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347

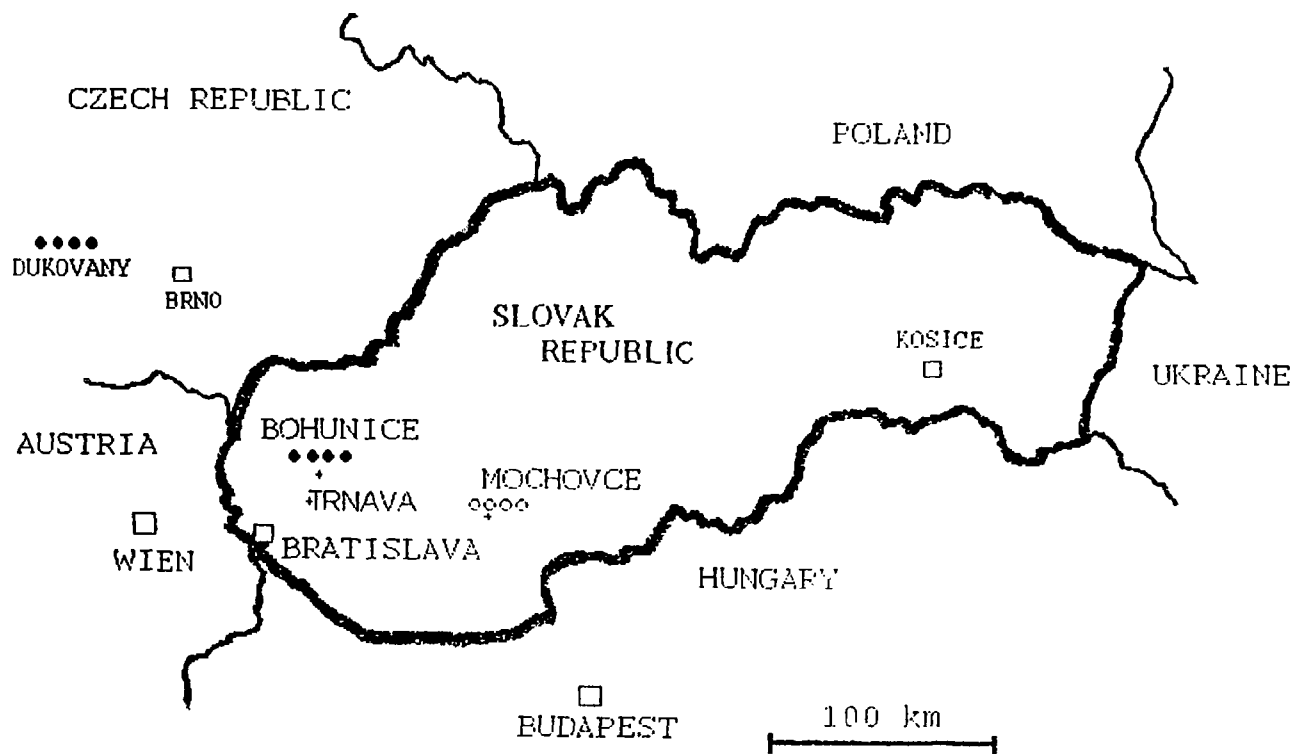
Technical Co-operation Meeting on Personnel Training
Requirements and Programme for WWER-Type NPPs

11-15 October 1993

IAEA Vienna

SYSTEM OF NPP PERSONNEL TRAINING
IN SLOVAK REPUBLIC

DUCHÁČ A., DUGOVIČ M., ŽIAKOVÁ M.

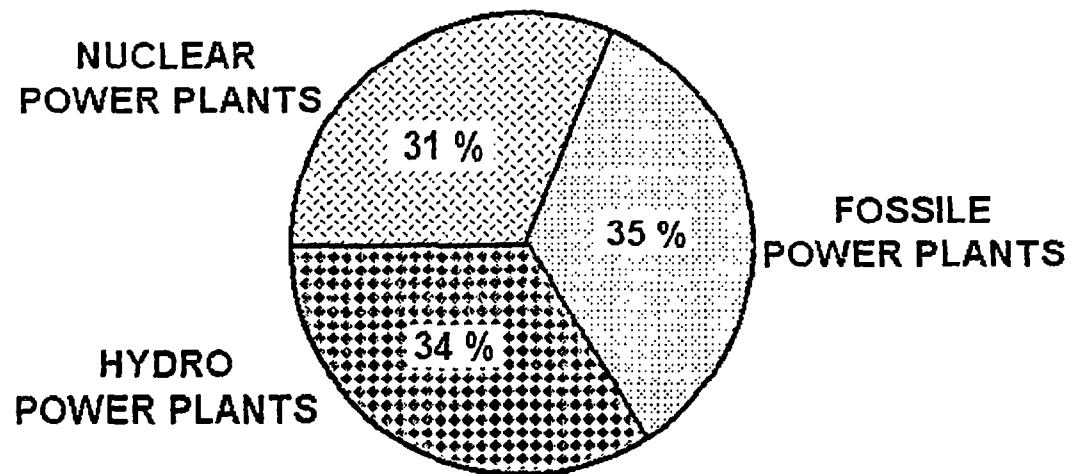


348

SLOVAK POWER SYSTEM

INSTALLED CAPACITY (MW)

	1991	1992	UNDER CONSTRUCTION
NUCLEAR	1760	1760	1760
FOSSILE	1990	1990	
HYDRO	1648	1916	180
TOTAL	5398	5666	



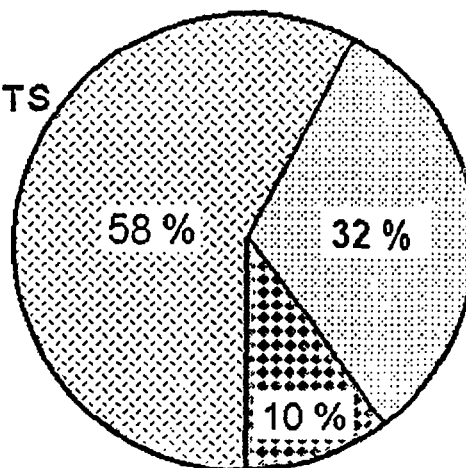
350

SLOVAK POWER SYSTEM

POWER PRODUCTION (GWhr)

	1991	1992
NUCLEAR	11689	11049
FOSSILE	6122	6045
HYDRO	1854	1927
TOTAL	19665	19021

NUCLEAR
POWER PLANTS



FOSSILE
POWER PLANTS

HYDRO
POWER PLANTS

Training of the NPP personnel in Slovak Republic is based especially on

- Act No 28 from 1984 on the Authority of the State over Nuclear Safety of Nuclear facilities (this is the Act from previous ČSFR but it is valid in Slovakia);
- Regulation of Czechoslovak Commission for Atomic Energy and Federal Ministry of Economy from 1991 on Criteria for Energetic Enterprises Personnel Training
- Regulation of the Slovak Power Enterprises No 14 from 1992 on Rules for NPP Personnel Training.

In accordance with these documents personnel of NPPs is divided into 6 categories :

- category I - Licensed Personnel
- category II - Technical and Economical Personnel and Foremen
- category III - Shift and Other Operating Personnel
- category IV - Maintenance Personnel
- category V - Plant Deccomissioning Personnel
- category VI - Other Personnel

Category I - Licensed Personnel

Those NPP personnel are included who have direct impact on nuclear safety and plant operation availability by their performance.

This category is divided into following groups :

- a) shift supervisor, unit shift supervisor, reactor operator, secondary plant operator
- b) reactor physicist
- c) instructor in training centres
- d) instructors at the full-scope simulator
- e) personnel for NPP commissioning

Category II - Technical and Economical Personnel and Foremen

Those NPP personnel with university and high school education are included who carry out (perform) functions in operating, technical and maintenance sections of NPPs. Also personnel from training facilities not included among Category I personnel are classified in this category.

This category is divided into following groups :

- a) managers and heads of sections and departments
- b) personnel of operating section
 - primary plant
 - secondary plant
 - I&C
 - electrical systems
 - chemistry
 - radioactive waste management
- c) personnel of maintenance section
 - mechanical maintenance
 - electrical maintenance
 - I&C maintenance

d) personnel of technical sections

- health physics
- quality assurance
- in-service inspection
- radioactive waste management
- decontamination
- construction and commissioning
- civil engineering

e) foremen

- primary plant
- secondary plant
- I&C
- electrical systems
- chemistry
- health physics
- maintenance
- radioactive waste management

Category III - Shift and Other Operating Personnel

Those NPP personnel are included who perform handling on technological equipment with the exception of foremen who are included in Category II.

This category is divided into following groups :

- primary plant
- secondary plant
- I&C
- electrical systems
- chemistry
- health physics
- radioactive waste management

3 57

Category IV - Maintenance Personnel

Those personnel who perform maintenance activities on technological equipment are included in this category.

This category is divided into following groups :

- mechanical maintenance
- electrical maintenance
- I&C maintenance
- maintenance of equipment used in health physics

Category V - Personnel Working in Plant Decommissioning
Section

Those personnel who perform activities in the section for nuclear power plant decommissioning are included in this category.

This category is divided into following groups :

- a) managers, heads of departments and foremen
- b) other personnel
 - operation
 - transport of spent fuel
 - decontamination and chemistry
 - radioactive waste management

Training programmes organized for NPP personnel :

- Initial Training
- Continuing Training
- Training for Personnel Who Is Changing a Job at NPP
- Training for Personnel Who Starts to Do the Same Job at the Other NPP
- Other Training

Initial Training

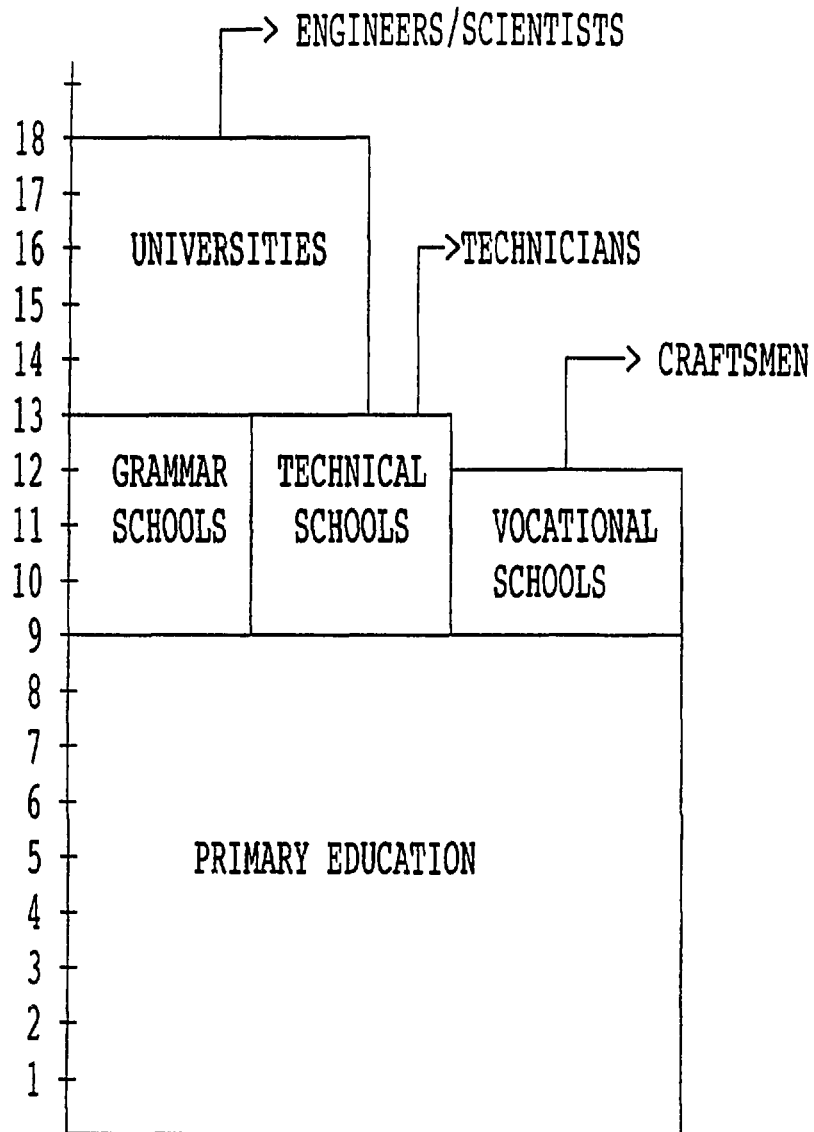
The goal :

to ensure that personnel possess knowledge, intellectual abilities and manual and communication skills necessary to perform assigned duties in a manner that promotes safe and reliable operation.

The initial training is organized in following phases

- theoretical training
- on-the-job training
- simulator training
- preparation and examination for obtaining "Certificate"
- training at working place
- preparation and exam for obtaining "Licence" - for Category I and examination for obtaining "Commission" - for other categories

The initial training is organized according to training plans which determine the learning objectives, duration, content, training setting and the way how to assess the meeting of the learning objectives.



INITIAL TRAINING OF NPP PERSONNEL

PHASE OF TRAINING	C A T E G O R Y					
	I	II	III	IV	V	VI
THEORETICAL TRAINING	22	13	6	6	8	X
ON-THE-JOB TRAINING	15	6	6	6	7	
SIMULATOR TRAINING	5					
EXAM FOP "CERTIFICATE"	2	1.5	1	1	1	1
TRAINING AT WORKING PLACE	4	X	X	X	X	X
EXAM FOR "LICENCE"	X					
EXAM FOR "COMMISSION"	X	X	X	X	X	X

DURATION OF PHASES IS GIVEN IN WEEKS

LIST OF SUBJECTS FOR THERETICAL TRAINING

CATEGORY I

DURATION : 22 WEEKS

1.Nuclear Physics	12	WT
2.Theory of Nuclear Reactor	32	OT
3.Reactor construction	8	WT
4.NPP Mechanical Equipment	18	OT
5.I&C-part I	14	OT
6.Design and Operational modes of NPP	24	OT
7.Nuclear Safety	14	OT
8.Hydrodynamics & Thermodynamics	12	WT
9.Quality Assurance	8	WT
10.Chemistry and Materials	22	WT
11.Maintenance	12	WT
12.Reactor Coolant System	52	OT
13.Secondary Circuit	52	OT
14.Electrical Systems	58	OT
15.I&C-part II	40	OT
16.Health Physics	38	OT
17.NPP Chemistry	16	WT
18.Operation Safety	18	WT
19.NPP Operation	78	OT
20.Emergency Operational Procedures	50	OT
21.Storage and Transport of New and Spent Fuel	24	WT
22.Purification Systems	30	WT
23.Safety and Health Standards and Fire Protection	14	WT
24.Reactor and Operational Physics	24	OT

METHODS USED DURING THEORETICAL TRAINING

- lecture
- discussion
- self study
- demonstration

AIDS USED DURING THEORETICAL TRAINING

- whiteboard
- transparencies
- slides
- videorecord
- models
- computers for computer-based training
- simulator

METHODS USED DURING PRACTICAL TRAINING

- demonstration / practice
- walk through
- on-the job training
- practice under real conditions
- discussion
- oral questioning
- self study

AIDS USED DURING PRACTICAL TRAINING

- videorecords
 - computers for computer-based training
- * mock ups

366

INITIAL SIMULATOR TRAINING

Duration : 5 weeks

Content : normal operational modes
 emergency operational modes

METHODS USED DURING SIMULATOR TRAINING

- demonstration / practice
- discussion
- walk-through
- oral questioning
- lecture

AIDS USED DURING SIMULATOR TRAINING

- simulator
- computers for computer-based training
- transparencies and slides

CONTINUING TRAINING

The goal :
to maintain and improve competence and qualification of personnel

Professional oriented training

- revision of required knowledge and skills from initial training;
- modifications and changes of a NPP and its procedures in areas relevant to an employee job functions;
- lessons learned from incidents and events at the plant and similar plants.

General employee continuing training

- industrial safety
- fire protection and fire fighting
- health physics
- response to plant emergencies

Simulator retraining

- compulsory for personnel from Category I
- simulator retraining is organized twice a year for five days
- content - normal operational procedures
 - emergency operational procedures

LIST OF SUBJECTS FOR THERETICAL TRAINING

CATEGORY I

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1.Nuclear Physics	12	WT
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METHODS USED DURING THEORETICAL TRAINING

- lecture
- discussion
- self study
- demonstration

AIDS USED DURING THEORETICAL TRAINING

- whiteboard
- transparencies
- slides
- videorecord
- models
- computers for computer-based training
- simulator

370

METHODS USED DURING PRACTICAL TRAINING

- demonstration / practice
- walk through
- on-the job training
- practice under real conditions
- discussion
- oral questioning
- self study

AIDS USED DURING PRACTICAL TRAINING

- videorecords
- computers for computer-based training
- * mock ups

371

INITIAL SIMULATOR TRAINING

Duration : 5 weeks

Content : normal operational modes
 emergency operational modes

METHODS USED DURING SIMULATOR TRAINING

- demonstration / practice
- discussion
- walk-through
- oral questioning
- lecture

AIDS USED DURING SIMULATOR TRAINING

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 - emergency operational procedures

TRAINING FOR PERSONNEL WHO CHANGE JOB POSITION AT A NPP

The general rule is :

- if the employee's new job position belongs to the same category but not to the same group than old one the employee must take part in all phases of initial training for the new position except of the general part of theoretical training;
- if the employee's new job position belongs to another category than the old one the employee must usually take part in all phases of initial training for the new position.

EVALUATION OF THE TRAINING PROCESS

- individual evaluation by : instructors
responsible personnel of the training
centers
external audit authorities

- subjects of evaluation : trainees
instructors
documentation
teaching materials
teaching aids

- tools for evaluation : questionnaires
class visits
examinations
statistical evaluations

The evaluation of the human factor contribution to the NPPs failures is also very important indicator of the personnel training quality.

NUMBER OF TRAINEES IN

	1981-86	1987	1988	1989	1990	1991	1992
CATEGORY I	242	48	48	42	54	39	14
CATEGORY II except of foremen	636	127	96	145	67	46	15
CATEGORY II foremen	184	33	26	56	50	14	36
CATEGORY III	449	124	257	108	62	23	11
CATEGORY IV	285	259	228	197	116	38	24
CATEGORY V managers	8	2	-	5	-	1	-
CATEGORY V others	-	-	-	4	-	-	22