

# Discussion Paper on the Establishment of an Institute of Nuclear Power Operations

## Overview

The electric utility industry is developing plans for an Institute of Nuclear Power Operations (INPO), dedicated to ensuring the high quality of operation in nuclear power plants. Its purposes, in brief, are to establish industrywide benchmarks for excellence in nuclear operation and to conduct independent evaluations to assist utilities in meeting the benchmarks. It will determine educational and training requirements for operating personnel and will accredit training organizations.

Plans for the Institute are being developed under the leadership of Dr. Chauncey Starr, Vice Chairman of the Electric Power Research Institute (EPRI). Committees and advisory groups involved in the planning process are listed at the end of this paper.

## Philosophy of Operations

The philosophy of the Institute of Nuclear Power Operations is to:

- Promote a level of professionalism in nuclear power operations commensurate with the importance to the public of safe, reliable, and economically efficient operations.
- Involve plant operating staffs in development of benchmarks and training systems in the conduct of the operation evaluations.
- Use the best available techniques and methods to develop operating and training practices and the human factors aspects of design and operation.
- Utilize independent professional advice and counsel towards accomplishing the Institute objective.
- Support and improve existing practices and training systems, wherever possible, rather than supplant them.
- Help the utilities to help themselves rather than preempt their management responsibilities.
- Encourage excellence.

In carrying out this philosophy of operations, the Institute will:

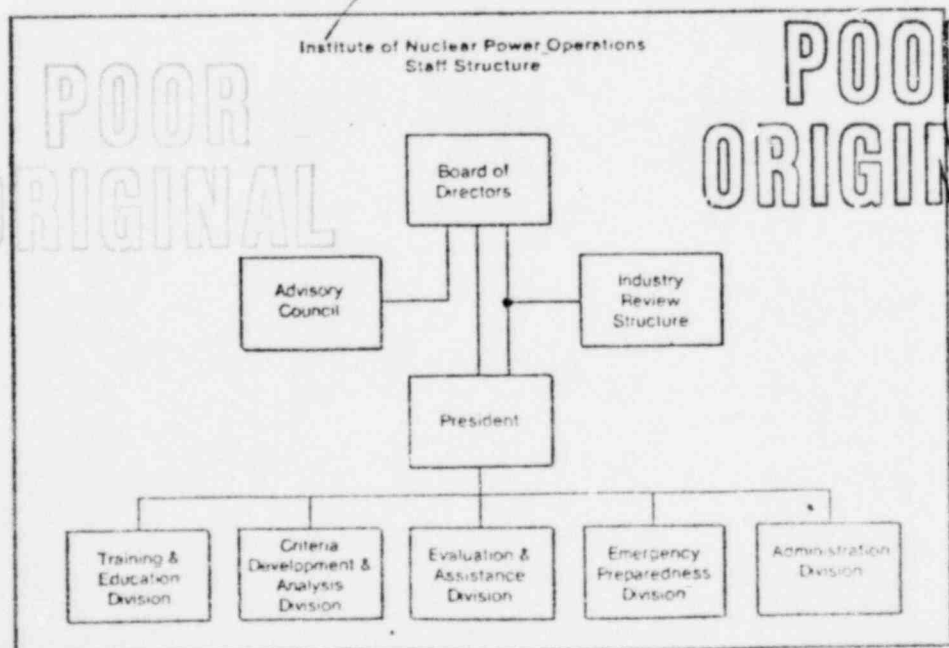
- Establish industrywide benchmarks for excellence in the management and operation of nuclear power plants.
- Conduct independent evaluations to determine that the benchmarks are being met.
- Review nuclear power operating experiences for analysis and feedback to the utilities. Incorporate lessons learned into training programs. Coordinate information reporting and analysis with other organizations.
- Establish educational and training requirements for operations and maintenance personnel and develop screening and performance measurement systems.
- Accredit training programs and certify instructors.
- Conduct seminars and generic training for various utility employees, including instructors, utility executives, and upper management, to ensure quality in the operation of nuclear power programs.
- Perform studies and analyses to support development of criteria, for operation, for training, and for

the human factors aspects of design and operation.

- Provide emergency preparedness coordination for the nuclear utility industry.
- Exchange information and experience with operators of nuclear power plants in other countries.

## Institute Organization

The Institute consists of a Board of Directors, an Advisory Council, an Industry Review Structure, a President, and five divisions. The Board of Directors will set Institute policies and direction and will be composed of a chairman and elected members from the member utilities. The Advisory Council will review Institute programs and provide advice to the Board of Directors; it will be composed of distinguished persons in areas related to the Institute's objectives and will include prominent educators, scientists, engineers, industrialists, and health specialists. The Industry Review Structure will perform review and direction functions assigned to it by the Board of Directors; it will be composed of industry persons experienced in areas related to the Institute's activities. Its organization will parallel that of the staff structure.



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The President will manage the Institute's operation, and will be chosen by the Board of Directors.

The functions of the Institute's divisions are described in the following sections.

### Training and Education Division

General functions of this Division will be to:

- Review curricula, lesson plans, and training materials. Existing approaches will be upgraded if needed.
- Accredit instruction systems for nuclear power operations technology. Certify instructors; assist in their training and the development of teaching skills, as necessary.
- Assist in utility planning to meet manpower needs.
- Conduct workshops, seminars, and training programs as needed.
- Periodically publish information of interest to nuclear power operations and training staffs.

Initial emphasis will be on identifying and making generally available the best of existing training materials and resources and on filling industry needs where no material or approaches yet exist.

The activities of the Training and Education Division will include the following areas:

#### Executive Program

- Management responsibility and philosophy on safety and reliability.
- Relations with regulatory and government agencies on public safety.
- Crisis management and communication with the public and the regulatory agencies.

#### Operations Program

- Upgrading of training and abilities of operators to handle off-normal events.
- Increasing the understanding of plant systems and operations by supervisors and engineering support staff.
- Developing training programs for supervisors.

### Technicians Program

- Development of training specifications and performance standards for skilled workers and for technicians involved in plant maintenance and operations support.

### Criteria Development and Analysis Division

The Division will develop benchmarks and guidelines for use in nuclear power operations, will identify training needs, and will develop and evaluate training techniques. The development process will include the following:

- Information on present practices, obtained from the Training and Education Division and the Evaluation and Assistance Division.
- Identification, monitoring, and evaluation of operations problems and collection of related information from Licensee Event Reports (LERs) and other information sources.
- Coordinate data basis and events evaluation with related work done by EPRI and other organizations.
- Studies and analyses, including human factors studies, sponsored studies in direct support of operations, and comparisons with practices in other countries.
- Review proposed guidelines with the Industry Review Structure.

The Division will provide liaison with architect-engineers and vendor organizations to ensure their participation in Institute activities. Information on related technical research needs, such as instrumentation development, will be sent to EPRI and other appropriate organizations.

To support criteria development, studies and analyses might be conducted in such areas as:

- Adequacy of training simulator models and techniques of simulator use. Development of performance measures and evaluation systems.
- Effectiveness of advanced instructional methods, such as computer-aided instruction and part-task simulators.

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- Psychological and physiological studies in areas such as shift rotation, attentiveness, and stress.
- Communications techniques and procedures.
- Control room alarm presentation, control concepts, and information processing and display.
- Methods for effective use of operating and casualty procedures.
- Detailed human factors analysis of generic operating problems.
- Stress response testing for screening and development.
- Organizational behavior and motivation.

### Evaluation and Assistance Division

The objective of this Division will be to identify and promulgate the best nuclear plant operating practices and to inform and assist utilities when adopting such practices might improve their operations. Evaluation teams will consist of from four to six members of the Institute staff, mostly members of this Division, who are experienced in plant operations management. Some team members may be from other INPO divisions, and the team may be assisted by staves of the member utilities. Evaluations will probably be annual and will be followed by consultation with and a report to the utility.

Evaluations will be plant oriented and will cover the following areas:

- Management and organization.
- Plant operating practices.
- Training and qualifications.
- Technological support.
- Maintenance practices and material condition.
- Human factors aspects of designs, arrangements, and practices.
- Radiological controls.
- Emergency preparedness.
- Procedures, documentation, and administration.
- In-house audit and quality assurance (QA) practices.

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About six evaluation teams will be required for industrywide coverage. Staves of the Training and Education Division, and Criteria Development and Analysis Division will regularly participate in operations evaluations to ensure their continuing close familiarity with operating conditions and practices.

Institute evaluations will include reviews of existing utility audits. Encouraging self audits will be an aim of the Institute. Problems in determining the effectiveness and adaptability of various practices will be referred to the Criteria Development and Analysis Division for study. The Institute staff will need to work closely with other organizations, such as NRC and insurance companies, interested in the review process.

## Emergency Preparedness Division

This Division will establish and maintain a manpower listing of experts in various fields who could be available to a utility experiencing an emergency. The listing will include the individual's qualifications and abilities. Listed personnel could be divided into regional emergency technical support teams.

The Division will also maintain an inventory of emergency equipment, where it is located, and whom to contact concerning availability. This inventory will include equipment in vendors' shops, plants under construction, plants in operation, national laboratories, and federal agencies. The INPO's services will be available to all plants at all times.

## Financial Analysis

### Institute Staffing Requirements

Evaluation and Assistance Division:

Average estimated time per evaluation is one week per participation unit, requiring 218 team-weeks per year for annual industry-wide evaluations. Resulting minimal staff is 4.5 teams for an ideal schedule. Assume the Division has 6 teams of 5 members each, requiring 30 team members. Assume 20 Division staff for management, for

direct support, and for assistance functions in areas indicated by the evaluations.

Total Division staff: 50

Other Divisions:

Estimates of the staff sizes of the other Divisions are as follows:

Training and Education	40
Criteria Development and Analysis	40
Emergency Preparedness	15
Administration	50
Presidents Office	5

If a significant amount of the work of the Criteria Development and Analysis Division is contracted outside INPO, the staff size might be smaller, but total INPO expenditures would not be changed greatly.

Total Institute staff: 200

### Annual Institute Operating Costs

Based on EPRI ratios of staff salaries to benefits, travel, professional and computer services, printing, rents, utilities, and phones, total operating costs of about twice the total salaries are indicated. The average of INPO staff salaries, professional and support, is projected at \$27,500; the figure will depend on site location.

At \$55,000 per staff member, annual operating costs would be \$11 million. For the first year, an initially smaller staff will compensate for capital expenditures and startup expenses.

## Related Committees and Advisory Groups

The following committees and advisory groups are involved in the development of plans for the Institute.

### TMI Ad Hoc Nuclear Oversight Committee

(Top-level industry committee)

**Floyd Lewis, Chairman**  
Middle South Utilities, Inc.

**Thomas Ayers**  
Commonwealth Edison Co.

**Lee Everett**  
Philadelphia Electric Co.

**William Lee**  
Duke Power Co.

**Frank Linder**  
Dairyland Power Cooperative

**Jack Pfister**  
Salt River Project

**John Selby**  
Consumers Power Co.

**Frank Warren**  
Portland General Electric Co.

**INPO Steering Committee**  
(Overseeing establishment of INPO; reports to Oversight Committee)

**William Lee, Chairman**  
Duke Power Co.

**Jack Pfister, Vice Chairman**  
Salt River Project

**Howard Braun**  
Pacific Gas and Electric Co.

**Sol Burstein**  
Wisconsin Electric Power Co.

**Richard Eckert**  
Public Service Electric and Gas Co.

**Bryon Lee, Jr.**  
Commonwealth Edison Co.

**Frank Staszsky**  
Boston Edison Co.

**James Taylor**  
Dairyland Power Cooperative

**AIF Policy Committee on Follow-up to TMI Accident**  
(Recommended establishment of INPO; reports to Oversight Committee)

**Bryon Lee, Jr., Chairman**  
Commonwealth Edison Co.

**Robert A. Szalay, Secretary**  
Atomic Industrial Forum

**Shepard Bartnoff**  
Jersey Central Power & Light Co.

**Vincent S. Boyer**  
Philadelphia Electric Co.

**A. Phillip Bray**  
General Electric Co.

**Robert Cockrell**  
Washington Public Power System

**Joseph R. Dietrich**  
Combustion Engineering, Inc.

**Roy H. Dunham**  
Tennessee Valley Authority

**Richard M. Eckert**  
Public Service Electric and Gas Co.

**Walt Fee**

Northeast Utilities

**D. Clark Gibbs**

Middle South Services, Inc.

**John W. Gore, Jr.**

Baltimore Gas and Electric Co.

**Steve Howell**

Consumers Power Co.

**William J. L. Kennedy**

Stone & Webster Engineering Co.

**Leonard J. Koch**

Illinois Power Co.

**William Lindblad**

Portland General Electric Co.

**John H. MacMillan**

Babcock & Wilcox Co.

**Warren H. Owen**

Duke Power Co.

**Romano Salvatori**

Westinghouse Electric Corp.

**Charles W. Sandford**

Bechtel Power Corp.

**James R. Stoudt**

Gilbert/Commonwealth Companies

**Ruble A. Thomas**

Southern Company Services, Inc.

**Donald E. Vandenburg**

Yankee Atomic Electric Co.

**William Wallace, III**

Ebasco Services Inc.

**John Ward**

Sargent & Lundy, Inc.

*INPO Establishment Advisory Group*

To advise on the functions and organization of INPO, Dr. Starr has assembled a group of experienced people from various activities with strong national safety programs or who have participated in major educational activities related to safety.

**Dr. S. A. Bernsen and Frank M. Staszkesky, Jr.**

Bechtel Power Corp.

**Dr. Joseph J. Bulmer**

President, Hudson Valley Junior College

(formerly in charge of the Naval Nuclear Power School at the Knolls Atomic Power Laboratory)

**Leo Duffey**

EG&G Idaho, Inc.

(formerly with Bettis Atomic Power Laboratory)

**Jerome Lederer**

Retired (formerly, Director of Safety, NASA, and head of the Flight Safety Foundation.)

**Dr. Miles Leverett**

Retired (formerly with General Electric Co.)

**Dr. Russell O'Neill**

Dean, School of Engineering and Applied Science, University of California at Los Angeles

**Walter Rapp**

Pacific Gas and Electric Co.

**Fred P. Riley**

Southern California Edison Co.

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