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**NUCLEAR ENERGY AGENCY
COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES**

**NEA/CNRA/R(98)1
Unclassified**

Working Group on Inspection Practices (WGIP)

**COMPARISON OF THE INSPECTION PRACTICES IN RELATION TO
THE CONTROL ROOM OPERATOR AND SHIFT SUPERVISOR LICENSES**

63905

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article I of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original Member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became Members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996) and the Republic of Korea (12th December 1996). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of the OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full Member. NEA membership today consists of all OECD Member countries except New Zealand and Poland. The Commission of the European Communities takes part in the work of the Agency.

The primary objective of the NEA is to promote co-operation among the governments of its participating countries in furthering the development of nuclear power as a safe, environmentally acceptable and economic energy source.

This is achieved by:

- *encouraging harmonization of national regulatory policies and practices, with particular reference to the safety of nuclear installations, protection of man against ionising radiation and preservation of the environment, radioactive waste management, and nuclear third party liability and insurance;*
- *assessing the contribution of nuclear power to the overall energy supply by keeping under review the technical and economic aspects of nuclear power growth and forecasting demand and supply for the different phases of the nuclear fuel cycle;*
- *developing exchanges of scientific and technical information particularly through participation in common services;*
- *setting up international research and development programmes and joint undertakings.*

In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has concluded a Co-operation Agreement, as well as with other international organisations in the nuclear field.

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COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

The Committee on Nuclear Regulatory Activities (CNRA) of the OECD Nuclear Energy Agency (NEA) is an international committee made up primarily of senior nuclear regulators. It was set up in 1989 as a forum for the exchange of information and experience among regulatory organisations and for the review of developments which could affect regulatory requirements.

The Committee is responsible for the programme of the NEA, concerning the regulation, licensing and inspection of nuclear installations. The Committee reviews developments which could affect regulatory requirements with the objective of providing members with an understanding of the motivation for new regulatory requirements under consideration and an opportunity to offer suggestions that might improve them or avoid disparities among Member Countries. In particular, the Committee reviews current practices and operating experience.

The Committee focuses primarily on power reactors and other nuclear installations currently being built and operated. It also may consider the regulatory implications of new designs of power reactors and other types of nuclear installations.

In implementing its programme, CNRA establishes co-operative mechanisms with NEA's Committee on the Safety of Nuclear Installations (CSNI), responsible for coordinating the activities of the Agency concerning the technical aspects of design, construction and operation of nuclear installations insofar as they affect the safety of such installations. It also co-operates with NEA's Committee on Radiation Protection and Public Health (CRPPH) and NEA's Radioactive Waste Management Committee (RWMC) on matters of common interest.

ABSTRACT

This report presents a comparison of inspection practices in participating OECD countries relating to control room operator and shift supervisor licenses. Key questions for this comparison were "What are the regulatory or licensee requirements for holding and upkeeping a license or authorisation" and "How does the regulatory body inspect the training and competence of shift teams and individual operators".

FOREWORD

The CNRA believes that safety inspections are a major element in the regulatory authority's efforts to ensure the safe operation of nuclear facilities. Considering the importance of these issues, the Committee has established a special Working Group on Inspection Practices (WGIP). The purpose of WGIP, is to facilitate the exchange of information and experience related to regulatory safety inspections between CNRA Member countries

In 1996, members of WGIP discussed various ways in which regulatory inspectors look at and evaluate how licenses are given to control room operators and shift supervisors in the Member countries. As a result of these discussions it was proposed to put together a short comparison report on this issue. The CNRA approved work on this at its annual meeting that year. This CNRA/WGIP study concentrates on the regulatory inspection of control room operator competence and authorisation.

As noted in the text, fourteen Member countries supplied input by responding to the questionnaire. The authors wish to thank all those members of WGIP and their associated colleagues for their contributions. The WGIP also wishes to extend their appreciation to Mr. Ilari Aro of STUK in Finland who headed up this task and provided overall co-ordination in editing and compiling the report and to Mr. Hiroyoshi Koizumi of JAPEIC in Japan who assisted in putting together the charts and figures.

Finally, the WGIP wishes to acknowledge the contributions made by Mr. Pietro Manzella of ANPA in Italy.

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1. Introduction

This report presents a comparison of inspection practices in participating OECD countries relating to control room operator and shift supervisor licenses. The report has been derived from answers to a questionnaire on the basis of guidance given in Appendix 1.1 with the detailed answers being given in Appendix 1.

Key questions for this comparison were "What are the regulatory or licensee requirements for holding and upkeeping a license or authorisation" and "How does the regulatory body inspect the training and competence of shift teams and individual operators".

The main conclusion from the comparison is that the general practice within the participating countries for ensuring the competence of operators is broadly similar although regulatory practices differ markedly. For example, the regulatory bodies in some countries are actively involved in the examination and licensing process of individual operators whereas other regulatory bodies leave detailed work in this area to the operating organisations but monitor the process on a sample basis. There are however a number of other detailed differences highlighted in the report which could provide background material to those who work in this area.

There are two other recent studies on training activities of nuclear power plant personnel, namely OECD/NEA PWG 1 study and a study made by the IAEA. These studies give a broader view on training activities and offer good background material also for this study. This CNRA/WGIP study concentrates on the regulatory inspection of control room operator competence and authorisation. In many countries licensing of the control room operators is made by the regulatory body.

Contact information is presented in Appendix 2.

2. Countries which participated

Countries and regulatory bodies who have provided answers to the questionnaire are marked with the numeric reference. In analysing answers these numbers have been used. The fourteen participating countries are the following: Belgium, Canada, Finland, France, Germany, Hungary, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, United Kingdom and United States of America.

3. Licensing/authorisation of the control room operators and shift supervisors

The license/authorisation to the control room operators and shift supervisors is given mainly by the Operating Organisation or Regulatory Body. In some countries it is done by both together. In two countries some other organisation does the job. Figure 1 shows the distribution of practices in the OECD countries.

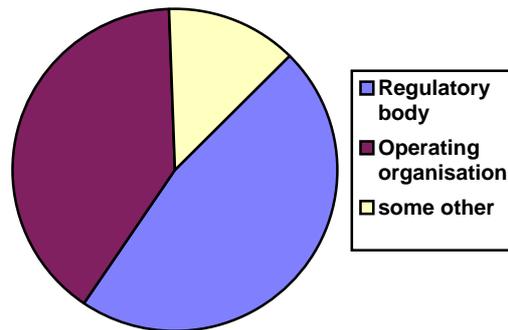


Figure 1. Licensing body in the OECD countries

A license/authorisation is mainly needed for people in positions who have right to do manipulations in the main control room such as shift supervisor (SS), control room operator (CRO), reactor operator (RO, specific for reactor), turbine operator (TO, specific for turbine). For some other positions a license is also needed such as direct supervisor of shift supervisors and shift technical adviser. In some countries there are specific requirements for deputy shift supervisor, and in some countries an individual with a reactor operator license is licensed for both the reactor and turbine. Figure 2 shows the distribution in the OECD countries.

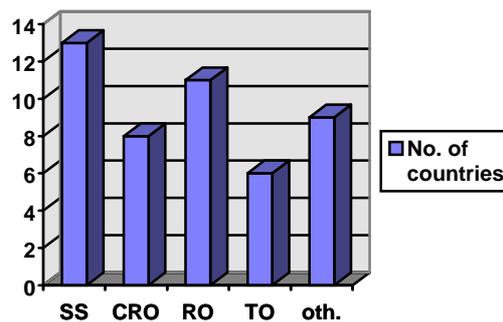


Figure 2. Licensed positions in the OECD countries. See text for explanation of positions

Basic requirements for licensing are suitable technical education, work experience, medical examination, aptitudinal or psychological test and personnel safety review. Technical education requirements vary somewhat among countries. Some countries require university degree level for shift supervisor and lower technical level for other control room positions. But there are countries which require university level degree for all control room positions, and countries which do not require university level for any positions. Required work experience varies from 1 to 5 years depending on the country and position. A specific medical examination is carried out by most countries; in two countries it is similar to the examination which is required to meet radiation protection regulations. Some of the countries require in addition to medical examination aptitudinal tests and some psychological tests. The details appear from Appendix 1.

Prerequisites to get the license/authorisation include passing the training programme, written license examination, oral license examination, and training simulator examination. The type of the simulator test/examination varies among countries; in some cases it is competence assessment and in some cases certificate of successful training. Some countries have additional practices such as plant walk through examination or supervised experience. Figure 3 shows the distribution in the OECD countries.

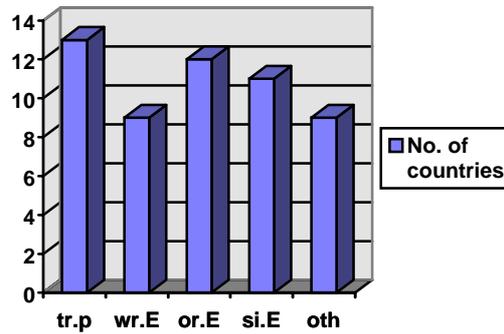


Figure 3. Prerequisites to get the license in the OECD countries. Passing the training programme (tr.p), written license examination (wr.E), oral license examination (or.E), and training simulator examination (si.E). oth means some other prerequisites

Regulatory involvement in licensing includes approval of training programme, participation in written, oral and simulator examinations as well as issuing licenses. Figure 4 shows organisations carrying out the licensing examinations and Figure 5 who issues licenses. In two cases the license is signed by both - operating organisation and regulatory body.

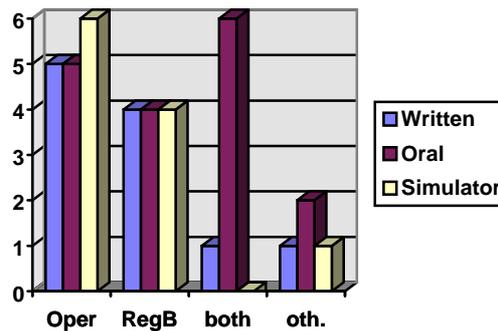


Figure 4. Organisations carrying out the licensing examinations in the OECD countries. Operating organisation (Oper), regulatory body (RegB), both means both together and oth. means some other organisation

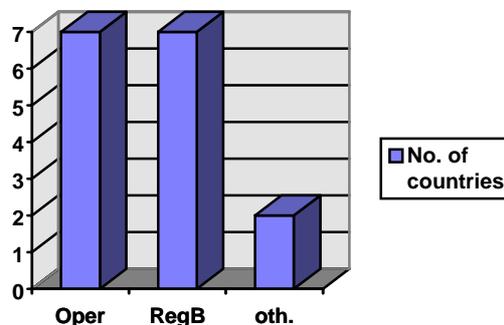


Figure 5. Organisations which issue license/authorisation in the OECD countries

The license/authorisation is given in most cases for a period of time which varies among countries from one to six years. In some cases there are no time limits but annual staff assessment methods are applied. Figure 6 shows the distribution in the OECD countries.

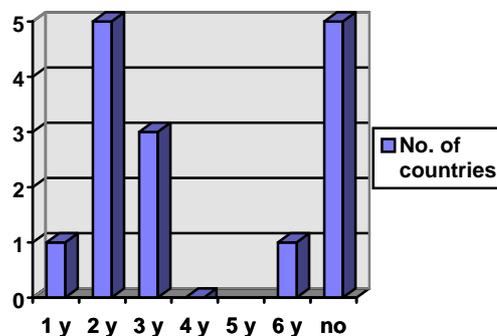


Figure 6. Duration of license in the OECD countries. License period varies from one to six years or there are no time limits (no)

4. Renewal of the license

For renewal of a license the following is needed - or if the license or authorisation is without time limits the following is carried out or checked regularly: medical examination, aptitudinal or psychological testing, personnel safety review, continuous control room work, participation in the refresher training programme, participation in the simulator training programme, written examination, oral examination, simulator examination. Detailed information is given in Appendix 1. Figures 7 and 10 show the distribution in the OECD countries.

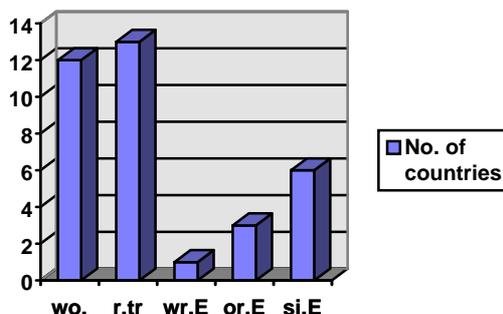


Figure 7. Prerequisites for the renewal of license: continuous control room work (wo.), participation in the refresher training programme including simulator training (r.tr), written examination (wr.E), oral examination (or.E), simulator examination (si.E)

Regulatory involvement in the renewal of licenses includes approval of refreshing training programme, participation in written, oral and simulator examinations as well as issuing of licenses. Six regulatory bodies approve specific refreshing training programmes. Figure 8 shows organisations carrying out the licensing examinations and Figure 9 who issues the license. In two cases the license is signed by both - operating organisation and regulatory body. In three cases there is no regulatory involvement in the renewal process.

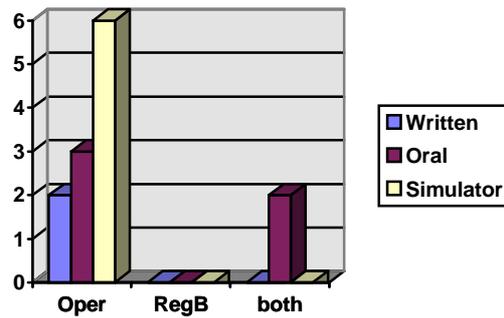


Figure 8. Organisations carrying out relicensing examinations among OECD countries: operating organisation (Oper), regulatory body (RegB), both means both together

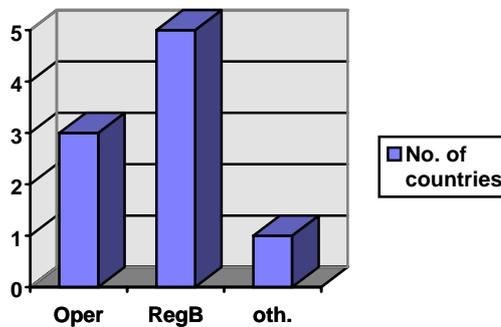


Figure 9. Organisations which issue continuation of licenses in the OECD countries

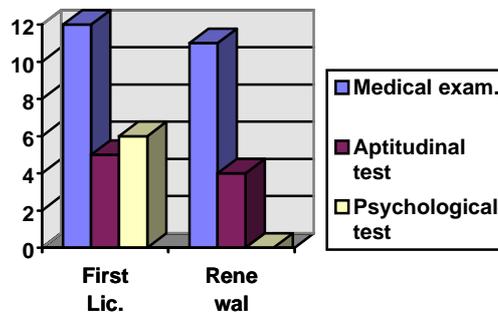


Figure 10. The role of specific medical examinations, aptitudinal tests and psychological tests in the operator licensing and relicensing. Two countries have medical examinations which are carried out to all radiation workers (not included in the above figure)

5. Upkeeping the license or authorisation

Cases when a valid operator license/authorisation may expire include: medical reasons, operators away from control room work, operators who grossly or repeatedly violate safety. There are also other reasons mentioned such as operators who fail to attend refreshing training programmes, age limit (e.g. 60 years), criminal reasons (personnel safety review), alcohol and drug abuse or where a regulatory body can cause license withdrawal on case by case basis. Figure 11 shows distribution in the OECD countries.

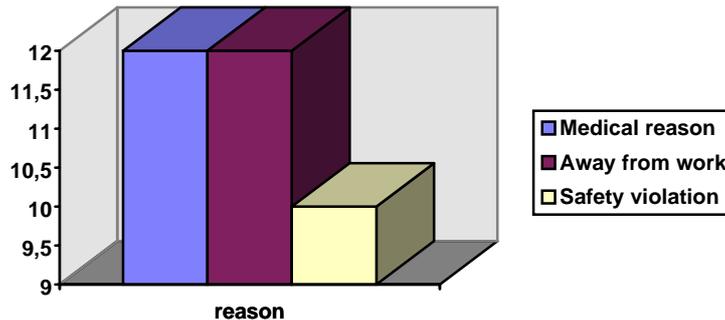


Figure 11. License may expire because of different reasons. This figure shows the No. of countries which presented the most obvious reasons: medical reasons, absence from work or violation of safety requirements. In addition some countries have licensing/ authorisation examinations which should be passed

Prerequisites for upkeeping the license include continuous control room work and participation in the refreshing training programme. Figure 12 shows how common these prerequisites are in the OECD countries. The time that an operator can be away from control room work varies from country to country from three months to one year. If the time limit is exceeded a new examination or additional training is needed. For upkeeping the license the amount of control room work and periodicity have been defined in many countries for those who are temporarily absent. The amount seems to be rather similar and varies between 30-40 hours calculated for a period of three months. However, when periodicity is considered some countries use a twelve month calculation period rather than a three month period. The details appear from Appendix 1.

Participation in the refreshing training programme is normally required as a prerequisite for upkeeping the license. Many countries approve a specific refreshing training programme. For upkeeping the license, the refresher training amount and periodicity have been specified in many countries. Participation in a continuing training programme or annual shift training is required. A typical amount of annual training is about 3-4 weeks including 2 weeks simulator training. Some countries provide both team and individual training. Another typical group of countries require or provide about two weeks training annually of which one week is training at the simulator. The details appear from Appendix 1.

These requirements have been set by the regulatory body or operating organisation or partly by both. They are written down in the regulatory guidelines or NPP procedures and in some cases in legislative documents. Detailed information on country practices is given in Appendix 1.

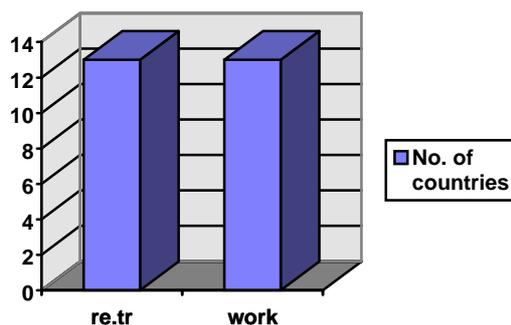


Figure 12. Prerequisites for competence upkeeping: regular participation in the refreshing training programme and continuous regular control room work

6. Other regulatory inspections to check the training and competence issues

The type of inspections carried out by the regulatory body to check the training and competence issues in addition to the operator licensing process include:

- regular periodic inspections twice a year
- both normal and focused inspections once a year
- assessment of licensee's yearly report on training activities
- periodic checks of the operator training process and of the content of the training packages
- inspection of the refreshing training programme every 2 years as well as regular observation of operator performance.

Reactive competence inspections are carried out also as necessary e.g. when triggered by perceived weakness in some areas or if significant organisational changes have been carried out. As a part of event investigations or root cause studies competence aspects are often taken into account e.g. by performing reactive inspections following incidents with human factor errors (and subsequent human factor analysis) with operators interviewed by inspectors.

There are also other type of inspections or reviews e.g. when a new training programme is started or when the long term training programme of operators are reviewed or if an independent e.g. international training review is made. Figure 13 shows how common the above mentioned inspections are in the OECD countries.

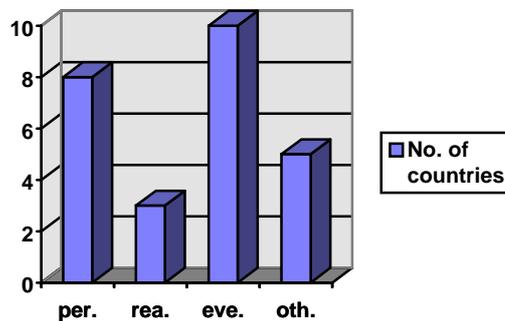


Figure 13. Type of inspections in the OECD countries: periodic inspections (per.), reactive inspections (rea.), event investigations (eve.) and other type of inspections such as larger reviews etc (oth.)

7. The use of training simulators

Training simulators are widely used in operator training (Figures 14 and 15). There are also some regulatory requirements for the use of training simulators such as a requirement for each NPP to have its own specific simulator or a requirement for simulator to be ready for training one year before fuel loading in the case of a new NPP.

The types of simulator are also specified, e.g.

- full scope and site specific simulator
- representative full-scope replica simulator
- full scope plant representative, preferable plant specific simulators in real time.

The amount of simulator training (initial and refreshing training) varies typically between the following extremes e.g.

- initial training about 24 weeks; refresher training about 60 hrs annually
- initial training about 10-12 weeks; refresher training about 2 weeks
- initial training about 50 days; refresher training 6 days in 2 years
- initial training 4 weeks; refresher training 2 weeks in 2 years
- refresher training - 5 days annually.

The simulators are used in operator licensing or authorisation e.g.

- candidates for licenses are tested by 2 or 3 simulator scenarios as part of licensing
- after initial training a candidate is tested individually at the simulator; for relicensing a team test at the simulator is required
- participation in the simulator training programme is a prerequisite for licensing.

These requirements have been set by the regulatory body or operating organisation or partly by both. They are written down in the regulatory guidelines or NPP procedures. Detailed information on country practices is given in Appendix 1.

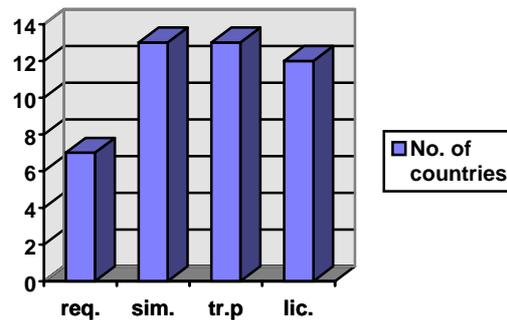


Figure 14. No. of OECD countries which use effectively full-scope training simulators: req. means that there are requirements to use simulators in training, sim. means that there are full-scope simulators in use, tr.p means that simulator training programmes are implemented and lic. means that simulators are used in licensing of operators.

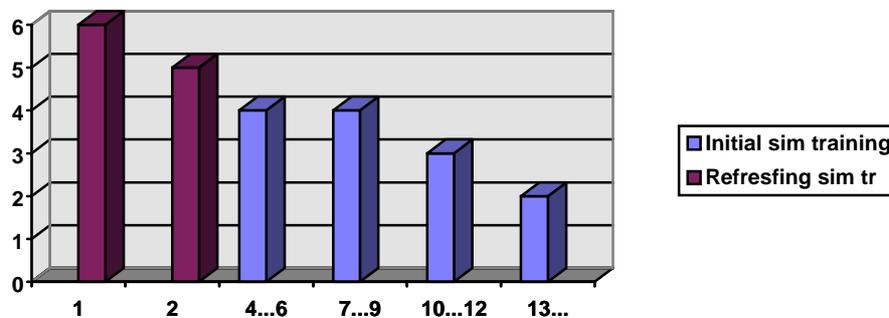


Figure 15. Typical simulator initial and refreshing training amounts in the OECD countries. No. of countries is presented in vertical axis. No. of simulator training weeks in horizontal axis (on the left amount of refreshing simulator training and on the right amount of initial simulator training).

8. Current/topical issues

There are some current/topical issues in training and qualification area which are under further development and which might be useful topics for international information exchange. The following were mentioned by the participants:

- Review of overall operator training and licensing practices against international practice
- Review of regulatory approach and co-operation with utilities in carrying out licensing examinations
- Consideration of type of simulators used in training in centralised training centres and at site as well as use of simulators in licensing examinations
- How much training is enough from theoretical point of view for initial and refreshing training
- Training and development of on site human factor incident analysis methods
- Training on severe accident management measures and theory.

9. General conclusions

In general, the practices in OECD countries for operator licensing or authorisation from the point of view of competence are rather similar although there are no formal requirements in all countries and although there is a clear variation in administrative methods e.g. licenses issued by either regulatory body or operating organisation.

The similarities can be summarised with the following statements:

- In most countries operators need a license or authorisation for the control room work
- Before a license or authorisation is first issued, operators have to complete training programme, including simulator training, pass a written, oral and simulator examination and pass a medical examination
- About half of the countries grant licenses or authorisation for specified periods of time
- For renewal of licenses or authorisation, completion of a refreshing training programme, including simulator training, is required as well as continuous control room work and a satisfactory result from a medical examination
- Renewal licenses are issued by the same organisation as initial licenses
- In most countries, licenses expire for medical reasons, absence from control room work or because of safety violations.

However, when the extreme ends are compared with each other considerable differences can be also found. The largest differences on the basis of this study are the following:

- Basic education varies; some countries require university level degrees for those working in the control room, some don't; in some countries there are different educational or experience requirements for different positions.
- Medical examination practices vary; in some countries specific control room work oriented examinations are not carried out. Also practices concerning aptitudinal or psychological testing vary considerably.
- From an administrative point of view there is variation in regulatory involvement in licensing examinations and in issuing licenses. In some countries the regulatory body participates very actively in examinations and issues licenses; in other countries the operating organisation arranges examinations and issues licenses but the process is only overseen by the regulatory body.

There are also some practices in relation to licensing examinations or upkeeping of competence or license where differences exist e.g.

- Use of simulators in operator training and licensing as well as simulator examination practices. E.g. there are clear differences in the amount of simulator training.
- The extent and frequency of absence from control room work before a license or authorisation is withdrawn
- The extent and nature of refreshing training, including simulator training, that is required

There are a number of current or topical issues in participating countries which may lead to changes in practice. A detailed list of these issues is provided in Appendix 1.

APPENDIX 1 - DETAILED ANSWERS OF THE 14 OECD COUNTRIES ON THE QUESTIONNAIRE ON OPERATOR LICENSING ISSUES

Participating Countries

Countries and regulatory bodies who have provided answers to the questionnaire are marked with the numeric reference. In analysing answers these numbers are used. The numbers and references are the following:

1. Belgium
2. Canada
3. Finland
4. France
5. Germany
6. Hungary
7. Italy
8. Japan
9. Netherlands
10. Sweden
11. Switzerland
12. United Kingdom
13. United States of America
14. Spain

In Appendix 1.1 basic guidance to fill the questionnaire is presented.

QUESTIONS AND ANSWERS

1. Who gives the license/authorisation to the control room operators and shift supervisors?

- | | | |
|---------------------------|--------------------------|---------------|
| A. Operating organisation | <input type="checkbox"/> | 14(8)9,10,12 |
| B. Regulatory body | <input type="checkbox"/> | 2356,11,13,14 |
| C. Some other, who | <input type="checkbox"/> | 78 |
- Italy: Inspectorate of Labour after consulting the advice of Regulatory Body
 - Japan: A - operators are licensed by operating organisation, herein after showed with brackets, C - shift supervisors are licensed by Accreditation Body
 - Netherlands: Besides the operational organisation also the regulatory body authorise the license of control room operators and shift supervisors. This is done after a joint (oral) examination.
 - Switzerland: after a joint examination. Also Finland and Hungary have joint examinations.

2. For which positions a specific license is needed?

- A. Shift supervisor 123456789,11,12,13,14
- B. Operator 1247(8)9,13,14
- C. Turbine operator (specific for turbine) 346(8)9,11
- D. Reactor operator (specific for reactor) 134567(8)9,11,12,14
- E. Other position, which 123456,11,12,14
- Belgium: operation engineers/Shift Technical Adviser
 - Canada: shift operating supervisor
 - Finland: operation engineers need shift supervisor license
 - France: field operator; operation technician for turbine; licensing contains also Nuclear Safety Qualification (SN1,SN2,SN3,SN4)
 - Germany: deputy of SS needs SS license; section head of shift crews, shift engineer
 - Hungary: unit shift supervisor, CRO for electrical systems
 - Netherlands: the deputy shift supervisor must have a shift supervisor license
 - Switzerland: picket engineer as a shift technical advisor
 - United Kingdom: Shift Manager for control, supervision and emergency controller duty
 - United States: an individual with a RO license is licensed for both the reactor and turbine
 - Spain: one deputy shift supervisor with a shift supervisor license
- F. No specific licenses are needed 10

3. What are the basic requirements?

- A. Basic education, which 123456(8)9,10,11,12,13,14
- Belgium: technical level
 - Canada: university degree in science/engineering for SS, grade 12/13 for CRO (end of high school); not mandatory
 - Finland: engineer degree for SS, technician for CRO's
 - France: Baccalaureate +2 years (end of technical high school)
 - Germany: engineer (DI or I) degree for SS, engineer or technician for CRO's; special nuclear training course is needed
 - Hungary: DI or I for SS and DI, I or technician degree for CRO
 - Japan: degree at technical high school
 - Netherlands: degree at a technical high school + Nuclear technology
 - Switzerland: technician for CRO's and SS; B.Sc. for PI
 - United Kingdom: university degree or equivalent
 - United States: see Regulatory Guide 1.8, Rev.2 (1987) "Qualification and training of personnel for NPPs" that refers to ANSI/ANS-3.1 "selection, qualification and training of personnel for NPP's" (1981)
 - Spain: university degree

- B. Work experience, how long 12345678(8)9,10,11,13,14
- Belgium: 3-4 years in power plant of which 1-2 in nuclear power plant
 - Canada: 4 years for SS, 5 years for CRO; experience requirement increase with lesser basic education
 - Finland: 5 years for SS of which 3 years in nuclear field, 3 years for CRO of which 1 year in nuclear field
 - France: 2 years from technician to reactor operator and 5-10 years from reactor operator to shift supervisor
 - Germany: 3 years in NPP for SS and 2 years in NPP for CRO
 - Hungary: 4/8 years in NPP for SS (DI/I), 2/3/4 years for CRO (DI/I/T)
 - Italy: 3 months
 - Japan: 1,5 years from operator to SS, 2,5 years for CRO (time for CRO is slightly different among the electric companies)
 - Netherlands: CRO - one year; SS - 2 years + 2 years as an operator
 - Sweden: on judgement from manager
 - Switzerland: at least 2 years
 - United States: see point A
 - Spain: at least 2 years from reactor operator and 2 years like operator for shift supervisor
- C. Medical examination 1346789,10,11,12,13,14
- Germany: same as required for most of NPP personnel according to Radiation Protection Regulations, made yearly
 - Sweden: same as for all radiological workers at the NPP
 - United States: see ANSI/ANS-3.4 "medical certification and monitoring of personnel requiring operating licenses for NPP's"
- D. Aptitudinal tests required 3467,14
- E. Psychological tests required 679,11,13,14
- United States: required for all badged personnel
- F. Personnel safety review 345,10

4. What are the prerequisites to get the license/authorisation?

- A. Passing the training programme 1345678(8)9,10,11,12,13,14
- B. Written license examination 3457(8)9,11,13,14
- C. Oral license examination 1345678(8)9,11,12,13,14
- D. Training simulator examination 134568(8),10,11,12,13,14
- France: competence assessment
 - Germany: certificate of successful training
- E. Something other, what 23579,10,12,13
- Canada: declaration from the station director that the individual possesses all the knowledge skills and personal attributes required by the position
 - Finland: for SS - 6 months work as operator of which at least 3 months at the reactor
 - Germany: for SS - 6 months work as reactor operator
 - Italy: practical license examination on the control room of the NPP

- Netherlands: 4 weeks simulator training; to become SS a new training programme and examination are needed
- Sweden: passing OJT
- United Kingdom: supervised experience
- United States: oral is A, plant walk through examination
- Spain: plant walk through examination

5. What is regulatory involvement in licensing examinations?

A. Regulatory body has approved a specific training programme 1579,11,14

B. The written, oral and simulator examinations in para. 4 are carried out by

	Written	Oral	Simulator
operating organisation	<input type="checkbox"/> 45(8)9,11	<input type="checkbox"/> (8),14,11,12	<input type="checkbox"/> 134(8),11,12
regulatory body	<input type="checkbox"/> 27,13,14	<input type="checkbox"/> 78,13,14	<input type="checkbox"/> 27,13,14
both in co-operation	<input type="checkbox"/> 3	<input type="checkbox"/> 13569,11	<input type="checkbox"/>
some other organisation	<input type="checkbox"/> 11	<input type="checkbox"/> 58	<input type="checkbox"/> 8

- Germany: expert organisation TUV, GRS participate together with Reg. Body and licensee
- Italy: practical test is carried out on the control room instead of simulator
- Japan: Accreditation Body (oral together with Regulatory Body)
- Switzerland: PSI Training Center

C. A specific license is written for the candidate by

operating organisation	<input type="checkbox"/> 14(8)9,11,12
regulatory body	<input type="checkbox"/> 2359,13,14
some other organisation	<input type="checkbox"/> 78

- Belgium: veto right by Regulatory Body
- Italy: Inspectorate of Labour
- Japan: Accreditation Body; in MITI ordinance, SS shall have a qualification
- Netherlands: operating organisation writes and Regulatory Body signs also
- Switzerland: operating organisation writes and Regulatory Body signs also
- United Kingdom: although operator "licenses" are granted by the operating organisation, the Regulatory Body can cause any license to be withdrawn at any time. The training process carried out by licensees is monitored by the Regulatory Body to ensure that it is satisfactory.

D. There is no regulatory involvement

6. The license/authorisation is given

- A. for a period of time, for how long 1346789,10,13,14
- 1 year: Sweden
 - 2 years: Belgium, Hungary, Netherlands, Spain
 - Finland: first license 2 years, then 3 years (max.)
France: 2 years for competence nuclear safety qualification
 - 3 years: Italy, Japan
 - 6 years: United States
- B. without any time limits 25(8),11,12
- Canada: introduction of limited time licences under consideration
 - United Kingdom: in practice staff are assessed annually. The results of these assessments are inspected by the Regulatory Body.

7. For the renewal of the license the following is needed: - or if the license/authorisation is without time limits the following is made/checked regularly:

- A. Medical examination 1346789,11,12,13,14
- B. Aptitudinal/psychological testing 67,12,14
- C. Personnel safety review 234
- D. Continuous control room work 123456789,10,11,14
- Japan: over 2 months in 3 years
- E. Participation in refresher training programme 12345679,10,11,12,13,14
- F. Participation in simulator training programme 12345689,10,11,12,13,14
- Canada: the above points are covered in Ontario Hydro documents
 - United States: as part of refresher training programme
- G. Written examination 13
- H. Oral examination 36,13
- I. Simulator examination 234,11,12,13
- Germany: points GHI: informal control of training success by the trainer

8. What is regulatory body's involvement in the renewal process?

- A. Regulatory body has approved a specific refresher training programme 12589,13,14
- Canada: in progress
 - Finland: amount of simulator training in conformance with regulatory body
 - Germany: detailed 3 year training programme
 - Japan: SS has to take a seminar in renewal
 -
- B. The written, oral and simulator examinations in para. 7 are carried out by
- | | Written | Oral | Simulator |
|-------------------------|--------------------------------|-----------------------------------|----------------------------------------|
| operating organisation | <input type="checkbox"/> 11,13 | <input type="checkbox"/> 11,12,13 | <input type="checkbox"/> 2346,11,12,13 |
| regulatory body | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| both in co-operation | <input type="checkbox"/> | <input type="checkbox"/> 36 | <input type="checkbox"/> |
| some other organisation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

C. A specific license is written for the candidate by
operating organisation
regulatory body
some other organisation

- 149
 369,13,14,
 8

- Belgium: veto right by Regulatory Body
- Netherlands: operating organisation writes and Regulatory Body signs also; before signing fulfilment of topics mentioned under question 7, is inspected
- Switzerland: operating organisation writes and Regulatory Body signs also

D. If the license/authorisation is given without
time limits, a periodic checking is made by
the operating organisation, how often
regulatory body, how often

- 2(8),11,12
 25,11,13

- Canada: twice a year by the operating organisation; a few observations of operating organisation's requalification examination have been performed by the Regulatory Body. Planned systematic assessment of these examinations at a frequency to be determined
- Germany: regulatory body inspects the yearly report on training measures prepared by the licensee
- Japan: operating organisation checks operator's history properly
- Switzerland: annually by the licensee; spot checks by the Regulatory Body
- United Kingdom: 12 months, see question 6
- United States: the refresher training programme is inspected every 2 years; the license is for 6 years.

E. There is no regulatory involvement in renewal
process or periodic checking process

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9. In which cases a valid operator license/authorisation may expire?

A. For medical reasons

- 1234679,10,11,12,13,14

B. Operator is away from control room work,
for how long:

- 1234569,10,11,12,13,14

- Belgium: 4 months
- Canada: an authorised person must work in the authorised position at least 3 shifts (36 hrs) per calendar quarter (NOB/NGD-POL129)
- Finland, France, Hungary: 6 months
- Germany: away more than 1 year - examination is needed; control room work less than 2 weeks in six months - additional training is needed
- Netherlands: more than 25 % of his normal working hours
- Spain, Sweden, Switzerland: one year
- United Kingdom: prolonged period
- United States: may be allowed to retain license for up to 2 years under special circumstances

- C. Operator violate grossly or repeatedly safety requirements 23468,10,11,12,13,14
- D. Other reasons, which 179,10,11,12,13,14
- Belgium, Spain: case by case
 - Canada: alcohol and drug abuse
 - Hungary: if operating organisation requests regulatory body cancel the license
 - Italy, Netherlands: age limit (60 years)
 - Sweden: no longer attending refresher training, criminal reasons
 - Switzerland: criminal reasons
 - United Kingdom: Regulatory Body can cause license withdrawn
 - United States: no longer attending refresher training

10. What kind of prerequisites are there for upkeeping the license?

- A. Regular participation in operator refresher training 1234568(8)9,10,11,12,13,14
How much is enough?
- Belgium: licensing committee(Reg. Body + licensee) defines
 - Finland: participation in annual refreshing/simulator training programme defined by the licensee: three weeks annually of which two weeks at the simulator
 - France: 2 weeks simulator training /year, second week with team + 8 hours on SGTR
 - Germany: classroom training, special operational works - over 100 hours/year; simulator training - over 20 days in three years (PWR) or over 15 days in three years (BWR); minimum 5 days/year
 - Hungary: 8 days/year classroom training; 10 days/year simulator training
 - Japan: more than once in 3 years for SS
 - Netherlands: 10 days annually of which 5 days at the simulator
 - Sweden: 10 days annually of which 5 days at simulator
 - Switzerland: continuous training programme
 - United Kingdom: annual shift training
 - United States, Spain: continuous training programme
- B. Continuous/regular control room work; 12345679,10,11,12,13,14
How many hours/days in a given period or in a given interval control room work is required for upkeeping the license?
- Belgium: see point A
 - Canada: requirements are documented; see reference in No.9 B
 - Finland: participation in control room work - amount specified by the licensee: e.g. in one power company 4 days in three months
 - Germany: over 2 weeks in six months
 - Hungary: three 8 hour shifts in three months
 - Netherlands: more than 75% of his normal working hours
 - Sweden: 21 shifts in 6 months
 - Switzerland: one month/ year
 - United Kingdom: this is not specified
 - United States: none required but must stand 40 hours of training watch if not withstanding for 3 months
 - Spain: 1 year

- C. These requirements have been set by
the regulatory body 135679,10,11,13,14
operating organisation 2349,11,12
- Finland: general requirement by the Regulatory Body, details by the licensees
 - Netherlands: requirements have been set in co-operation by licensee and Regulatory Body
- D. These requirements have been written down in
regulatory guideline or NPP procedure; 1234568(8)9,10,11,12,13,14
Please name the guideline/procedure
- Belgium: requirements are presented in the Safety Analysis Report
 - Canada: Ontario Hydro documents NOB/NGD-POL124, POL 129
 - Finland: regulatory guide YVL 1.6, NPP procedures under preparation
 - France: EDF Quality Assurance Manual chapter "Training and Licensing" (1996)
 - Germany: regulatory guideline No. 3.38
 - Hungary: ministerial decree, governmental decree (safety codes and standards), safety guide (to be named in 1997)
 - Japan: Accreditation Body has presented these requirements: "Guideline of authorisation for shift supervisors"
 - Netherlands: RT84-019 Rev., Instruction operating personnel of NPP
 - Sweden: Competence guideline
 - Switzerland: HSK regulatory guides R-17 "Organisation and personnel of NPP", R-27 "Selection, training and examination of licensed personnel of NPP"
 - United Kingdom: individual NPP procedures which are inspected by the regulatory body
 - United States: 10 CFR Part 55
 - Spain: Regulatory Guide CSN 1.1, developing the ministerial RINR (1974)

11. Which type of inspections are carried out by the regulatory body to check the training and competence aspects of the control room operators (in addition to the operator licensing process)?

- A. Regular/periodic inspections; 1345,10,12,13,14
which inspection and how often
- Belgium: observations are made during control room inspections
 - Finland: Periodic Inspection Programme, inspections B1 (general training inspection, once a year) and B2 (training and qualification of specific personnel groups, Operations once in three years)
 - France: periodic inspections, e.g. during the change of team organisation (1994-96) and in 1997 operator training had high priority in inspections: 16 inspections at sites, 2 on training centres and one at EDF Central Services to verify the updated strategy of EDF with respect to training and licensing
 - Germany: assessment of licensee's yearly report on training activities
 - Sweden: both normal and focused inspections once/year
 - United Kingdom: periodic checks are made of the operator training process and of the content of the training packages
 - United States: inspection of refresher programme every 2 years. daily observation of operator performance

- Spain: general training inspection once a year and daily observation by resident inspectors
- B. Competence inspections now and then; 2,11,12
please give an example, and how often
- Canada: is triggered by perceived weakness in some areas
 - Switzerland: simulator training - sporadic
 - United Kingdom: regular inspections are made of reactor control rooms to check for compliance with operating limits and conditions and the general level of operator competence. These inspections sometimes occur during reactor start-ups, shutdowns, on-load refuelling or load changes.
- C. As a part of event investigations/root cause studies 12367,10,11,12,13,14
competence aspects are taken into account
- D. Other type, which 2489,11
- Canada: when a new training programme is started
 - France: reactive inspections following incidents with human factor errors (and subsequent human factor analysis) with operators interviewing by inspectors
 - Japan: review of training programme (long term) for operator
 - Netherlands: see question 8
 - Switzerland: at special plant tests, at shut down tests (for refuelling) and start-up test for the next cycle
- E. In case You are willing to present more information on Your inspection activities, You are encouraged to do so because these examples may be valuable information when the summary report is prepared.

12. Training simulators are widely used in operator training

- A. Is there any regulatory requirements in Your country to use training simulators? What requirements?
- Belgium: simulators are normally required for initial and retraining of CR operators
 - Canada: regulatory requirement to this effect under consideration. Each NPP has to have its own specific simulator
 - Finland: requires representative full-scope replica simulators to be used in initial and refreshing training; Simulator should be ready for training one year before fuel loading in the case of new NPP.
 - France: there are no regulatory requirements to use training simulators, mainly because EDF had led an ambitious and advanced policy in this area
 - Germany: regulatory guidelines 3.2 and 3.38
 - Hungary: passing the simulator training according to the initial and refreshing training programmes are prerequisites for licensing
 - Italy: no requirements
 - Japan: no requirements
 - Sweden: informal requirement concerning amount of simulator training based on licensee's programme
 - Switzerland: statement in a guideline that simulator training is required - initial training for each license step, refresher training; no requirements on duration

- United Kingdom: there is no regulatory requirement to use training simulators but their use is encouraged.
- United States: simulators are required by 10 CFR Part 55, with one exemption
- Spain: there is no regulatory requirement to use training simulators but their use is encouraged, the safety guide 1.1 is not mandatory

B. What type of simulators are required?

- Belgium: full-scope simulators are normally required; some differences are tolerated on the layout of the control room. Licensees also use basic principle or functional simulators on a voluntary basis.
- Canada: full scope; specifications are given in "regulatory simulator-based examination procedure" where indicated in OCD-ST6
- Finland: representative full-scope replica simulator
- France: full-scope simulators are of the following types (although not required by the regulatory body): full scale (13 of them covering the different PWR types in France, one new "process" simulator for each site (SIPACT) and other type SEPIA for incidents and accidents
- Germany: full scope plant representative, preferable plant specific simulators in real time
- Hungary: full scope simulator, PC based principle simulator (basic process of NPP); PC based simulator is used in initial classroom training of reactor and turbine operators
- Italy: no requirements
- Japan: full scope replica simulator (not required but usually used)
- Netherlands: simulator must represent the type of reactor; a full scope simulator is present after mid 1997
- Sweden: full scope replica simulator
- Switzerland: full scope simulators
- United Kingdom: Currently there are full scope simulators for the AGR and PWR NPP's and a generic simulator for the Magnox NPPs.
- United States: full scope and site specific simulators
- Spain: there is training centre in Spain (Tecnatom) with two full scope simulators and the plants are developing SGI system and in some cases also full scope simulators; the CSN is reviewing now the situation

C. How much simulator training: initial and refreshing training is required/provided?

- Belgium: initial training 6 weeks; refresher training 2 weeks in two years
- Canada: initial training about 24 weeks; refresher training about 60 hrs
- Finland: initial training about 10-12 weeks; refresher training about 2 weeks
- France: 10 weeks of training on the "full-scope simulators" (like S3C) in training centres like Bugey, Paluel, CAEN; 2 weeks each year for refreshing
- Germany: initial: over 8 weeks (PWR) and over 7 weeks (BWR) + necessary preparation work; refresher: over 20 days in three years (PWR) - 80 hours simulator control room work - or over 15 days in three years (BWR) - 60 hours simulator control room work; minimum 5 days/year
- Hungary: initial: 15 weeks for shift supervisors (5 weeks reactor, 5 weeks turbine and 5 weeks shift supervisor training) and 6 weeks for reactor, turbine and senior field operator for secondary side; refreshing: 10 days/year simulator training (shift supervisors, reactor/turbine/electrical control room operators, senior field operator on the secondary circuit);

- Italy: no requirements
- Japan: initial - about 50 days; refresher - 6 days in 2 years
- Netherlands: initial - 4 weeks; refresher - 2 weeks in 2 years
- Sweden: refreshing training - 5 days annually
- Switzerland: provided: initial - 2-7 weeks; refresher - more than one week
- United Kingdom: the operating organisations typically require simulator training to be included in both initial and refresher training packages. Additional simulator training is arranged according to need e.g. in preparation for special plant manoeuvres or to validate and train operators in new operating procedures.
- United States: the exact amount of simulator training is not defined by requirement. Initial training is about 6-8 weeks, refresher training about 60 hours per year.
- Spain: initial training 120 hours, refreshing training 20 hours per year

D. How are the simulators used in operator licensing/authorisation?

- Belgium: simulator training is a requirement for the licensing examination, but no official licensing examination (i.e. in presence of regulators) is performed on simulators
- Canada: every candidate is individually tested in a simulator-based examination comprising of several (minimum of 3) test scenarios
- Finland: after initial training a candidate is tested individually at the simulator; For relicensing a team test at the simulator is required.
- France: EDF gives the license/authorisation on the following grounds: completion of certain number of training courses required by EDF central services including simulator training, completion of other local training sessions imposed by the site management and appreciation of the operator's competence through the team reactor operation training
- Hungary: participation in the simulator training programme is a prerequisite for licensing
- Italy: no requirements
- Japan: in examination of SS
- Sweden: passing the programme
- United States: candidates for licenses are tested by 2 or 3 simulator scenarios as part of licensing.

13. Please list the regulations and regulatory guidelines in which the above requirements are presented:

- Belgium: US NRC rules as basis, with adaptation to the Belgian situation
- Canada: AECB Operator Certification Division Procedure OCD-ST6; New act and regulations are being tabled.
- Finland: regulatory guides YVL 1.6 and YVL 1.7
- France: article 7 of ministerial order of August, 1984 dealing with Q/A and Q/C (general principle), article 6 of decree of July 24, 1980 dealing with intentional violation of regulations dealing with safety
- Germany: 3.2, 3.38 and 3.39 for NPP's, 3.3 and 3.53 for research reactors, 3.57.1 for personnel safety and reliability check
- Hungary: the following regulations: Requirements and process of the licensing examination (1992), Requirements and process of the license renewal (1983), Scope of the positions for which a separate license is needed from regulatory body (1984/86), License validity (1985),

Prerequisites to get the license and for upkeeping the license (1995). All regulatory guidelines will be renewed in 1997.

- Japan: see 10 D
- Netherlands: RT84-019 Rev (part of N.V.R. 2.2.1 (Dutch translation of IAEA 50-SG-O1); For inspection a procedure IP 6.5.2 is made.
- Switzerland: HSK-R-17, HSK-R-27, see 10 D
- United Kingdom: regulatory requirements are specified in license conditions which state e.g.:
 - The licensee shall ensure that no operations are carried out which may affect safety expect under the control and supervision of suitably qualified and experienced persons appointed for that purpose by the licensee.
 - The licensee shall make and implement adequate arrangements to ensure that only suitably qualified and experienced persons perform any duties which may affect the safety of operations on the site ...
 - The aforesaid arrangements shall also provide for the appointment, in appropriate cases, of duly authorised persons to control and supervise operations which may affect plant safety.
 - The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify. (+ Changes for approval).
 - The licensee shall ensure that no person continues to act as a duly authorised person if, in the opinion of the Executive, he is unfit to act in that capacity and the Executive has notified the licensee to that effect.
 - The licensee shall make and implement adequate arrangements for suitable training of all those on site who have responsibility for any operations which may affect safety.
 - The licensee shall submit to the Executive for approval such part or parts of the aforesaid arrangements as the Executive may specify. (+ Changes for approval).
- United States: 10 CFR Part 55, NUREG 1021, Regulatory Guide 1.149
- Spain: RINR (radioactive and nuclear installations rule) ministerial decree in 1974; Regulatory Guide 1.1 (qualifications and training technical aspects); Regulatory Guide 7.4 (medical qualifications and requirements aspects)

14. Please list the NPP procedures in which the above requirements and practices are presented:

- Belgium: The above requirements are part of the safety analysis report
- Canada: Ontario Hydro: NOB/NGD Policy 113 (divisional standards for effective training programs), Policy 124 (Continuing training for authorised staff in NGD), Policy 127 (Training and development certification), Policy 129 (Retention & reacquisition of authorisation of generating station staff)
- Finland: NPP Training Manual/procedures and job specific training programmes
- France: EDF internal guideline No. 20 (Safety responsibilities for operation during incidents and accidents), see point 10
- Germany: Training Manual
- Hungary: Educational Manual of NPP
- Japan: there are authorisation procedures for operator
- Netherlands: in the overall procedure PU-Z01-01 the implementation of training activities for all personnel working at the NPP at Borselle is described

- United Kingdom: there are no general procedures. Each NPP has its own documentation which specifies requirements and practices.
- United States: Varies by licensee. Too numerous to list
- Spain: NPP Training Manual and Procedures and NPP Operation Procedures

15. What are the current/topical issues in training and qualification area in your country which are under further development and which might be useful topics for international information exchange:

- Canada: 1. Review and revision of training programmes for senior control room staff to make them comply with Systematic Approach to Training (SAT) principles, 2. Revision of regulatory approach to authorisation (licensing) of senior control room staff to bring it more in line with internationally accepted practices; 3. Review of guidelines for initial qualification and requalification of senior control room staff; 4. Limited period licensing (in new regulations under consideration); 5. Development of continuing training programs for authorised staff
- Finland: Testing of operators at the simulator; practices are developed by the licensees currently; the use of test results in relicensing of operators
- France: The two main trends under development are the following: decentralisation of training with adequate adaptation for the individual operator and associated evaluation of his competencies and specific needs for further training; improve the knowledge of physical phenomena occurring in reactor through the new SIPACT site simulator
- Germany: there are plans to introduce accident management measures for severe accident situations into the simulator training programmes. Also, severe accident phenomena, in particular core melt accidents and associated physical and chemical processes are under consideration to be introduced into classroom training of control room personnel
- Hungary: The following is under development: 1. Training inspection practices, 2. Use of full scope simulator to support licensing examinations, 3. Operator testing practices at the simulator.
- Sweden: 1. Examinations either yearly or periodically and criteria for the retraining, 2. SAT procedures, 3. How much is enough training scientifically.
- Switzerland: tendency for full scope replica simulators; established 2 (NPP Leibstadt, Muhleberg), planned 1 (NPP Gösgen), in discussion 1 (NPP Beznau) which has plant specific compact simulator on site and plant specific (models) full scope abroad
- United States: USNRC is considering jointly writing the licensing examinations with utilities. The utilities would likely provide the first draft
- Spain: the utilities are developing a training guide for all the plant personnel, not only for the operators licensed; This guide will be followed by the nuclear industry; The CSN is preparing changes in regulatory aspects (valid period for the license 3 years instead of 2, written and oral examinations for upkeeping the license by the utilities with CSN audits etc.); The most important aspect under decision by the CSN is to require a full scope simulator to all NPP, due to some plants are first generations of W and GE and we have several types of plants in Spain.

16. Other comments and explanations:

- France: EDF (licensee) has the prime responsibility for reactor safety and also for adjusting and verifying the level of competence of reactor operators through adequate team organisation and operator training. The DSIN checks with EDF central services that organisation and training principles are adequate (generally following advice of the Advisory Committee for Nuclear Reactors) and gives formal approval for site implementation following site inspections. There are also ad hoc inspections (training or incident follow up).
- United Kingdom: regulatory system for NPPs is non-prescriptive.

Appendix 1.1 - Basic guidance to fill the questionnaireFINNISH CENTRE FOR RADIATION
AND NUCLEAR SAFETY

Ilari Aro

9th August 1996

**OECD/NEA CNRA/ Working Group on Inspection Practices
Comparison of the inspection practices in relation to the control room operator licenses**

The participants answered to the following questionnaire on the basis of the following guidance:

”With reference to the point IX in the summary record of the eleventh meeting, 24th May 1996 in the UK the following proposal for the consideration of the Working Group is presented. Please provide Your response/ comments before the WGIP-meeting 30 September-2 October 1996 in Munich to Messrs. Kaufer and Aro.

Control room operator licensing/authorisation practices in different countries vary and also the regulatory body’s involvement in licensing/authorisation has considerable differences in different countries. After the provision of authorisation to work as a control room operator or as a shift supervisor there might be changes in individual’s abilities, knowledge and duties, e.g. changes in shift positions, temporary assignments to other jobs in the power plant or outside the operating organisation, leave from the shift work due to medical, educational or other reasons. Key questions for this comparison are ”what are the regulatory or licensee requirements for upkeeping the authorisation/license” and ”how regulatory body inspects competence of shift teams and individual operators”.

While setting requirements for the competence upkeeping or inspecting individual operator histories from the competence point of view an inspector may need some useful references from other countries so that he/she is not alone with his/her ideas which is often the case in a small country. In training and competence matters the administrative practices may vary in different countries a lot. However, it would be ideal if the requirements which have scientific/technical/biological nature were rather similar. This would create confidence also on regulatory practices. Therefore the following questionnaire and the respective report where the results are analysed could offer an interesting and useful background material and contact information to those who are working with these matters.

Therefore I would like to propose the following questionnaire which is easy to fill and does not take too much working time of an inspector who handles training and competence matters. **Mainly the filling is made by crossing the true statements.**

Please cross the true statement. If You are willing to explain more and/or need more space for Your answer please mark reference and answer by using a separate sheet of paper. You are free to explain more and to add some reference material if You wish.

Contact information:

Information was provided by, name: _____

Organisation/

Address: _____

Tel./Fax _____ ”

APPENDIX 2 - CONTACTS

The following numbers are provided as a contact for obtaining further information or details about the inspection practices within the contributing countries. (NOTE: Addresses, phone numbers and names provided in this section represents current information, *as of 1 March 1998*. Since this information is subject to changes due to re-organisations, advancements, etc., the reader should take these occurrences into account.)

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