



A Proposal for More Effective Training in Countries Developing Nuclear Power

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Introduction

- Many countries are considering building nuclear plants for producing electrical energy and desalinating water.
- The use of nuclear power is growing, because it can safely produce high density base-load power.
- Nuclear power does not generate “greenhouse” gases, which could alter the world’s climate.
- This growth is occurring especially in Asia, but also in the Middle East and Mediterranean region.
- For these new plants to be operated safely and securely, more effective training and knowledge transfer must occur.
- The following presentation outlines how the use of senior nuclear experts can support the transfer of nuclear knowledge to the younger generation that will run the new nuclear plants.

Current Status and Impediments

Academic Training is Not Enough:

- Nuclear Engineering and Technology are applied Sciences.
- Engineers must work in industry to fully understand how it is practically implemented.

Impediments to Nuclear Knowledge Transfer:

- Loss of Government support for National Labs after the Three Mile Island and Chernobyl Accidents.
- Closure of research reactors and reduced budgets.
- Reduced sponsorship of college students and interns for the nuclear industry.
- Short-term focus on immediate business profits, without consideration for the long-term development of engineers.
- Forced (early) retirement of nuclear experts from international organizations, such as the IAEA).

Incentives for More Effective Knowledge Transfer

Cost of Training is nominal compared to the cost of nuclear facilities (fraction of a percent)

Avoiding Accidents and Incidents on a National and International Level:

- Catastrophic Chemical Explosions (Chernobyl, Ukraine SSR, 1986)
- Loss of Coolant Accidents and Core Meltdown (Three Mile Island, U.S., 1979)
- Nuclear Criticality Accidents (JCO, Japan, 1999)
- Radiation Over-Exposure Accidents (Goiania, Brazil, 1985)
- Nuclear Condenser Steam Line Explosions (Mihama, Japan, 2004)
- Accidents due to poor safeguards and process control – THORP dissolver leak, UK, 2005 and similar accidents in the U.S.

Enhanced Nuclear Training Focus

Enhanced Nuclear Training would Mitigate Accidents, with an emphasis on:

- Nuclear Facility Operation, Industrial Safety, Nuclear Safety, Security, Nuclear Safeguards, and Maintenance
- Proper Design of reactor containment
- Safe Operation and Design of nuclear reactors
- Nuclear Criticality Safety, in handling enriched uranium
- Process Control and Nuclear Safeguards, in nuclear material conversion, fuel fabrication, waste management, etc.
- Safe and secure handling and control of Radiation Sources for industrial, research, and medical applications
- Preventive Maintenance for nuclear facilities and power plants

An Approach for the Future

Our Proposed Approach for Enhancing Nuclear Training:

- Increasing Government support of National Labs, research reactors, and university nuclear programs.
- Supporting development and training for the allied Nuclear Industry – uranium exploration, mining, milling, conversion, processing, waste treatment, etc.
- Training for essential Oversight Functions – Industrial Safety, Nuclear Safety, Nuclear Safeguards, Security, & Maintenance.
- Using senior experts from industry, consultancies, and international organizations more extensively.
- Sponsoring college students and interns in the nuclear industry.
- Coordinating developments between countries having common cause.

Summary and Conclusions

Conclusions:

- Nuclear power is expanding again, especially in Asia and the Middle East.
- An entire new generation of nuclear engineers and scientists needs to be effectively trained, especially where nuclear plants are being built for the first time.
- The incentive for enhanced nuclear training is to avoid the previous mistakes and accidents in the nuclear industry.
- A nuclear related accident (anywhere) can have grave consequences for the worldwide nuclear industry.
- Enhanced nuclear training, using senior nuclear experts, can mitigate accidents, and ensure that new nuclear facilities are more safely and securely operated than in the past.
- This can be the case even in countries building their first nuclear power plant.

**Thank you very much for your
attention !!**