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**Competence Building and Education in Nuclear Field - Nuclear Culture**

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# **Competence Building and Education in Nuclear Field – Nuclear Culture**

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*“You love the work you know  
And you know the work you love”*

- Safety of Nuclear Power is a key behavior, and it is absolutely necessary for acceptance of Nuclear Power by society;
- INSAG shortly after Chernobyl accident developed Safety Culture principle;
- Safety Culture principle is the main in philosophy of Nuclear Power;
- No Safety Culture – no Nuclear Power. Violation from Safety Culture principle leads to significant problems

We often and a lot talk about Safety Culture,  
and

We often and a lot talk about knowledge and competence

How does Safety Culture interfere with competence?  
Could Safety Culture be reached without competence?

# Necessary Definitions

**Safety culture** - assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.

**Competence** - organizational and personal capability to solve definite class of professional tasks.

# Most Safety Problems Are Born by Human Being

The human mind is very effective in detecting and eliminating potential problems, and this has an important positive impact on safety. For these reasons, individuals carry heavy responsibility.

At the same time due to insufficient (inadequate) knowledge and training a human being was a root causes of many safety problems, including severe accidents (TMI, Chernobyl, Fukushima).

The organizations bearing responsibility for nuclear power safety must develop Safety Culture (Competence) so that to prevent human error and to benefit from the positive aspects of human action.

# Knowledge Is the Basis of Safety Culture

According to INSAG – 4

- Individual awareness of the importance of safety – no awareness without *knowledge*.
- **Knowledge** and competence, conferred by training and instruction of personnel and by their self-education.
- Commitment, requiring demonstration at senior management level of the high priority of safety and adoption by individuals of the common goal of safety – it is impossible without *knowledge*.
- Motivation, through leadership, the setting of objectives and systems of rewards and sanctions, and through individuals' self-generated attitudes - it is impossible without *knowledge*.
- Supervision, including audit and review practices, with readiness to respond to individuals' questioning attitudes - it is impossible without *knowledge*.
- Responsibility, through formal assignment and description of duties and their understanding by individuals - it is impossible without *knowledge*.

# Safety Culture Resources

Safety Culture has two general components:

- Corporate - framework within an organization which is the responsibility of the management hierarchy.
- Personal - attitude of staff at all levels in responding to and benefiting from the framework.

Resources are devoted to safety:

- Experienced staff, supplemented by consultants or contractors. Staffing policies ensure that competent individuals can advance through the key posts. Training of staff is vital and the necessary resources are devoted to it;
- Staff are provided for with well developed and verified procedures;
- Staff are provided for with appropriate equipment, facilities and supporting technical infrastructure.
- Staff are provided for with working environment promoting the effective performance of their duties.

# Competence - Role of Managers

The Managers are interested to have staff fully competent in their duties (*“if you want to sleep at night train your personnel during the day”*).

## **Manager must:**

- develop requirements to initial qualifications of personnel in terms of intellect, education and psychology;
- develop training and periodic retraining programs and provide the training;
- check permanently technical competence of the staff;
- check permanently the staff physical and psychological conditions and train the staff to perform their duties in unusual and unexpected condition;
- develop and provide the staff with procedures and necessary equipment.

Manager should instill more than technical skills or familiarity with detailed procedures to be followed. He should support knowledge transfer by broader training, sufficient to ensure that individuals understand the significance of their duties and the consequences of mistakes arising from misconceptions or lack of diligence.

**Safety culture is characterized by**

**A QUESTIONING ATTITUDE**

*plus*

**A RIGOROUS AND PRUDENT APPROACH**

*plus*

**COMMUNICATION**

# Questioning attitude

- Do I understand the task?
- What are my responsibilities?
- How do they relate to safety?
- Do I have the necessary knowledge to proceed?
- What are the responsibilities of others?
- Are there any unusual circumstances?
- Do I need any assistance?
- What can go wrong?
- What could be the consequences of failure or error?
- What should be done to prevent failures?
- What do I do if a fault occurs?

# Rigorous and prudent approach

- understanding the work procedures;
- complying with the procedures;
- being alert for the unexpected;
- stopping and thinking if a problem arises;
- seeking help if necessary;
- devoting attention to orderliness, timeliness and housekeeping;
- proceeding with deliberate care;
- forgoing shortcuts.

# Communications

- obtaining useful information from others;
- transmitting information to others;
- reporting on and documenting results of work, both routine and unusual;
- developing and suggesting new safety initiatives.

**Questioning attitude, Rigorous and Prudent  
Approach, and Communication  
are elements of  
Competence Building & Education**

## Pride or Confidence?

INSAG-4: *“A questioning attitude, a rigorous and prudent approach, and necessary communication are all aspects of an effective Safety Culture in individuals. The product contributes to a high level of safety and generates a personal **PRIDE** in dealing with important tasks in a professional manner”.*

But Pride lead to complacency. It is much better to talk about confidence to fulfill the personnel task in safely manner.

# Competence - Role of Managers

It is absolutely necessary to check individual attitudes, balance of Safety Culture and competence:

- Are procedures strictly followed even when quicker methods are available?
- Do staff members stop and think when facing an unforeseen situation?
- Is a good safety attitude respected by management and within peer groups of the staff?
- Do staff take the initiative in suggesting safety improvements?

# Competence - Role of Managers

- Does all critical training and retraining culminate in formal assessment and approval for duties? What is the success/failure record? What is the proportion of operating staffs time devoted to training?
- Is the quality of training programs assessed at corporate and plant management levels?
- Is there a periodic review of the applicability, correctness and results of training courses? Does this review take into account operating experience feedback?
- How frequently are production requirements permitted to interfere with scheduled training?
- Do staff understand the significance of the operating limits of the plant in their areas of responsibility?
- Are the staff educated in the safety consequences of the malfunction of plant items?

# Competence - Role of Managers

- Are staff trained in the special importance of following procedures? Are they regularly reminded? Are they trained in the safety basis of the procedures?
- Can training staff cite examples of operating errors that have resulted in modifications to a training program?
- For control room operators, do retraining sessions on simulators take into account the difficulties that staff have experienced and the questions that they have raised?
- For maintenance personnel, do training sessions make use of mock-ups and video recordings before maintenance activity is performed?
- Are training simulator modifications made as soon as the plant is modified?
- Do training programs address Safety Culture?