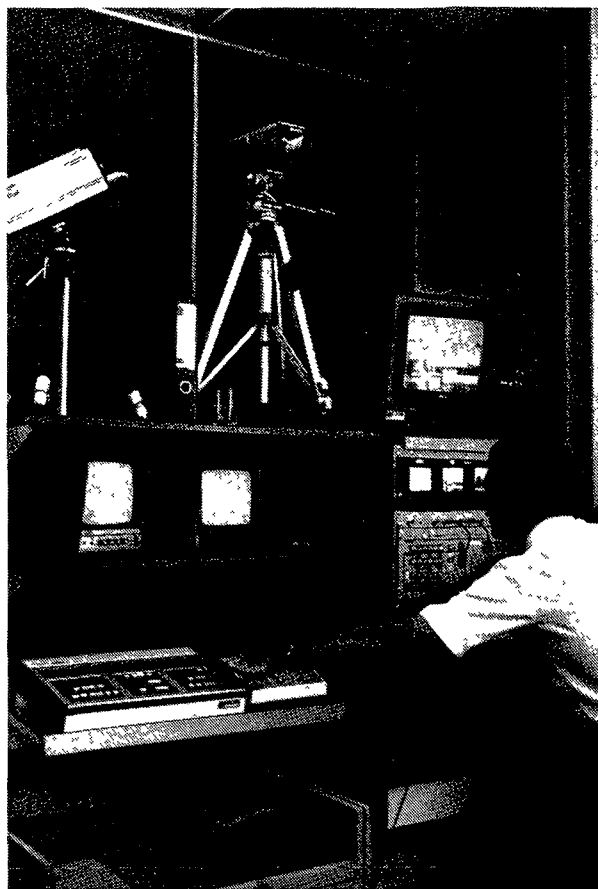
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With these basic assumptions in mind, plus, of course, the experience collected from the previous courses and some practical limitations, such as time and travel, imposed by the work of the Operational Divisions, the training programme was divided into two periods of one year each: initial training; and experienced inspector follow-on training.

Initial training The first year of training is divided into two terms — basic courses and advanced courses. To begin with, over a period of approximately six months, a two-part introductory course is given. Part I lasts eight weeks with the inspectors attending full-time. Part II, lasting two weeks, is given after the inspectors have already performed a few inspections and are fully integrated in their section's activities. Within four months and after the completion of the first part of the introductory course, two other short complementary basic courses are offered.

After completion of the basic courses, the inspector is given the opportunity to attend two advanced courses, and thus upgrade his skills so that he may qualify as an experienced inspector. The five basic courses and two advanced courses are summarized in Table 1.

Experienced inspectors' follow-on training During the second year of the inspectors' initial contract, advanced courses are offered for those who need them. These courses tend to be much more specific and specialized, as can be seen from the course titles and objectives given in Table 2. It is expected that refresher courses will be offered to experienced inspectors and staff as



Using television as a teaching aid: the console for recording and playing back videotapes.

Table 1. Basic and advanced courses for first-year training

Course title	Duration	Objectives
Basic courses		
Reading and self-study	1 week	To give an overview of Agency's safeguards through reading pertinent articles, booklets, and administrative manuals To anticipate reading notes for subsequent lectures.
Introductory course on Agency safeguards, Part I.	8 weeks	To give sufficient knowledge and skill to enable the inspector to undertake inspection of comparatively simple facilities such as a power plant. He will also be given elementary information on the methods and techniques employed in the safeguarding of bulk-handling facilities
Introductory course on Agency safeguards, Part II	2 weeks	To provide knowledge in the areas of audit, sampling plan and data evaluation, and analysis for bulk-handling facilities
Computer data-base	1 week	To understand the organization of major safeguards data files in ADABAS and to use terminals to access safeguards information in the ADABAS data-base.
Basic non-destructive analysis (NDA)	1 week	To be fully trained in the existing safeguards NDA instruments for all specific applications.
Advanced courses		
Fuel fabrication plant orientation	1 week	To familiarize the inspector with construction, operation and process used in these particular facilities.
Fuel reprocessing plant orientation	1 week	

Table 2. Advanced courses for experienced inspectors

Course title	Objectives
Advanced statistics in nuclear material accountability	To upgrade the knowledge of the inspectors in the field of sampling plan and data evaluation
Nuclear material accountability for bulk-handling facilities	To give training in the practical aspects of nuclear material accountability in bulk-handling facilities.
Special techniques for calibration and measurements	
Integral exercises	To train the experienced inspector in new techniques/special instrumentation used in safeguards activities. These courses will be offered according to needs.
Visits to facilities/institutions for specific training	
Dynamic Materials Accounting (DYMAC)	
Aspects of Candu reactors	
Management seminar/course	

instrumentation, safeguards methodology, and information systems change. Recently a radiation protection refresher course was given to all inspectors and staff who work in radiation environments.

Television as teaching aid

To improve the quality of classroom teaching and to provide material for individual tuition, a closed-circuit television system has been developed with the assistance of the US support programme. This video system includes several record and playback units, several black-and-white cameras including one with a remotely controlled lens, an editing machine, a character generator, a special-effects generator, individual desk monitors, and assorted peripheral equipment.

This system has already been used for: projecting visual aids with more flexibility than conventional transparency or slide projectors; recording classroom sessions for students make-up purposes; training students who could not attend live sessions; providing instructors with feedback on their teaching techniques, and

providing reference material for course development, producing training modules using resources which could not be available for live sessions; recording technical briefings and demonstrations of equipment by experts who are at the Agency for only a short time; and playing taped presentations produced outside the Agency.

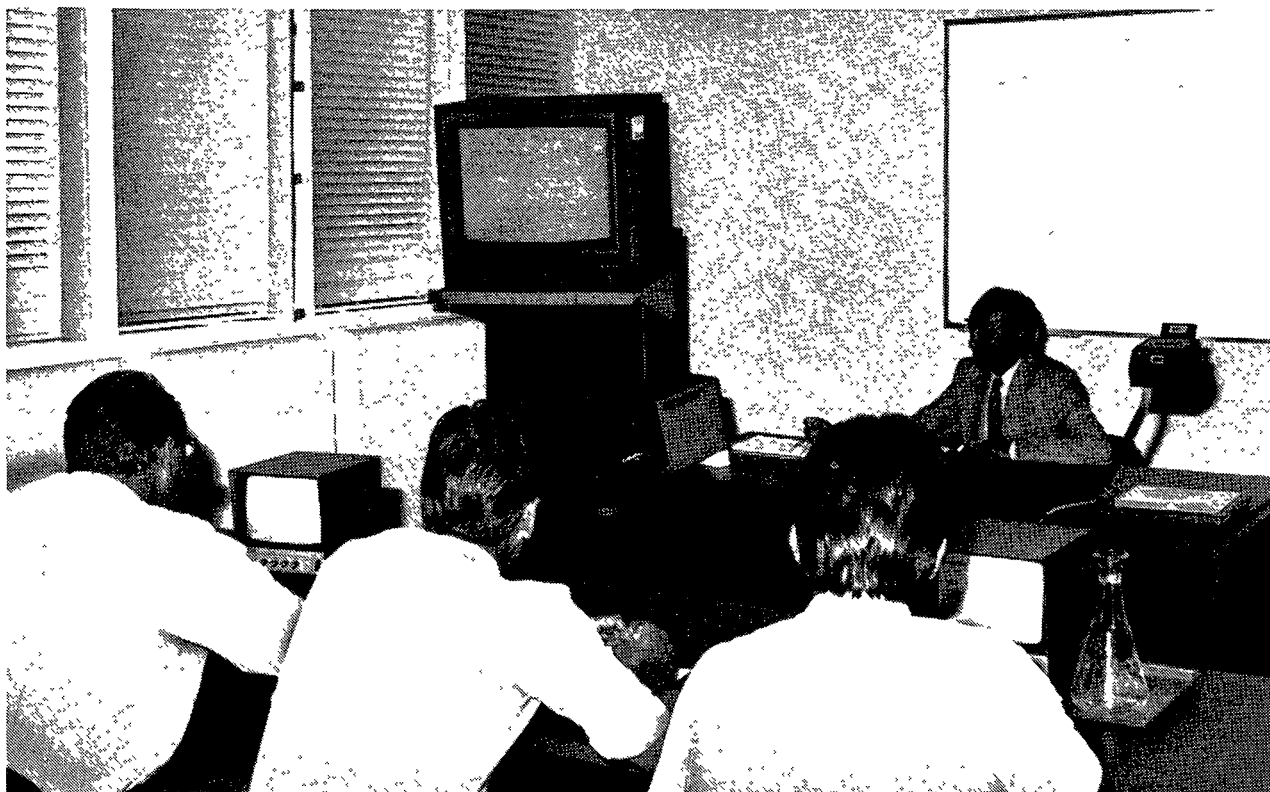
Although good live presentations are preferable to taped ones, recurrent problems, such as unavailability of instructors or equipment, make the added flexibility afforded by a video system a valuable contribution to the training programme.

Nuclear accountancy

From the time of the first nuclear programmes, systems of accounting for and control of nuclear material have been developed and implemented in nuclear research centres and industrial facilities. It is widely recognized that setting up and maintaining an adequate state system of accountancy and control of nuclear material (SSAC) by states is important for the effectiveness and credibility of IAEA safeguards. To assist Member States in

Table 3. Training courses sponsored by Member States

Sponsoring Government	Course	Intended for
UK	Bulk-handling facilities (Springfield/Windscale)	Experienced inspectors
USA	NDA instruments and techniques (Los Alamos)	New inspectors
USSR	Comprehensive inspection exercise (Novo-Voronezh)	New inspectors
German Dem. Rep.	Comprehensive inspection exercise (Rhensberg, Rossendorf, Zittau)	New inspectors
Canada	Candu reactors Fuel bundle counter	Experienced inspectors Experienced inspectors



Use of television in the classroom: the material that the lecturer is pointing to is being projected to the students' desk-top TV screens by an overhead camera. At the same time the demonstration is being recorded on videotape.

establishing, maintaining and reviewing their SSACs, the Department of Safeguards develops guidelines and presents training courses to clarify these guidelines. In 1981 two SSAC courses were held. An advanced SSAC course was held in Los Alamos National Laboratory and Exxon Fuel Fabrication Plant, Richland, Washington, USA, in May; the other, basic SSAC course, was held in the USSR in October. Financial support was provided by the respective Governments.

Support programmes

Member States' support programmes make a substantial contribution to the training of new inspectors, specialized training of experienced inspectors, and SSAC training for Member States (Table 3).

In most training courses, the entire cost of the training is borne by the sponsoring government. Even the expenses of the participants, such as airfares, per diem and local transport, are paid. The support programmes have proven to be a very effective way of providing the type of training needed but which the Department of Safeguards does not have the resources to provide. Very favourable reports have been received from the sponsoring governments and from participants regarding these training courses.

The Government of the USA has provided additional manpower support to the Department of Safeguards in

the form of cost-free experts to perform specific tasks such as develop training materials and facilities where the Department does not have the resident expertise and resources to do these tasks itself. The television teaching system is an example of this. The facility was designed, installed, and operated by a cost-free expert over the last eighteen months or so.

Participation in the training courses offered by the Department of Safeguards has been very encouraging. Over the year, February 1980–March 1981, approximately 512 participants attended 21 different courses, including two courses for Member States: basic SSAC, and a workshop seminar on safeguards information (Table 4).

Table 4. Participants in safeguards training courses

Type	Number
Inspectors	264
Other safeguards staff	154
Other Agency Departments	25
Participants from Member States	69
TOTAL	512

Persons attending more than one course are counted more than once