

# SYSTEMATIC APPROACH TO TRAINING

Experiences from the training activities of  
regulatory body personnel in STUK

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## ABSTRACT

The report describes the experiences obtained of a training programme for nuclear power plant inspectors arranged in the 90's by the Radiation and Nuclear Safety Authority of Finland (STUK). In the implementation of the programme, a systematic method was used to analyse the training needs, to plan, develop and implement the training programme as well as to assess the programme's implementation and results. The method used, "SAT—Systematic Approach to Training", is presented in "Nuclear Power Plant Personnel Training and its Evaluation, A Guidebook", IAEA Technical Report Series No. 380, which is a publication of the International Atomic Energy Agency. It is recommended that this method be applied in the planning and implementation of nuclear power plant personnel training. The application of the method as a tool for developing the qualifications of nuclear power plant inspectors shows that the method is well suited for use in Finland.

Until the 90's, STUK had no systematic approach to training activities. Some training was arranged internally, but training in most respects meant participation in external training events and international seminars. A more systematic approach was adopted in the early 90's. The main goal was to define basic competence profiles for inspectors working in different fields and to provide an internal basic training programme not available externally. The development of the training activities called for a profound renewal of the training function to ensure a systematic approach and high quality.

The experiences gained in STUK are useful in co-operation with Eastern and Central European regulatory bodies; they can be utilised when the qualifications of personnel who carry out inspections are developed. This will extensively contribute to the safety of nuclear power plants.

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## TIIVISTELMÄ

Raportissa esitetään Säteilyturvakeskuksessa 90-luvulla toteutetun tarkastajien koulutusohjelman toteuttamisesta saadut kokemukset. Koulutusohjelman toteuttamisessa on noudatettu järjestelmällistä menetelmää koulutustarpeiden analysoinnissa, koulutusohjelman suunnittelemisessa ja kehittämisessä, koulutusohjelman toteuttamisessa sekä toteutuksen ja tulosten arvioinnissa. Tämä menetelmä ”SAT—Systematic Approach to Training” on esitetty Kansainvälisen Atomienergiajärjestön IAEA:n julkaisussa ”Nuclear Power Plant Personnel Training and its Evaluation, A Guidebook”, IAEA Technical Report Series No. 380 ja menetelmän soveltamista suositellaan ydinvoimaloiden henkilökunnan koulutustoiminnan suunnittelemisessa ja toteuttamisessa. Menetelmän soveltaminen ydinvoimaloita valvovien tarkastajien pätevyyden kehittämisessä osoittaa, että menetelmä soveltuu hyvin myös suomalaisiin olosuhteisiin.

Aiemmin Säteilyturvakeskuksessa ei ollut käytössä järjestelmällistä lähestymistapaa koulutustoiminnassa. Koulutustapahtumia järjestettiin sisäisesti, mutta suurelta osin koulutus oli osallistumista ulkopuolisiin koulutustapahtumiin ja kansainvälisiin seminaareihin. 90-luvun alussa alettiin kehittää järjestelmällisempää lähestymistapaa. Pää tavoitteina oli määritellä eri alueilla toimiville tarkastajille pätevyysprofiilit ja tarjota sellainen sisäinen peruskoulutusohjelma, jota ei ollut saatavilla ulko-puolisista lähteistä. Koulutustoiminnan kehittäminen edellytti koulutustoiminnan perusteellista uudistamista järjestelmällisyyden ja korkean laadun varmistamiseksi.

Säteilyturvakeskuksessa saadut kokemukset ovat hyödyllisiä, kun avustetaan Itä-Euroopan ydinvoimaloita valvovia viranomaisorganisaatioita tarkastustoimintaa tekevän henkilöstön pätevyyden kehittämisessä. Tätä kautta vaikutukset ulottuvat ydinvoimaloiden turvallisuuden parantumiseen laajasti.

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# 1 BACKGROUND

This report describes regulatory training experiences of the regulatory body supervising nuclear power plants. The training activities in STUK – Radiation and Nuclear Safety Authority, Finland, in the Department of Nuclear Safety during the period 1991–1998 are presented. The aim is to describe how systematic approach can be achieved and maintained in the regulatory training activities.

The staff size was about 70 inspectors working in the fields of nuclear safety, radiation safety, safety assessment, NPP inspection, pressure vessels, nuclear materials and nuclear waste. Currently the inspection staff has average age of 45 years and has professional experience of 0...25 years. At the moment about 10 persons can be considered as newcomers having less than 5 years experience in their respective jobs as regulatory inspectors. They may have experience in other type of organisations or they may be newcomers directly from universities.

It is well known that the nuclear power plant organisations are required to provide training for their staff according to systematic approach. Often the well known American method SAT—Systematic Approach to Training is mentioned in this context. The key question for the regulatory body is: should the regulatory body also make sure through a systematic method that its staff—the inspectors who supervise the safety of nuclear installations—are competent in their jobs. And furthermore how can we achieve this goal in the case of newcomers. Professionalism is a key word when the development of inspectors' knowledge, skills and attitudes are concerned.

Before the 90's there were no systematic approach in the regulatory training activities in

STUK. Some training events were organised internally but mainly the training was participation in external training events or international seminars and conferences according to the individuals' own wish. The budget was such that once a year an inspector had this kind of opportunity for professional development. Also one to two years working possibilities abroad—in the US NRC or in the IAEA were provided for some individuals. These activities provided good framework for active inspectors who were knowledgeable in English language to develop their professional skills.

Technical training was provided by Finnish training organisations in certain technical fields. These training events were useful for inspectors but the regulatory inspectors were not the target group when the training events were developed. On the Job Training (OJT) was mainly working without specific guidelines (to provide systematic approach). The regulatory staff was rather permanent in their jobs and personnel turnover was small which provided good possibilities for learning through experience.

This was the environment when training activities were started to be developed at the beginning of 90's. The main goals were to define some basic competence profiles of the inspectors working in different fields and to provide basic regulatory inspector training programme which cannot be received outside the regulatory organisation. From administrative point of view a training structure—organisation and administration including policy, guidelines, programmes, courses, materials and facilities had to be developed to provide systematic approach and quality in training activities.

## 2 THE ROLE OF MANAGEMENT AND TRAINING POLICY

The main role of management is to set goals for training. The management has the overall responsibility on the competence of their staff. The management has to provide financial and organisational means to fulfil the goals. The management has to develop precise job descriptions for all positions important to safety to be used also in the development of training programmes. The attitude of management towards the training of their staff is an important factor to be considered carefully.

The means to be used by the management are to formulate and promulgate training policy. The Internal Quality Manual of the regulatory body is a natural place where the training policy can be presented either separately or combined with training guidelines. Also the job descriptions should be included in the Internal Quality Manual. This is also the case in STUK. Training policy is defined in the internal guideline defining training administration. In the training policy the following aspects are stressed:

- starting points and goals for training such as
  - STUK as a regulatory body
  - job descriptions
  - preceding training and work experience
  - qualifying a person to the job in question
  - use of resources of the whole organisation
  - training goals for each function
- general objective is to provide a person with the knowledge, skills and attitudes needed to perform his/her specific job
  - responsibilities of all involved such as
    - management
    - training manager
    - supervisor
    - individual
    - training of a newcomer
- continuing training in respect of further development of knowledge, skills and attitudes e.g. in communication and management and for international co-operation
- monitoring, evaluation and control of training.

### 3 THE ROLE OF TRAINING ORGANISATION AND ORGANISATION OF TRAINING

When training administration is concerned the following principles should be taken into account:

- Nominating Training Manager and Training Secretary
- Defining Training Policy
- Developing training guidelines
- Setting qualification requirements or training goals
- Developing systematic/ individual training programmes
- Developing training courses and materials
- Provision of training facilities and equipment

A large regulatory body may need a separate training centre with several instructors especially if there are advanced training tools in use such as training simulators. A small regulatory body needs a training manager or training co-ordinator and a training secretary. Number of instructors depend on organisational arrangements.

STUK has a Training Manager position including a responsibility to inspect NPP training activities. Training Secretary is a part time job. On the other hand Administrative Department of STUK has the Department Head with the responsibility to organise general type of training such as management, communication, language, computer etc. training and there is another secretary, there, to keep training records. In STUK technical and general type of training have been separated. STUK uses part time instructors—all the specialists have a duty to provide training in their specific fields when needed.

An important policy issue is the amount of annual training for the inspectors. How much working time an inspector can and should spend in the development of his/her professional knowledge and skills? In STUK two to three weeks annually has been considered as suitable amount.

Newcomers should spend much more time in training during the first years.

A central principle in the training activities is that the supervisor is responsible for the qualification and training of his/her subordinate. Accordingly the supervisor evaluates the training needs of subordinate annually e.g. as a part of performance appraisal. The supervisor takes part in the planning of training with the assistance of Training Manager and ensures the fulfilling of the training plan. Every individual is responsible for developing himself/herself according to the offered possibilities as well as to present initiatives for identifying training needs.

If a new inspector is recruited, the supervisor takes care with the help of Training Manager that the newcomer is familiarized with his/her duties according to the Inspector Qualification Guidelines included in the Internal Quality Manual. If necessary the supervisor nominates a personal instructor to the newcomer. The newcomer starts to work immediately. The requirement level of the tasks given to him/her increases with work experience. The supervisor shall ensure that the subordinate is able to perform a given duty.

Training Manager develops training guidelines, training goals for professional staff, draws up the lines for training of staff, prepares individual training programmes and annual training programme for the whole department, arranges training courses, procures and develops training material, and follows training achievements and results. Training secretary takes care of course secretary duties, looks after the training library, keeps records etc.

Typical training facilities include an auditory, meeting rooms for group work as well as training library for self study and for supporting instructors and for loaning training materials. Computer

based systems for production of lectures and overheads are necessary elements for successful training activities. Direct connection from computer through video gun to show overheads is a good method and can save materials. STUK uses Word and PowerPoint programmes for preparing materials and there is a possibility to use diskettes or direct connection from computer in the auditory. Standardised systems are also useful when international co-operation is concerned.

A small regulatory body needs assistance from outside organisations. E.g. power plant training centres are needed for simulator training. Power company training materials are also important when plant and system knowledge training is concerned. Other technical institutes are needed for specialized training e.g. in NDT methods and welding technology. International organisations are needed to collect a "critical mass" of narrow area specialists for exchange of information on current issues.

## 4 THE APPLICATION OF SAT METHODOLOGY

*In the following the experiences gained are described by using typical terminology of SAT methodology to reflect the important elements in training development.*

### 4.1 Analysis of job and training needs

Analysis of a job is based on the job description. This phase comprises the identification of training needs and of the competencies required to perform a particular job.

The following means are used in STUK:

- Training Card model for the identification of training needs and for the follow-up; it comprises two lists of items: general elements of regulatory training and specific elements of regulatory training from which necessary topics could be selected for definition of the training courses needed
- Inspector Qualification Guidelines including subguidelines for the definition of individual OJT for a specific job

In the development of these means the past STUK experiences as well as international experience from OECD countries through OECD/NEA CNRA/WGIP have been utilised.

General and individual elements of regulatory training contain the following items:

#### Basics:

- Familiarization; radiation and industrial safety
- Nuclear Safety Principles/ safety culture
- Plant and system knowledge
- Accident analysis and emergency preparedness
- Quality assurance; organisational practices

#### Professional:

- Regulatory control
- Assessment skills

- Inspection skills
- Job specific training courses
- On the Job Training

#### Communication and management skills:

- Interpersonal relationships
- Interview and negotiation skills
- Effective writing skills
- Media relationships
- Team work
- Leadership

#### Continuing training:

- Refreshing training
- Further development of professional knowledge and skills
- Information exchange

Inspector Qualification Guidelines contain the following specific subguides on the basis of which individual OJT programme can be developed:

- Introduction to and familiarization of the regulatory body
- Legislation and regulatory guidance
- Selected codes, guides and standards
- Structure and content of safety assessment report and other licensing documents
- Onsite training
- Inspection manual and inspection practices
- Required technical and skills training
- Qualification and certification procedure
- Continuing training

When the above tools are used in the analysis of individual's training needs his past education and training as well as work experience are taken into account. Similarly the job description as well as separate tasks are taken into account so that an individual training programme can be designed.

## 4.2 Design and development of individual training programme

The above means are rather straightforward to use and they provide individual training needs analysis for systematic individual training programme. The programme partly utilises internal training courses provided by STUK and partly individual OJT provided by supervisor and older colleagues. In case external training needs are identified this training can be organised.

### Individual training planning

Training planning is based on the training analysis which takes into account job specific training requirements and individual needs of persons. Person's earlier training and work experience is also taken into account. An individual familiarization and training programme is prepared for new recruits and for those persons who are changing to an other job.

The supervisor prepares with the training manager a training programme for a new recruit on the basis of job specific training goals. At the beginning the courses that can be considered as settled on the base of earlier training are identified and additional training is specified. In the preparation of training the courses offered by STUK are taken into account.

A key element in the personal training programme development is the Inspector Qualification Guidelines. By applying these guidelines the job specific training needs can be taken into account. What cannot be offered through training courses can be provided through individual guidance. OJT can be used also to relate theoretical knowledge and practice together so that best learning results are achieved.

### Continuing training

In addition to the initial training, maintaining and developing of person's knowledge and skills i.e. professionalism shall be taken into account. This presupposes actions related to the training and information exchange. Professionalism can be increased by continuing training, participating in the seminars and conferences, and by exchanging information in the house or with external organisations. Preserving of qualifications presupposes also refreshing training and working in the partic-

ular job.

In a small regulatory body training courses cannot be repeated very often because the amount of participants is too small and lecturer resources are limited. In a large regulatory body resources and amount of participants are larger and situation is therefore more favourable. International organisations can assist in this respect by providing certain training courses.

### Annual training programme

Regulatory Body should provide an annual training programme where initial training needs as well as refreshing training needs are combined together in such a manner that necessary training courses are repeated periodically.

Training Manager prepares annually e.g. in September the targets for the training programme of next year. Preparation of the targets is based on the needs presented by the management and units of the Department, on the courses arranged during the preceding years and experiences from them, on the operational experiences from the nuclear power plants, and on the development of nuclear power situation and regulatory activities. Also questionnaires to collect individual training needs and wishes can be developed and distributed to get direct information from individuals. Performance appraisals are also a good form to collect individual information inside the organisational units. After the commenting by the units the proposed annual training programme is given together with a budget proposal to the management of Department for approval. After approval annual training programme will be published in the form of catalogue which is distributed to all the staff of Department.

For Training Manager a long term strategy is an important tool to provide training courses in a systematic manner and in the right order so that courses support each other and current activities of the Department. Long term training strategy correlates with the long term strategy of the Department.

The annual training programme contains initial and refreshing courses, annual training days for presenting major plant modifications, operational experiences and regulatory changes, preparing for the annual plant outages, work safety as well as other needed matters such as communi-

cation and management training. Also other courses developing special knowledge and skills can be considered.

Monthly information hits is an useful form of training on the topical issues. According to the present practice half-an-hour information hits are given during the first Mondays of the months preceding the general department meeting. A longer training session is also possible on a topical issue if needed.

When annual training programme is planned the units should present their needs for participation in the external courses for the training budget purposes. Proposals can be made also later according to the financial possibilities of units.

### 4.3 Implementation of training programmes

Internal training courses are presented in the Annual Training Catalogue. Training facilities such as auditory are reserved. A detailed programme is planned. Lecturers are agreed. Preparation of necessary training materials is carried out by the lecturers. Lecturers can use overhead projector or video gun to have direct link from diskette or computer to show overheads. Written participant materials are prepared and copied. Control questions are prepared if necessary. Exercises and discussion topics are provided. Invitations are sent to the nominated participants and/or to the whole department depending on the training event. Course Secretary assists in training material production and in distribution of information. In STUK training is normally provided in the auditory where there are excellent tools including simultaneous interpretation possibilities. Course Director runs the course and assists in keeping the schedule. A participant list is circulated. Enough time and possibilities for discussion are provided so that participants have a possibility to understand the matter and also to express their opinions. Control test question sheets are collected and checked. A feedback questionnaire is distributed to get feedback from the participants for quality control. Mistakes are corrected for the future training sessions. Results are recorded. In addition to the training courses training is given during the monthly information hits.

Mainly the own staff is used as instructors in the internal training courses. Performing as an instructor belongs to the job of professional staff. In some cases an instructor can be taken from power companies or research centres for special knowledge, new insights or for a change. In such cases where power company practices are important to be understood well it is advisable to use power company lecturers. Mutual understanding is increased if common workshops are organised in topical matters. However, budget must be taken into account.

If internal training courses can not provide the necessary knowledge external training is arranged. Developing special skills presupposes the follow-up of external training possibilities. A person himself and the supervisor are responsible for this follow-up and necessary actions.

On the job training according to the Inspector Qualification Guidelines is mainly carried out inside the organisational units by supervisors and older colleagues of the newcomer. If there are several newcomers at the same phase of progress some topics can be collected together and handled in the form of training course. Individual guidelines are prepared by the supervisor in co-operation with the Training Manager.

Chapter 5 provides an example how training programme has been organised in a regulatory body during 90's.

### 4.4 Evaluation of training and individual progress

Evaluation of training means all the feedback processes from other SAT phases to improve training programme and its implementation. It also means the follow-up of training events, course evaluations and individual progress as well as maintaining training register.

Course follow-up means that planned training events are kept and intended persons participate. Training manager or other course organiser provides course report which contains course programme, participants list and course evaluation. Quality of course is evaluated taking into account course content, training materials, instructor performance and general arrangements. Standard evaluation sheet should be provided. Course re-

port is also important on the external courses; participant should comment the usefulness of the course so that other colleagues have this necessary information when they are considering this event for themselves or for their subordinates. Training Manager is responsible of the follow-up and reporting to the management once a year.

Follow-up of individual progress means maintaining the training register so that all the participations are listed in the register. Also the progress with the OJT guidelines are followed. Evaluation of person's qualifications for independent work is carried out after the planned training programme is fulfilled. There are various methods to make the follow-up of necessary training easier for Training Manager and supervisors. Design of the register

in such a way that the requirements and fulfilment of requirements are seen at the same time, makes it easier for the Training Manager and supervisor to plan the future training activities. Computer program Excel is used by STUK to follow the implementation of technical training. Also certificates on the participation in the "Re-qualification Training Programme" was given in 1997 and the certificates were recorded in the STUK training register. (See Appendices 1 and 2.)

When training courses are organised in the future the Excel register is used to identify the potential participants. Evaluation of participant feedback and satisfaction helps to improve training activities.

## 5 CASE STUDY—TRAINING COURSES ORGANISED BY STUK

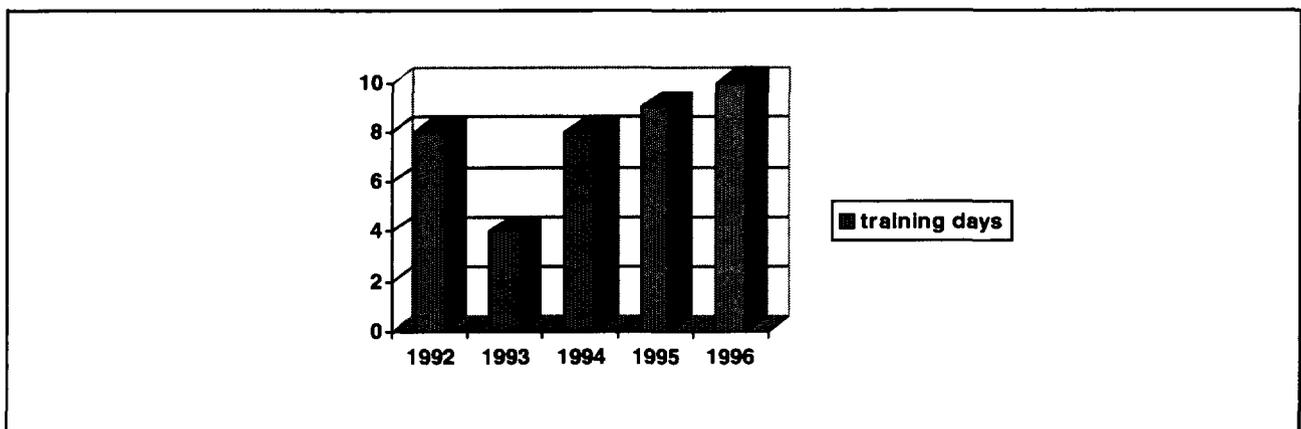
### 5.1 Participation in the training programme and training costs

In the following example case it is studied what kind of training STUK has provided to its staff during 90's. At the beginning of 90's an inspector qualification training programme was developed to provide necessary training courses for inspectors on the basic inspection knowledge and skills. This programme can be called "requalification programme" because most of the participants had already considerable experience in their fields. The inspectors had a possibility to update their knowledge in the areas which they felt important. Development of the programme was based on the detailed questionnaire on the needs and wishes. The priorities were based on the results of the questionnaire.

The programme contained mainly the topics presented in the paragraph 4.1. A detailed list of

courses is presented in Appendix 1. From newcomers point of view it would be ideal to organise the training courses during two to three years but in practise it took five to six years to organise all of them. For Training Manager it is important to know how much training can be organised during one year and how much training can be tolerated by the inspectors. Budget is also an important factor; when the own staff is used as instructors the cost of training maybe lower compared with the alternative that all services are bought from outside organisations; Then, however, inspectors' workload increases.

Figure 1 presents participation in the annual internal training programme (training days on the average) during the inspector "requalification programme". Typically participation varied between eight to ten days annually. Combined with the outside conference and seminar participation average amount of participation was two to three



**Figure 1.** Amount of participation (average annual training days) in the internal inspector training programme organised to cover basic inspector qualification topics in STUK during 90's.

weeks in the activities to develop professionalism. Figure 2 presents variation in participation during the period 1994–1996.

Figure 3 presents the total amount of course days spent in the programme. Figure 4 presents the costs of internal training programme per person covering the costs paid to the external training organisations. At the beginning of programme

instructors were mainly from the own house and (external) training costs were low. At the end of the programme large part of training was bought from outside organisations and the training costs increased. The numbers of the figure 4 do not include the price of internal working hours nor travel expenses caused by external training.

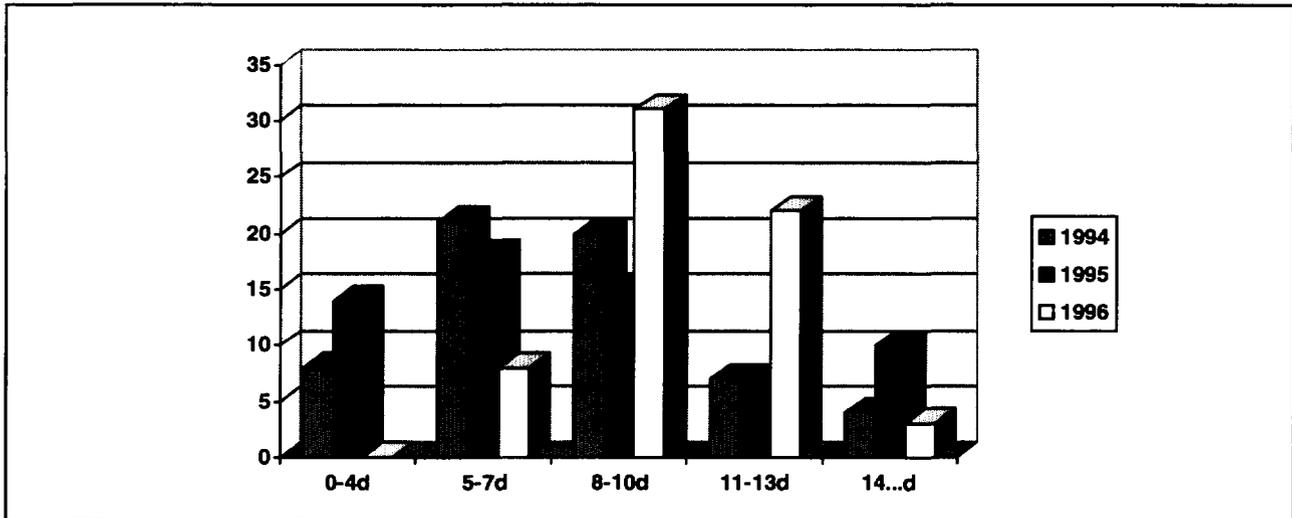


Figure 2. Variation of participation in the annual training programme during the years 1994–1996. Horizontal axis presents the number of training days and vertical axis the number of persons.

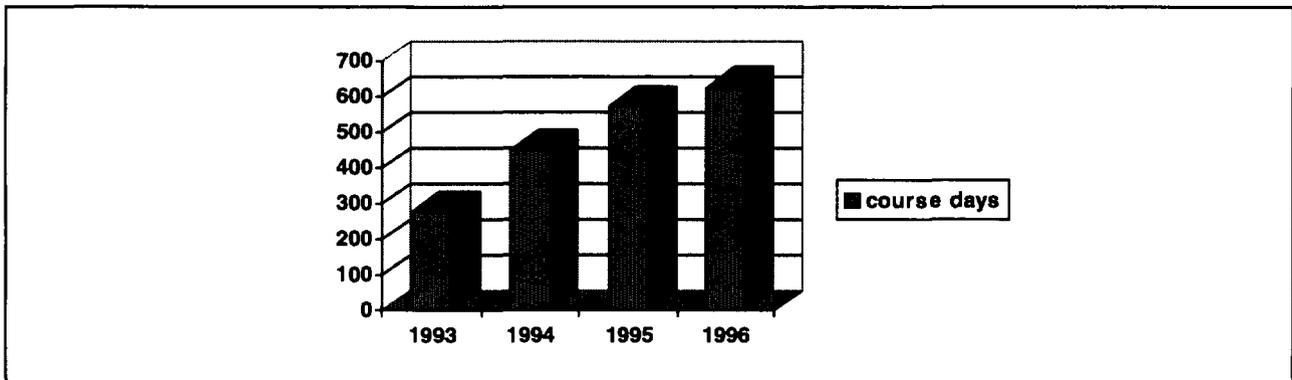


Figure 3. Participation in the annual internal training programme. Total amount of annual internal course days.

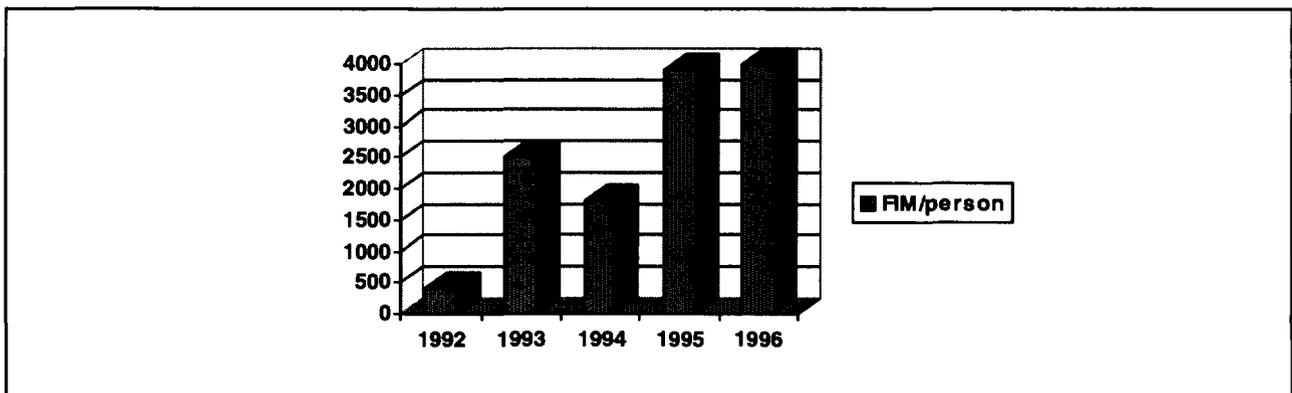


Figure 4. Cost of annual internal training programme per person (FIM).

## 5.2 Contents of the training programme

In the following the structure of the training programme provided by STUK during 90's is described. The "requalification training programme" is also presented in Appendix 1. The programme was at the beginning technically oriented. Later when the most urgent technical topics had been covered more and more communication and management issues were introduced. The technical courses were provided in a systematic manner so that the previous courses supported the following programme.

### Plant knowledge

The first course at the end of 1991 was plant knowledge course planned mainly for experienced inspectors for refreshing. The length of the course was two days lectures—one day per plant type; However, each lecture contained also exercise part—altogether about 170 questions—and answering to all the questions took 1–3 days depending on the participant's knowledge level. Lecturers were experienced inspectors. 36 inspectors participated and performed exercises.

### Nuclear safety

The programme continued in 1992 with the Nuclear Safety Technology Course which was rather detailed and technical in nature. Course was organised in a module structure having 11 half a day modules. Altogether there were 36 hours lectures. Control questions were provided. Written materials were technical in nature with examples from Finnish NPP's. For the experienced inspectors the course provided detailed technical information to extend their knowledge. For the beginners it contained too many technical details which made it difficult for them to get an overview on nuclear safety principles. Lecturers were experienced inspectors. 46 inspectors participated and performed exercises.

### Inspector knowledge

At the end of 1992 Inspection Skills Seminar was organised. The aim was to cover general inspection related topics such as inspector's rights and obligations and behavioural aspects etc. as well as specific inspection and assessment related topics in different technical fields as mechanical,

electrical, process systems and operations. The seminar took two days and contained lectures and group discussions on topical matters. 46 inspectors participated.

### System knowledge

In 1993 a more detailed Systems Knowledge Course (BWR technology) was organised. The course had modular structure with six modules, altogether 36 hours lectures. Control questions were provided. Modular structure was important because it made possible for the specialised inspectors to select those topics which were needed and important for them. 19 inspectors participated in the whole course and performed exercises. System Course was supported by two similar three-day (21 hours) Simulator Training Courses at the NPP Simulator Training Centre. 14 inspectors participated in simulator training (7 inspectors per course). The simulator training part was highly appreciated by the experienced inspectors.

Similar type Systems Knowledge Course (VVER Technology) including simulator training was provided in 1994. At the end of 1994 a Course on Fuel Cycle including fuel transportation, fuel handling systems and waste management was organised. The course contained altogether 15 hours lectures. 22 inspectors participated. These 3–5 courses during 1993–1994 covered detailed systems knowledge and normal NPP operations training, altogether about 120 hours lectures and simulator exercises on BWR and VVER systems technology. Lecturers were mainly experienced inspectors and simulator instructors from power company staff.

### Accident management

In 1995 a Course on Transient and Accident Analysis was provided (methods, results and topical issues). Plant analyser APROS was also used. 12 hours lectures were provided. Lecturers came partly from Technical Research Centre and partly from power companies. 38 inspectors participated. The course was supported by the two day (14 hours) Simulator Training Course on Emergency Operations (BWR simulator) with 15 participants. A specific Course on Severe Accident Management was already organised in 1993 (12 hours, 30 participants, lecturers came from Technical Research Centre).

In 1996 a Course on Emergency Planning and Preparedness was provided with 14 hours lectures and exercises. 54 inspectors participated. In addition one day (5 hours) programme on PSA results was organised; 30 inspectors participated. These courses were supported by the two day (14 hours) Simulator Training Course on Emergency Operations (VVER simulator) with 15 participants. These five courses during 1995–1996 covered accident management training, altogether 70 hours lectures, exercises and simulator training.

### **Component knowledge**

In 1996–1997 plant knowledge was deepened by going into component level. Specific training days were arranged to cover such topics as ASME code applications, relief valves, valve actuators, automation and NPP Ageing Phenomena. Typically 15 inspectors participated. Lecturers were either from STUK or outside organisations.

### **Inspector qualification**

The organisation of training courses is not the only means to provide training for newcomers. It is very important to provide an individual On the Job Training Guideline for provision of systematic training for the specific job by the supervisor and more experienced colleagues. An OECD/NEA working group has developed a general model for Inspector Qualification Guidelines on the basis of US NRC respective guides. Application of this Guideline makes it possible to plan, implement and follow the training needed for a specific job.

### **Continuing training**

Regular refreshing training on topical issues such as plant operational experience and plant modifications, regulatory issues and results from safety research as well as preparation for annual maintenance outages are also important to be organised. Regular annual training days are organised in January to cover operational experience and in spring before outage periods to cover important outage issues.

To develop professionalism among inspectors an input is needed from outside organisations and from other countries. Therefore it was felt important to get once a year such a workshop which is general enough so that many inspectors can participate and which contains some important cur-

rent topic. Power companies and Technical Research Centre was also invited to participate to improve communication with power companies in the subject. Often the IAEA was invited to support the activity. The following typically one week workshops were organised:

- 1992, ASSET-seminar on event investigation methods (26 participants)
- 1993, ASCOT-seminar on safety culture (29 participants)
- 1994, OECD/NEA Inspector Workshop on inspection practices (15 participants from STUK, altogether about 60 from OECD countries and Eastern Europe)
- 1995, Seminar on Operational QA of NPP's (7 participants from STUK, about 25 from power companies and Eastern Europe)
- 1996, Internal NPP Component Ageing Seminar (15 participants)
- 1997, Workshop on Emergency Planning and Preparedness (10 participants from STUK, about 30 from Nordic countries and Eastern Europe).

During the programme, co-operation with the IAEA was developed and several other courses and workshops were also organised as a part of the IAEA's Strengthening Nuclear Safety Regulatory Bodies -programme. These courses also supported STUK training programme by providing training for newcomers and information exchange for more experienced inspectors. The following training courses were organised:

- 1995, Regulatory Control of NPP's (two weeks)
- 1995, Information to the Public (one week)
- 1996, General Approach to Nuclear Safety (two weeks)
- 1997, QA in NPP Operations and Maintenance (three weeks)
- 1997, Operator Training and Licensing (one week).

About five STUK inspectors participated in each of these training events.

### **Communication and management skills**

In 1994–1998 a lot of emphasis was put and several internal workshops were organised on internal co-operation and communication, development of working atmosphere, team work and management. More specific issues were develop-

ment of internal QA methods, interviewing methods and contacts with news media. Development of language skills has been also an important issue as well as new computer tools and methods.

### 5.3 New prospects in training

After the six years when the programme turned one cycle, NPP's and working methods have been changed and new interesting developments have taken place. There are obvious needs to repeat the programme for refreshing purposes and for newcomers. A challenging task is to find new interesting ways to handle the same topics and to combine refreshing purposes with newcomers' interests.

As an example of an evaluation and feedback process the questionnaire was again distributed to all inspectors and the needs and wishes were surveyed at the end of 1997. The following topics received most support (over 15 persons): Annual Training Days, Plant Knowledge after Modernisation Programme, Computer Tools and Methods, Nuclear Safety Principles and Management/Team Work. Certain specific technical topics received also support (8-10 persons) such as Simulator Training, Interviewing and Negotiation Skills, Ageing of NPP's, Automation Systems, Regulatory Control/Assessment Skills, Emergency Prepared-

ness.

In 1998 a new Nuclear Safety Course is organised. The purpose at this time is to give more general vision on nuclear safety than during previous courses and to stress some current topical issues in the nuclear safety field. The course programme combined refreshing interests of experienced inspectors, newcomers interests and provision of topical issues. Some French books were used to give different views compared to Finnish practices.

In addition to the training activities there are also other useful means to develop professionalism inside the regulatory body. Safety culture attitudes, quality consciousness and practices, internal co-operation and regulatory/operator interface are topics which can be developed through discussions in internal workshops. The ideas presented should be collected, processed and necessary improvements made to develop activities. Often some external input is needed such as Quality Award questionnaires for improving quality or facilitators to improve regulator/operator interface or international information exchange to get new fresh ideas and experiences. Participation in common safety reviews etc. promotes the dissemination of safety practices among participating organisations.

## REFERENCES

1. Nuclear Power Plant Personnel Training and its Evaluation, A Guidebook, IAEA Technical Report Series No. 380, IAEA, 1996
2. Inspector Qualification Guidelines, OECD Nuclear Energy Agency CNRA/Working Group on Inspection Practices, 1994

## PARTICIPATION IN THE STUK/YTO INTERNAL INSPECTOR TRAINING PROGRAMME 91-97

Courses	year	organiser	hours	participant test
Work safety	1992	STUK	4	53 test
Radiation protection	1994	STUK	4	30
Inspector skill semin.	1992	STUK	14	46 test
Inspector skill I	1995	STUK	8	12 (+5 L) test
Regulatory Control	1995	IAEA	54	3 (+6 E)
Inspector skill II IQG	1995 alk.	STUK		2 (4 kesk)
Work at IAEA,NRC				17
Nuclear safety	1992	STUK	36	46 test
Gen.Appr.Nucl.Safety	1996	IAEA		54 3 (+7 E)
Plant knowledge	1991	STUK	37 (7 L)	36 (+12 L) test
Plant knowledge	1996	STUK	4	11
System knowl.-TVO	1993	STUK	36	19 (+2 L) test
Simulator C.- TVO	1993	TVO	21	14
System knowl.-IVO	1994	STUK	22	18 (+9 L) test
Simulator C.-IVO	1994	IVO	21	15
Fuel Cycle	1994	STUK	15	22
EU-safeguards-sem.	1994	EU	15	5
Component knowledg	1995	IVO/VTT	8	15
Component knowledg	1996	STUK	2	19
ASME-Course	1996	TVO	7	5
NPP Ageing sem.	1996-7	STUK	16	15
Severe accidents	1993	VTT	12	30
Accident analysis	1995	IVO/TVO/VTT	12	38
Simulator-distur-TVO	1995	TVO	14	15
Emergency Prepared	1996	STUK	14	54
PSA-day	1996	STUK	5	30
Simulator-distur-IVO	1996	IVO	14	16
Annual tr.1992-96		STUK	yht. 25	49
Outage tr.1993-96		STUK	yht. 18	20
ASSET-semin.	1992	IAEA	30	
ASCOT-semin.	1993	IAEA	12	14
Inspector Workshop	1994	NEA/CNRA	20	15
Operational QA	1995	IAEA	14	7
Inform. to the Public	1995	IAEA	24	5
Communication skills	1994	STUK/Työterv.	20	noin 60
Interviewing tech.	1995	Assertum	14	12
Co-operation skills	1995	Psyko	35	48
Team training	1996	HAUS (STUK)	13 (7)	17 (40)
Advanced English	1995/1997	HAUS	30	33 certif.
ATK-Microsoft	1996	AddWise Oy	36	noin 60
Kept lectures	1991-97			



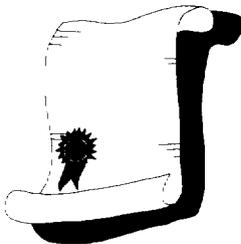
## TARKASTAJAN TAITO - DIPLOMI

*Ilari Aro* on osallistunut Säteilyturvakeskuksen ydinturvallisuusosaston järjestämään ammattitaitoa edistävään kertaus- ja täydennyskoulutusohjelmaan vuosina 1991-97 osallistuen seuraaviin koulutustilaisuuksiin:

Kurssi	vuosi	kesto, h	koe
Työ- ja säteilysuojelu	1992/94	2x4	hyväksytty
Tarkastajan taito seminaari	1992	14	ryhmätyö
Ydinturvallisuustekniikka	1992	36	hyväksytty
Laitostuntemus	1991	36	hyväksytty
Järjestelmätuntemus - TVO	1993	36	hyväksytty
Simulaattorikurssi - TVO	1993	21	-
Järjestelmätuntemus - Loviisa	1994	22	hyväksytty
Simulaattorikurssi - Loviisa	1994	21	-
Polttoainekierto	1994	15	-
Vakavat onnettomuudet	1993	12	-
Transientti- ja onnettomuusanalyysit	1995	12	-
Simulaattorikurssi - häiriöt (TVO)	1995	14	-
Valmiustoiminta	1996	14	-
PSA-päivä	1996	5	-
Simulaattorikurssi - häiriöt (Loviisa)	1996	14	-
YVL-komponenttien ikääntyminen	1997	16	-
Kommunikaatiovalmennus	1994	20	-
Haastattelutekniikka	1995	14	-
Tiimityö	1996	13	-
Advanced English for Int. Communic.	1995	30	kielitodistus
Muut kurssit, ks. koulutusrekisteri			

Kertaus- ja täydennyskoulutusohjelman yhteydessä pidettyjen luentojen määrä on 29 luentoa.

Helsingissä 30 syyskuuta 1997



Lasse Reiman  
Johtaja



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