

# Review

A bimonthly publication of the Institute of Nuclear Power Operations

MAY/JUNE 1997

## IN THIS ISSUE

WANO Biennial General Meeting

Educational assistance update

New human performance course

INPO's internal self-assessment

## New, improved Nuclear Network to make its debut

**I**NPO will unveil a new version of Nuclear Network® July 1 designed to make it easier for users to access and exchange information with their nuclear peers. The enhanced Network provides new capabilities such as improved search functions and the ability to transmit color graphic files.

A colorful screen, along with a new circular logo for the computerized messaging system, greets users when they visit Network. From here, users can select several categories:

- **Technical Exchange Information** – Plants and nuclear organizations worldwide can use the subject categories to post public questions and answers regarding plant operating experience. The improved Network offers 25 groups comprising 75 new information categories compared to 38 that were available on the earlier version. "We took a 'fresh sheet of paper' approach in developing the new topics," says Johnny Wright, Network section manager. "The Network ad-hoc users group, which consisted of U.S. utility and international personnel, met at INPO in October 1996 to determine the new set of categories." The ad-hoc group considered current topics, and current and future industry needs for operating experience information exchange in developing its recommendation.
- **Plant Event Reports** – This section features Significant Event Evaluation and Information Network reports issued by INPO, including Significant Operating Experience Reports, Significant Event Reports and Significant Event Notifications. It also features Operating Experience

Reports issued by member utilities.

- **Daily Plant Status Reports** – Users can find highlights of the most recent Nuclear Regulatory Commission's Daily Plant Status Reports, including scrams, plant events, preliminary notifications and unusual occurrences.
- **Download New Messages** – Users can download new unread messages with the click of a button. The user can then use a macro or manually cut and paste selected messages and forward them to the appropriate individuals at the organization.
- **Private E-mail** – Users can access this feature to send a private message to another Network user. This feature also enables users to send a private message to any organization connected to Network.
- **Using Nuclear Network** – This feature provides tips and techniques on how to use Network and offers on-line help and a users' manual. Responsibilities of the Network coordinator are also included in this feature.

In addition, a What's New feature explains any new additions to Network, upcoming Network meetings and any recently issued SEE-IN document or message of importance. The Emergency Hotline will be activated if there is an actual site or area emergency.

*Continued on page 3*



*An improved version of Nuclear Network® is now available for INPO members to use. It takes advantage of Internet technology, is user friendly and provides new capabilities such as improved search functions and the ability to transmit color graphic files.*

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**Nuclear Network users can click on any of these categories, and additional categories will be displayed for their selection:**

- |                          |                                 |
|--------------------------|---------------------------------|
| • Chemistry              | • Operations                    |
| • Coordination with INPO | • Operating experience programs |
| • Computer technology    | • Plant event reports           |
| • NRC daily plant status | • Planning and scheduling       |
| • Emergency preparedness | • Procurement                   |

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| • Engineering processes         | • Radiation protection          |
| • Equipment performance         | • Radioactive waste             |
| • Fire protection               | • Records management            |
| • Human performance             | • Regulatory reports            |
| • Industrial safety and medical | • Security                      |
| • Licensing/Nuclear safety      | • Self-assessment               |
| • Maintenance processes         | • Training                      |
| • Meeting information           |                                 |



## WANO leadership changes in Prague

*"It is my vision that INPO should be the premier nuclear safety organization in the United States and that WANO should be the premier nuclear safety organization worldwide."*

*- Zack Pate*

In his acceptance speech as the new chairman of the World Association of Nuclear Operators, INPO President and CEO Zack Pate told the participants at WANO's fifth Biennial General Meeting, "It is my vision that INPO should be the premier nuclear safety organization in the United States and that WANO should be the premier nuclear safety organization worldwide." At the meeting in Prague May 11-13, Pate succeeded Remy Carle as WANO chairman, and Allan Kupcis, president and chief executive officer of Ontario Hydro, succeeded Erik Pozdyshev, president of Russia's Rosenergoatom, as WANO president.

Pate told the more than 270 participants that, as chairman, he plans to listen carefully to the WANO membership and fellow governors, and recognize and respect the wide cultural differences among WANO members. He will encourage all regions to devote the necessary resources to WANO, seek to continue improvements in all WANO programs and seek to keep WANO focused on its nuclear safety mission. Pate emphasized that he does not plan to change the relationship between WANO and INPO in any significant way.

WANO's new president, Allan Kupcis, expressed optimism about nuclear power's future and discussed how Ontario Hydro uses WANO programs to improve. He cautioned delegates against the dangers of isolation from the rest of the nuclear industry. Ontario Hydro has had some difficulties, he said, because "we became insular in our thinking, almost as if we couldn't learn from others. What I have discovered in my association with WANO is that such thinking is wrong-headed. Others have much to teach us ... and I daresay each of you has much to learn as well."

### New members

The WANO membership also welcomed six new members in Prague:

- Aktau NPP, Kazakhstan
- Magnox Electric PLC, United Kingdom

- The Power Reactor and Nuclear Fuel Development Corporation (PNC), Japan
  - Nuclear Electric Ltd., United Kingdom
  - Energoatom, Ukraine
  - Phenix, France
- WANO now has 148 members from 33 countries.

Delegates also learned about the progress they and their staffs have made in nuclear plant operation in the two years since the previous biennial meeting in Paris. Outgoing chairman Carle updated the group on WANO's activities. He urged plants to increase the effectiveness of event reporting and the number of peer reviews, and to make greater efforts to communicate within the organization and externally.

"All over the world the safety and reliability of plants have improved," Carle said. "Behind this progress lies a decisive improvement of safety culture, to which WANO has contributed, but which remains threatened wherever the financial situation is precarious."

Wes Taylor explored the importance of operating experience and the need to share information worldwide, while recounting success stories of the nuclear industry's international operating experience program. "As members of the nuclear industry, we have great interest in the various events that happen at nuclear plants around the world," said Taylor, president, Generation Division, TU Electric.

Taylor also reminded delegates to consider events that did not happen. For example, in June 1994, Japan's Fukushima Daini Nuclear Power Station did not sustain a reactor internal jet pump failure. The station encountered reactor water-level fluctuations similar to ones reported at Grand Gulf Nuclear Station in 1994. Personnel at Fukushima Daini used their knowledge of Grand Gulf's operating experience to find the problem and make repairs at the Japanese plant.

One key aspect of WANO, as discussed by William Cavanaugh III, president and chief executive officer

of Carolina Power & Light Company, continues to be the voluntary peer review program. CP&L's Brunswick Steam Electric Plant just finished a WANO voluntary peer review, and Cavanaugh complimented the peer review team for its thoroughness, expertise and professionalism. Some areas for improvement noted by the team, he said, "would not have been identified if it weren't for the broad international make-up of the peer review team."

Delegates were also reminded to continue to report events and learn from the operating experience of others. W. George Hairston III, president and chief executive officer, Southern Nuclear Operating Company, gave several examples of how Southern Nuclear effectively uses operating experience. "As a worldwide nuclear industry, we have accumulated more than 8,000 reactor years of experience," Hairston said. "But we can't learn from each other if we don't report events. And we can't improve unless we act on those events once they are reported. How well we do this will determine - in great measure - our ability to improve in the future."

The advantages of twinning were also explored at the meeting. Susquehanna Steam Electric Station in the United States and Kursk nuclear plant in Russia have had four sets of exchange visits since 1990. "The exchanges are invaluable for personnel development," remarked William Hecht, chairman, president and chief executive officer of Pennsylvania Power & Light Company. "It is very important that the future leaders of our industry have not only a technical understanding of our business, but also a deeper understanding of cultural similarities and differences that shape the decision-making process .... Already, we are seeing important advances in technical areas such as annealing reactor pressure vessel and the welding of small diameter tubes."

New governors joining the WANO-Atlanta Center board at the meeting were James F. Hankinson, president and chief executive officer, New Brunswick Power (Canada);

Andre Caille, president-director general, Hydro-Quebec (Canada); Francisco Torres, general manager, Comision Federal de Electricidad (Mexico); Ion Rotaru, commissioning and operation director, Nuclear Power Group, Romanian Electricity Authority (Romania); W. George Hairston III, president and chief executive officer, Southern Nuclear Operating Company (USA); and Fred M. Petersen, president and



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The next biennial general meeting, which will mark the 10th anniversary of the founding of WANO, will be held in May 1999 in Victoria, British Columbia, Canada. ■



*Delegates at the WANO Biennial General Meeting heard speakers address a range of nuclear-related topics, including WANO's voluntary peer review program. Here, a multinational team of nuclear experts prepares for a peer review visit to Brunswick Steam Electric Plant.*

## Program awards more than \$15 million to tomorrow's work force

**M**aking a difference in the life of a student can provide security for the future of the nuclear industry. This is one purpose of the National Academy for Nuclear Training's Educational Assistance Program. The program seeks to encourage students to study disciplines that prepare them for future nuclear power industry employment.

Since the program's inception in 1980, the National Academy has provided more than \$15 million in scholarships and fellowships to more than 2,800 engineering students at colleges and universities throughout the United States. Nuclear utilities, as well as INPO supplier participants, make it possible each year for approximately 200 undergraduate students majoring in nuclear engineering, health physics, and power-generation-related mechanical, electrical and chemical engineering fields to receive \$2,500 scholarships.

"The scholarship money made it easier for me to concentrate on studying," says David Lantz Jr., operating supervisor, Training Department, at Union Electric's Callaway Nuclear Plant. "Discovering the program enabled me to learn more about the industry in general." Lantz spent six years in the Navy before receiving his bachelor of science degree in electrical engineering from Southern Illinois University.

Annually, graduate fellowships in nuclear engineering or power-generation health physics are awarded directly to U.S. colleges and universities following a rigorous selection process. Students at the fifth year or master's level are then selected by the schools, subject to concurrence of the National Academy.

"The graduate fellowship carries such recognition industrywide, I believe it was instrumental in helping me get this job," says Emma York in safety services and industrial hygiene at Duke Power's McGuire Nuclear Station. "I feel very

fortunate to have received it because it has allowed me to work in the nuclear arena, broadening both my radiological protection background and industrial hygiene knowledge." York earned her undergraduate degree in health physics and industrial hygiene at Purdue University and her graduate degree in health physics at the University of North Carolina at Chapel Hill.

Every November, students may obtain scholarship application materials at their accredited, four-year institution or request applications from the National Academy. Applications may be initiated by the student or academic institution, but all must be endorsed and submitted by the institution's designated faculty representative or dean.

Students nationwide are then ranked and chosen for scholarship awards.

The Educational Assistance Program is part of a nationwide effort to encourage students to consider careers in the nuclear power industry. Students who demonstrate outstanding academic achievement and are interested in pursuing careers in the U.S. nuclear power industry are likely candidates for National Academy scholarships and fellowships. ■

For more information, contact Ann D. Winters, manager, Educational Assistance Program, (770) 644-8595, [wintersad@inpo.org](mailto:wintersad@inpo.org).



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Nuclear Network®, a computerized messaging system, is one of several ways the nuclear utility industry exchanges technical information. The system was created in response to the Kemeny Commission's 1979 recommendation to establish "an industrywide international communications network to facilitate the speedy flow of information."

### Nuclear Network

continued from page 1

Information will be updated throughout the emergency with the latest information supplied by the affected utility.

Coordinators Corner features a "coordinator of the month" as well as Network success stories that can provide useful information to members. In addition, the mailing address, phone number and secure e-mail address of all Network coordinators are provided.

All Network messages are also searchable with an internal search engine.

Network is accessible through INPO's new, secure Web site ([www.inpo.org](http://www.inpo.org)). Users need at least

a 486 personal computer with 16 megabytes of RAM. A 14.4 dial-up modem is the minimum speed a user should use. Encryption software must be loaded on the user's personal computer or on the utility's LAN server for access to Network. Microsoft's Internet Explorer 3.0+ or Netscape 3.0+ is required.

Regional training sessions on the new version of Network have been conducted at selected utilities. ■

For more information, contact Johnny Wright, (770) 644-8664, [wrightj@inpo.org](mailto:wrightj@inpo.org).

## New documents distributed to member utilities

**T**he 1996 Annual Report for the World Association of Nuclear Operators-Atlanta Center illustrates the Atlanta Center's progress and focus areas in 1996. Sections report on voluntary peer reviews, operating experience exchange, operator-to-operator exchanges, WANO performance indicators and the sharing of good practices.

The preliminary *Inspection and Test Process Description* (AP-910) provides a description of the process

(nuclear vice president up to and including the board of directors); nuclear management capability; operating philosophy and strategy exist and are applied; learning organization (self-evaluation and corrective action effectiveness); staff capability; and implementation (results).

*Guidelines for the Management of Planned Outages at Nuclear Power Stations* (INPO 97-005) describes key program elements for the management of planned outages at nuclear power

stations. Implementation of the guidelines should result in improved outage management and, therefore, contribute to safe and reliable plant operation.

*Guidelines for Shift Manager Selection, Training and Qualification, and Professional Development* (ACAD 97-004) was developed from a job and task





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Higinio Garcia of Mexico's Laguna Verde Nuclear Power Plant works with the new version of Nuclear Network®.

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The preliminary *Inspection and Test Process Description* (AP-910) provides a description of the process for managing inspection and testing activities during project delivery in a way that emphasizes standardization. INPO facilitated and coordinated the development of this inspection and test process with industry representatives to support building block seven goals of the industry's Strategic Plan for Building New Nuclear Power Plants.

The preliminary *Safety Focus During Changing Times, Recognizing Indications of Declining Plant Performance* (INPO 97-003) provides practical suggestions to assist in recognizing indications of declining plant performance. It is built on the major areas for self-assessing nuclear station operations at a utility. The document outlines six areas important in detecting declining performance: corporate governance, oversight and support

(nuclear vice president up to and including the board of directors); nuclear management capability; operating philosophy and strategy exist and are applied; learning organization (self-evaluation and corrective action effectiveness); staff capability; and implementation (results).

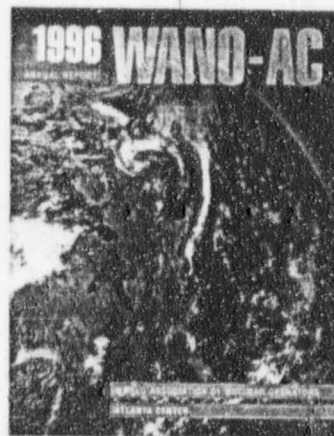
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*Guidelines for Shift Manager Selection, Training and Qualification, and Professional Development* (ACAD 97-004) was developed from a job and task analysis of the duties

of the shift manager that are beyond the responsibilities of senior reactor operators. Additionally, changes reflected in this revision to the guideline are the result of industry experience since the initial job and task analysis and publication of the guideline.

These documents are distributed to each member and participant administrative point of contact. They may also be requested from the INPO document request line, (770) 644-8513, [documentrequest@inpo.org](mailto:documentrequest@inpo.org). ■



## Engineering Supervisor Professional Development Seminar graduates



Graduates of the 11th Engineering Supervisor Professional Development Seminar are, from left (standing), **Russel A. Radke**, mechanical components lead, Dresden Station; **James W. Schubert**, electric and controls systems supervisor, Salem Generating Station; **David S. Hollabough**, performance/ISI supervising engineering, Calloway Nuclear Plant; **Karen M. Head**, nuclear engineering design supervisor, Arkansas Nuclear One; **Charles V. McFeaters**, system engineering supervisor, Beaver Valley Power Station; **Chester S. Sullivan**, principal engineer, Duane Arnold Energy Center; **Steve W. Wainio**, supervisor, Millstone Nuclear Power Station 2; **Robin R. Frederickson**, technical services supervisor, Monticello Nuclear Generating Plant; **Paul J. Davison**, electrical/I&C systems manager, Peach Bottom Atomic Power Station; (seated) **John W. Boyle**, power generation engineering manager, McGuire Nuclear Station; **Michael C. Brickey**, electrical/I&C engineering manager, Watts Bar Nuclear Plant; and **Asa Carlza Hermansson**, chemistry department liaison engineer (Sweden), Institute of Nuclear Power Operations.

## Upcoming working meetings

Working meetings focus on specific operational issues and are small-group forums for sharing information among nuclear personnel with similar concerns. These meetings are held at INPO headquarters.

### Engineering support working meetings

July 8-9	Main generator and support systems
July 22-23	Reactor engineering (PWR)
August 5-6	Control rod drive system and controls (BWR)
August 26-27	Main turbine and electrohydraulic control system
September 23-24	System engineering managers

### Equipment performance working meetings

July 23-24	Safety and relief valves
September 17	Probabilistic safety assessment
September 25-26	Feedwater controls

### Maintenance managers working meeting

## Priory, Abdoo elected to INPO Board of Directors



Richard Priory

**R**ichard B. Priory, president and chief operating officer of Duke Power Company, and Richard A. Abdoo, chairman, president and chief executive officer of Wisconsin Energy Corp., the parent company of Wisconsin Electric Power Company, have been elected to serve on INPO's Board of Directors. Priory will begin to serve on the Board in July, and Abdoo in September.

Priory's utility, Duke Power Company, operates three nuclear power plants—Catawba, McGuire and Oconee. In his position, Priory is responsible for the generation and delivery of electric service to the company's 1.8 million electric customers. He joined Duke Power as a design engineer in 1976 and was elected to its Board of Directors in 1990.



Richard Abdoo

Priory has served on the National Nuclear Accrediting Board since 1994 and is also a member of the National Academy of Engineering and the Association of Edison Illuminating Companies Power Generation Committee.

Abdoo's company, Wisconsin Electric, operates the Point Beach Nuclear Plant. Abdoo joined the company in 1975 as director of corporate planning. He serves on the board of Nuclear Electric Insurance Limited and is a member of the American Economic Association.

Abdoo is also a registered professional engineer in Wisconsin, Michigan, Ohio and the Commonwealth of Pennsylvania. ■

## INPO's videoconferencing system available for member use

**R**emember to take advantage of INPO's videoconferencing system. INPO's PictureTel 4000 is capable of 112K and 336K transmissions. Implemented in February 1995, this system has been used primarily for training and accreditation exit meetings.

"We average about three videoconferencing meetings each month and welcome our members and participants to try this alternative method of communication," says INPO's Ruth Todd, manager, Computer Systems and Telecommunications Department.

About 75 percent of the U.S. nuclear industry has some videoconferencing capability. An advantage is that it enables speakers

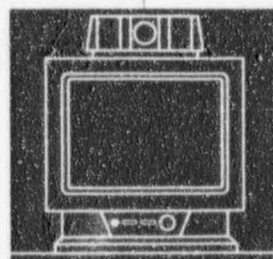
Wyatt. "It also saves time and the wear and tear of traveling."

Indian Point 3 Nuclear Power Plant Training Manager Dale Sperry also attended the MANTG videoconference. He says, "We were able to have more people participate, which provided more perspective and information. This also allowed us to cover

timely topics in a very efficient manner."

Vince Cwietniewicz, MANTG chairman and director of training at Peach Bottom Atomic Power Station, says, "I didn't want videoconferencing to replace somebody from INPO visiting us. But it was coordinated

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July 23-24	Safety and relief valves
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### Maintenance managers working meeting

August 19-20	Maintenance issues
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### Outage and work process working meetings

July 21-22	Work management
July 24-25	Work management
August 25-26	Outage management (BWR)
August 28-29	Outage management (PWR)

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About 75 percent of the U.S. nuclear industry has some videoconferencing capability. An advantage is that it enables speakers to be seen and heard via a television anywhere that cable can reach or a satellite can beam to.

Mike Wyatt, Operations Training Department at INPO, regularly uses videoconferencing for accreditation exit meetings. His February participation in the Mid-Atlantic Nuclear Training Group meeting was via satellite as well.

"Videoconferencing gives employees an opportunity to do a lot more and gets more people involved," says

Wyatt. "It also saves time and the wear and tear of traveling."

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nated very well, and we were able to cover five or six topics since more people were involved. I see a lot of future potential for this venue."

Videoconferencing provides numerous benefits to the industry and INPO, according to Todd. "It allows us to reduce overall travel expenses and conserve time and resources," she says. "Videoconferencing also enhances communication and gives us better control of our schedules." ■

For more information, contact Ruth Todd, (770) 644-8793, [rtodd@inpo.org](mailto:rtodd@inpo.org).



# Anatomy of an Event



## New course focuses on human performance

**T**hese days when Keith Gordon works in the control room at Grand Gulf Nuclear Station, he knows that all human beings, himself included, are fallible and make errors.

"As an industry, we need to acknowledge these more than we do," says the senior reactor operator shift plant supervisor. Gordon attributes his increased awareness of human error to his recent participation in the National Academy for Nuclear Training's new Human Performance Fundamentals Course.

"What I especially liked about the course was its emphasis on alleviating the precursors or stumbling blocks that lead to error," he continues. "If we eliminate the stumbling blocks, the errors that still do occur may be so small that an event won't result from it."

The National Academy's three-day Human Performance Fundamentals course aims to help nuclear employees prevent plant events caused by human error by applying human performance tools and fundamental principles to both the job site and the organization. Braidwood, Grand Gulf and Diablo Canyon nuclear plants served as pilot sites for the course in 1996, and Comanche Peak piloted the course in early 1997.

INPO's Tony Muschara, Training Activities, designed the course along with Organization & Administration's Tom Reeder. Muschara says the course introduces participants to a practical way of thinking about events caused by human error. "The course explores the issues of individual, leadership and organizational behaviors that can lead

**Error-likely situation**  
A work situation with conditions that reduce the opportunity for success related to:

- a particular individual
- performing a specific task
- in a given work environment

plant's functional areas and employees from various levels of the organization to facilitate communication," Reeder says. "We want to create a heightened awareness of human performance throughout all levels of the organization."

### Anatomy of an event

Much of the course addresses "the anatomy of an event," adapted from the book *Human Error* by psychologist James Reason. The anatomy of an event explores a situation from several perspectives: the consequences of the event, an initiating action, error precursors, flawed defenses and latent organizational weaknesses that are the fundamental causes of most plant events.

"We focus mostly on how people make errors and on the role of leaders and the organization as a whole in contributing to and preventing error," Muschara says. "The influence of management and the entire plant organization is often overlooked as a cause and solution to human error."

The course stresses proactive efforts to prevent human error in addition to the plant's root-cause analysis efforts. "We believe the conditions for human error are predictable, manageable and

## Shift Supervisor Professional Development Seminar graduates



Graduates of the 51st Shift Supervisor Professional Development Seminar are, from left (standing), Frederick E. Owens, Oconee Nuclear Station; Richard T. Fowler, Duane Arnold Energy Center; Thomas F. McElhinney, Pilgrim Nuclear Power Station; Lawrence M. Speight, Palo Verde Nuclear Generating Station; David Pietruski, Oyster Creek Nuclear Generating Station; Terry H. Holcombe, Grand Gulf Nuclear Station; Steven A. Hielt, Diablo Canyon Power Plant; Joe M. Iddings, McGuire Nuclear Station; Koichi Suzuki, visitor from BWR Training Center in Japan; Charles L. Behrend, Peach Bottom Atomic Power Station; Douglas J. Gomez, R. E. Ginna Nuclear Power Plant; (seated) Craig A. Gillig, Davis-Besse Nuclear Power Station; Raymond W. Waldo, seminar mentor, San Onofre Nuclear Generating Station; and Brian R. Hamilton, Salem Generating Station.



Graduates of the 52nd Shift Supervisor Professional Development Seminar are, from left (standing), Al P. Campagnolo, Pickering B (Canada); Larry W. Kilby, Arkansas Nuclear One; Thomas L. Grable, Sequoyah Nuclear Plant; John R. "Woody" Goodell, Fort Calhoun Station; William B. Gross, Surry Power Station; David Halbur, Maine Yankee Atomic Power Plant; Stuart W. Brantley, Three Mile Island Nuclear Station; Ted A. Sullivan, seminar mentor, Pilgrim Nuclear Power Station; Brian J. Stamp, Turkey Point Nuclear Power Plant; (seated) Herb D. Rodkey, WNP-2; Tom E. Tynan, Vogtle Electric Generating Plant; and Jeffrey L. Stogger, Kewaunee Nuclear Power Plant.

situations you may find yourself in. The course provided tools that help me focus on what occurs before the error takes place rather than focusing on the error after the fact."

Another strength of the course, according to Jim Gallman, performance

courses at their sites based on the National Academy course. "At Comanche Peak," explains Gallman, "we want to improve the focus employees place on smaller jobs that require a lot of attention and detail."

visor. Gordon attributes his increased awareness of human error to his recent participation in the National Academy for Nuclear Training's new Human Performance Fundamentals Course.

"What I especially liked about the course was its emphasis on alleviating the precursors or stumbling blocks that lead to error," he continues. "If we eliminate the stumbling blocks, the errors that still do occur may be so small that an event won't result from it."

The National Academy's three-day Human Performance Fundamentals course aims to help nuclear employees prevent plant events caused by human error by applying human performance tools and fundamental principles to both the job site and the organization. Braidwood, Grand Gulf and Diablo Canyon nuclear plants served as pilot sites for the course in 1996, and Comanche Peak piloted the course in early 1997.

INPO's Tony Muschara, Training Activities, designed the course along with Organization & Administration's Tom Reeder. Muschara says the course introduces participants to a practical way of thinking about events caused by human error. "The course explores the bases of individual, leadership and organizational behaviors that can lead to or prevent error," says Muschara. "A variety of conditions, including inappropriate individual behavior, insufficient management and leadership practices, and organizational weaknesses, influence human error. We examine all of these conditions during the course."

The on-site fundamentals course has 16 to 20 course participants, including managers, supervisors and front-line workers, representing various plant functional areas. "The audience should comprise a diagonal slice across a

plant's functional areas and employees from various levels of the organization to facilitate communication," Reeder says. "We want to create a heightened awareness of human performance throughout all levels of the organization."

#### Anatomy of an event

Much of the course addresses "the anatomy of an event," adapted from the book *Human Error* by psychologist James Reason. The anatomy of an event explores a situation from several perspectives: the consequences of the event, an initiating action, error precursors, flawed defenses and latent organizational weaknesses that are the fundamental causes of most plant events.

"We focus mostly on how people make errors and on the role of leaders and the organization as a whole in contributing to and preventing error," Muschara says. "The influence of management and the entire plant organization is often overlooked as a cause and solution to human error."

The course stresses proactive efforts to prevent human error in addition to the plant's root-cause analysis efforts. "We believe the conditions for human error are predictable, manageable and preventable," Muschara says. "We therefore encourage individuals to look for factors that provoke human error before these factors bite them in the back."

Course participants find this to be a proactive approach. Says Jerry Roberts, manager of special projects, Grand Gulf Nuclear Station, "The course moves the human performance process forward, beyond the more traditional 'stop, think, act, review' approach the industry has been using. There are many ways to prevent error-likely



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situations you may find yourself in. The course provided tools that help me focus on what occurs before the error takes place rather than focusing on the error after the fact."

Another strength of the course, according to Jim Gallman, performance analysis supervisor, Comanche Peak Steam Electric Station, is a list that identifies common error precursors according to task demands, individual capabilities, work environment and human nature. "Our supervisors can look at this list and find situations or attitudes that could put them in an error-likely environment," Gallman says. "The more they're aware of these precursors, the more they can head off preventable events."

Both Roberts and Gallman are involved in offering plant-specific

courses at their sites based on the National Academy course. "At Comanche Peak," explains Gallman, "we want to improve the focus employees place on smaller jobs that require a lot of attention and detail."

#### The course's beginning

The Human Performance Fundamentals Course builds upon and supports the 1995 document *Excellence in Human Performance* (preliminary), a final version of which will be issued this year. The course has its roots in the 1994 report "Recommendations for Human Performance Improvements in the U.S. Nuclear Industry."

Developed by an industrywide Human Performance Initiative Special Review Committee, this report urges

*Continued on page 6*



## Senior Nuclear Plant Management Course graduates



Graduates of the 42nd Senior Nuclear Plant Management Course are, from left (standing), Stephen H. Chesnut, manager, operations, Vogtle Electric Generating Plant; Joseph E. Venable, manager, operations, Grand Gulf Nuclear Station; David M. Smith, director, operations, Palo Verde Nuclear Generating Station; Steven P. Smith, technical assistant to the plant manager, Maine Yankee Atomic Power Plant; Ionel Bucur, deputy station manager, RENEL-Filiala Centrala Nucleoelectrica, Cernavoda (Romania); William T. O'Connor Jr., nuclear assessment manager, Fermi 2; Thomas D. Curtis, superintendent of operations, Oconee Nuclear Station; William M. Dowdy Jr., plant operations department manager, South Texas Project Electric Generating Station; Robert G. Anderson, manager, outage and support, Duane Arnold Energy Center; Clair S. Goddard, nuclear services group manager, Pilgrim Nuclear Power Station; (seated) Eugene S. Grecheck, assistant station manager, operations and maintenance, North Anna Power Station; and John Earp, organization and administration department liaison engineer (United Kingdom), Institute of Nuclear Power Operations.

## Maintenance Supervisor Professional Development Seminar graduates



Graduates of the 21st Maintenance Supervisor Professional Development Seminar are, from left

## Accreditation renewed

The National Nuclear Accrediting Board renewed the accreditation of 42 training programs at seven plants during meetings on April 16-17 and May 21-22. ■

### April Accreditation Renewals

Brunswick Steam Electric Plant  
Carolina Power & Light Company  
6 operator training programs

Shearon Harris Nuclear Power Plant  
Carolina Power & Light Company  
6 technical training programs

Susquehanna Steam Electric Station  
Pennsylvania Power & Light Company  
6 operator training programs

### May Accreditation Renewals

Byron Station  
Commonwealth Edison Company  
6 operator training programs

Dresden Station  
Commonwealth Edison Company  
6 operator training programs

Hope Creek Generating Station  
Public Service Electric and Gas Company  
6 technical training programs

Salem Generating Station  
Public Service Electric and Gas Company  
6 technical training programs

## On-loan employees

Two industry personnel began on-loan assignments at INPO in April.

Patrick Donnelly is an assistant team manager in the Organization & Administration Department. He served as plant manager at Consumers Energy's Big Rock Point Plant.

Don Lomax is an evaluator in the Engineering Support Department. He served as manager, Engineering Programs/Design Engineering, at Arkansas Nuclear One, Entergy Operations, Inc. ■

## Reverse loan assignments

Three INPO personnel began reverse loan assignments in June.

Guy Bruner, accreditation team manager in the Accreditation Evaluation Department, joined Entergy Operations, Inc. as manager of planning and scheduling at Waterford 3 Steam Electric Station.

Lee Giles, accreditation team manager, Accreditation Evaluation Department, joined Electricité de France in June.

Rick LaRhetie, staff assistant in the Government Relations Division, joined Wisconsin Electric Power Company as manager of corrective action at Point Beach Nuclear Plant. ■

## Liaison engineer

Marcel McClusky of ABB-Combustion Engineering began his assignment as a supplier liaison engineer to INPO in the Process Management Department in April. He was senior engineer at ABB-Combustion Engineering. ■

### Human performance

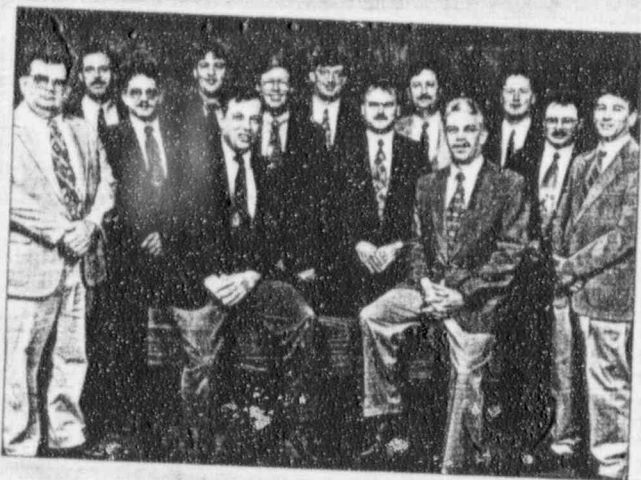
continued from page 5

the industry to improve its understanding of factors that affect human performance. Specifically, the document states that "the industry's leaders and managers should take a more active role in promoting understanding of the factors contributing to improved human performance throughout the industry."

of key concepts to other utility personnel. Muschara and Reeder hold in-depth discussions on the fourth day that concentrate on how participants can conduct and facilitate the course when they return to their plants. Participants also take a final exam to become certified as a course trainer. "Our goal is to have certified instructors at each site or utility," Muschara says.

Public Service Electric and Gas

# Maintenance Supervisor Professional Development Seminar graduates



Graduates of the 21st Maintenance Supervisor Professional Development Seminar are, from left (standing), **William E. Morgan**, electrical maintenance manager, Crystal River Unit 3; **Robert Sacco**, mechanical maintenance production supervisor, Susquehanna Steam Electric Station; **Erin O. Woody**, Unit 1 acting I&C maintenance manager, South Texas Project Electric Generating Station; **Bonny Taylor Harkey**, nuclear section manager, McGuire Nuclear Station; **William W. McCollough**, nuclear maintenance manager, Catawba Nuclear Station; **William H. Stoermer**, valve & rotating work team coordinator, Quad Cities Station; **Jim Valleeau**, leadership development training officer, Ontario Hydro (Canada); **Dave Schwartz**, maintenance support superintendent, Perry Nuclear Power Plant; **Patrick T. Soenksen**, daily planner I&C general supervisor, LaSalle County Station; **Ken Hobbs**, production maintenance supervisor, Pickering A (Canada); **James D. Carson**, I&C assistant supervisor, Surry Power Station; (seated) **John D. Allard**, seminar mentor, maintenance superintendent, Donald C. Cook Nuclear Plant; and **Barney R. Smith**, superintendent electrical, River Bend Nuclear Station.

Commonwealth Edison Company  
6 operator training programs

Dresden Station  
Commonwealth Edison Company  
6 operator training programs

Hope Creek Generating Station  
Public Service Electric and Gas Company  
6 technical training programs

Salem Generating Station  
Public Service Electric and Gas Company  
6 technical training programs

THE CRIVETT/HECHT/INDEPENDENT/CRYSTAL RIVER, joined Wisconsin Electric Power Company as manager of corrective actions at Point Beach Nuclear Plant. ■

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## Human performance

continued from page 5

the industry to improve its understanding of factors that affect human performance. Specifically, the document states that "the industry's leaders and managers should take a more active role in promoting understanding of the factors contributing to improved human performance throughout the industry."

"We saw this as an opportunity for INPO to help the industry achieve a breakthrough in human performance," Muschara says. Consequently, developing the Human Performance Fundamentals Course became an INPO annual objective in 1995, followed by pilot offerings in 1996.

## Training facilitators

An extra day is often added to the Human Performance Fundamentals Course in order to discuss facilitation

of key concepts to other utility personnel. Muscham and Reeder hold in-depth discussions on the fourth day that concentrate on how participants can conduct and facilitate the course when they return to their plants. Participants also take a final exam to become certified as a course trainer. "Our goal is to have certified instructors at each site or utility," Muscham says.

Public Service Electric and Gas Company hosted the first Human Performance Fundamentals Facilitators Course May 20-23. Arizona Public Service plans to host the second course in July, followed by Arkansas Nuclear One in September, Commonwealth Edison in October and PECO Energy in November. ■

For more information, contact Tony Muscham, (770) 644-8677, [muscham@inpo.org](mailto:muscham@inpo.org) or Tom Reeder, (770) 644-8445, [reedert@inpo.org](mailto:reedert@inpo.org).

# Significant event reports issued to industry

**S**ignificant Event Evaluation and Information Network documents recently issued include the following:

**Significant Event Report 5-97: Liquid Leak Sealant Material Migrates Into Reactor Vessel Head Vent System** describes an event in which station personnel discovered leak sealant material clogging two control valves in the reactor vessel head vent system when the unit was returning to operation after a refueling outage. Ineffective planning and execution of a sealant injection evolution resulted in injecting twice as much as specified of the wrong sealant into a valve located upstream of a leaking flange. A small portion of the sealant subsequently migrated upstream of the injected valve and adversely affected operation of the control valves.

Contributing factors to the event included weaknesses in management oversight of an infrequently performed evolution by a contractor, ineffective engineering review, breakdowns in communication and teamwork, and ineffective use of industry operating experience. For more information, contact Breu Kruse, (770) 644-8729, [kruseb@impo.org](mailto:kruseb@impo.org).

**SEN 6-97: Aging of PVC-Insulated Instrumentation and Control Wires** describes an event at an international plant in which personnel discovered numerous polyvinyl chloride-insulated instrument and control wires degraded as a result of aging of the insulation material. Plant personnel found cracked and broken insulation exposing the conductors of safety- and nonsafety-related wiring. While there have been no adverse operational effects, the potential for random spurious grounds presents a common-mode failure mechanism for safety-related systems.

Approximately 8,100 instrument and control wires will have to be replaced during the next refueling outage. The cause of wiring degradation is strongly suspected to be associated with a chemical additive (iron-manganese) used in manufacture of the PVC insulation. For more information, contact Mike Llewellyn, (770) 644-8769, [llewellynm@impo.org](mailto:llewellynm@impo.org).

**SEN 7-97: Operating Mechanism Problems in Medium-Voltage Circuit Breakers** describes the need for utilities to verify that maintenance programs and practices include appropriate guidance and activities to preclude breaker performance problems. Medium-voltage breakers (4 kV-16 kV) play an important role in station electrical distribution systems, both in safety-related applications and those nonsafety-related applications that are important to reliable plant operation. Common-mode failure mechanisms include failing to latch, hydrogen embrittlement of components, inadequate lubrication and latching pawl shaft cotter pin failures. For example, one emergency diesel generator breaker failure not only prevented the generator from performing its safety function, but this failure also went unnoticed for 25 days.

New breaker failure mechanisms and corrective actions are sometimes not reported in a timely manner by equipment vendors. Additionally, important technical information on breakers is sometimes not reaching plant personnel responsible for breaker maintenance. For more information, contact Steve Hill, (770) 644-8384, [hillsc@impo.org](mailto:hillsc@impo.org).

**SEN 8-97: Switchyard Circuit Breaker Failure Results in Motoring Main Generator** describes an event in which actions to connect the main turbine generator to the grid were unsuccessful when an auxiliary switch contact on one phase of a 345-kV switchyard circuit breaker failed to close. Operators did not fully isolate the generator before they opened the main generator field excitation breaker, approximately 30 minutes after the switchyard breaker malfunctioned, causing the generator to motor (unexcited, as an induction motor) for approximately seven minutes. Damage to the main generator occurred because of ineffective teamwork, inadequate preventive maintenance and ineffective problem resolution. For more information, contact Eric Oswood, (770) 644-8377, [oswooder@impo.org](mailto:oswooder@impo.org).

**SEN 9-97: Unrecognized Reactivity Mismanagement During a Reactor Shutdown** discusses an event that occurred when the plant was being shut down because of an inoperable containment spray pump. A reactor operator continuously and inappropriately withdrew the control rods for two minutes because core neutron flux decreased below the desired level, the point of adding heat. Just prior to withdrawing the control rods, the reactor operator had continuously inserted them for four minutes, which was an inappropriate interpretation of a step in the shutdown procedure. The excessive control rod insertion had made the reactor subcritical by greater than 1 percent delta k per k; therefore, the subsequent rod withdrawal constituted an unauthorized attempt to start up the reactor. The reactor operator stopped withdrawing the control rods when the shift supervisor ordered a reactor scram. Station personnel later determined the positive reactivity added during the control rod withdrawal resulted in an unauthorized mode change.

Significant aspects of this event include:

- Operator knowledge and skill deficiencies – The reactor operator was unable to apply fundamental nuclear concepts during this evolution. Operator knowledge weaknesses had been identified previously, but actions were not taken to correct the situation.
- Ineffective teamwork – Managers and supervisors did not reinforce the importance of

**Significant Event Notification 157: Reacting Event, Inappropriate Control Rod Withdrawal During an Unplanned Evolution** discusses an event in which a licensed control room operator inappropriately withdrew a control rod in a plant operating at 100 percent power when he attempted to demonstrate a control rod coupling check for a reactor operator license candidate. While reviewing the control rod drive system, the licensed operator requested permission from the control room supervisor to demonstrate a control rod coupling check for the trainee to enhance understanding. The licensed operator did not verify control rod position using the "full out" indication on the full-core display and the process computer printout of control rod positions. Reactor power increased to approximately 101 percent power as a result of the control rod withdrawal and was returned to less than 100 percent power within one and one-half minutes. However, if the rod block monitor had malfunctioned or if different core conditions existed, thermal limits might have been exceeded.

The event occurred because administrative controls were not properly implemented, including procedures that require preparation for the activity, shift manager approval, independent verification of rod selection and self-checking. In addition, reactor engineering was not consulted prior to reinserting the control rod, as required by station procedures. For more information, contact Bob Burnham, (770) 644-8885, [burnhamr@impo.org](mailto:burnhamr@impo.org).

**SEN 158: Unplanned Exposure During Spent Fuel Pool Diving Operations** discusses an event during a refueling outage where spent fuel pool diving operations were performed. The diver left the approved diving area, moved to an area that was in close proximity to a large group of recently discharged spent fuel rods, and received an unplanned exposure as he approached an extremely high radiation field. Based on the multiple dosimetry the diver was wearing, he was assigned a whole body exposure of 270 millirem and an extremity exposure of 885 millirem. This event had the potential for a serious personnel overexposure.

Contributing causes to this event include the following:

- Management involvement was insufficient to verify that proper responsibilities, preparation activities and work controls were effectively implemented.
- Station administrative controls for diving operations were informal. As a result, personnel with important responsibilities were unaware of them and several radiation protection measures were considered optional.
- Over the previous three days, three successful dives had been performed in the spent fuel pool and the refuel pool. These successful dives bred a sense of complacency, which affected the questioning attitude in personnel involved.

For more information, contact Bob Burnham, (770) 644-8885, [burnhamr@impo.org](mailto:burnhamr@impo.org).

**SEN 159: Foreign Material Intrusion Events at International Nuclear Stations** describes three international events involving foreign material intrusion incidents. The first event involves the intrusion of hundreds of small stainless steel pieces from the disintegration of a hot leg header cover left in the primary circuit at a pressurized water reactor. The second event describes discovery of many mechanical components and metal fasteners in the right-half core loop at a nuclear power plant. The third event involves a stuck open regulating valve in the main steam system of a nuclear power plant, due to a piece of PVC wiring insulation in the control contacts. These events are similar to events described in INPO Significant Operating Experience Report 95-1, *Reducing Events Resulting From Foreign Material Intrusion*, July 11, 1995. For more information, contact Cal Goslow, (770) 644-8312, [goslouc@impo.org](mailto:goslouc@impo.org).

**SEN 160, Revision 1: Inadequate Isolation Boundary While Two Workers Were Inspecting a Circulating Water Pump Impeller** describes an event in which two maintenance workers were subjected to an influx of cold water while inspecting a circulating water pump impeller when an isolation boundary did not effectively isolate the work area.

The workers were in a dewatered circulating water intake bay when the sodium hypochlorite injection system began to inject cold river water (approximately 44 degrees Fahrenheit) into the intake bay. An air-operated valve ineffectively used to isolate the system had opened. Water level in the intake increased from knee to waist level before the sodium hypochlorite system was secured. The workers were in a confined space; however, neither worker used a proper individual retrieval system. As a result, personnel outside the confined space were unable to extract them quickly. For more information, contact Fred Rehrig, (770) 644-8631, [rehrigf@impo.org](mailto:rehrigf@impo.org).

**SEN 161: Hydrogen Explosion and Fire Events at International Nuclear Stations** describes two events.

At one unit, a hydrogen explosion occurred inside the main generator as a result of inadequate purging of the generator with carbon dioxide following a plant shutdown. The explosion resulted in damage to the generator internals, and repairs to the generator extended the outage by 20 days.

At the second plant, a hydrogen fire that occurred during grab sampling of the main generator cooling air resulted in a total loss of the main generator and



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Significant aspects of this event include:

- Operator knowledge and skill deficiencies – The reactor operator was unable to apply fundamental nuclear concepts during this evolution. Operator knowledge weaknesses had been identified previously, but actions were not taken to correct the situation.
- Ineffective teamwork – Managers and supervisors did not reinforce the importance of control room teamwork. Consequently, communication standards were inconsistently applied, peer-checking was not used and crew members were not involved with the reactor operator's actions.
- Ineffective management direction and oversight – The site manager voiced his expectation for a safe reactor shutdown; however, control room personnel knew from past experience that last-minute restoration of inoperable equipment had been commended. Some crew members and managers allowed this bias to preclude proper planning, preparation and execution of control room activities.
- Ineffective use of operating experience – The reactor operator was not adequately prepared from prior industry operating experience that he was taking inappropriate actions.

For more information, contact Bob Ciminel, (770) 644-8310, ciminelr@impo.org.

The first event involves the intrusion of hundreds of small stainless steel pieces from the disintegration of a hot leg header cover left in the primary circuit at a pressurized water reactor. The second event describes discovery of many mechanical components and metal fasteners in the right-half core loop at a nuclear power plant. The third event involves a stuck open regulating valve in the main steam system of a nuclear power plant, due to a piece of PVC wiring insulation in the control contacts. These events are similar to events described in INPO Significant Operating Experience Report 95-1, *Reducing Events Resulting From Foreign Material Intrusion*, July 11, 1995. For more information, contact Cal Goslow, (770) 644-8312, goslowce@impo.org.

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At the second plant, a hydrogen fire that occurred during grab sampling of the main generator cooling gas required rapid unloading of the main generator and manual tripping of the main turbine. The fire self-ignited during the chemistry sampling evolution. The fire could not be immediately extinguished because it blocked access to the sample shutoff valve. The sampling procedure required an operator be stationed at the shutoff valve, but the chemistry technician performing the sampling did not follow the procedure requirements and no operator was present. For more information, contact Cal Goslow, (770) 644-8312, goslowce@impo.org.

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# INPO follows its own advice, conducts internal self-assessments

**W**hen INPO works with member utilities to improve plant safety and performance, one process the Institute encourages is ongoing self-assessment of the member's organization. Beginning in September 1996, INPO took its own advice, conducting a series of self-assessments designed to identify strengths and areas for improvement within the Institute. The review is a starting point for making self-assessment a more integral part of normal business at INPO.

Teams of four to six people reviewed each INPO division, using methodology much like that of a plant evaluation. Each team included a team leader, an employee on loan to INPO from a member utility, a host division employee and up to two other INPO employee members. The process provided an opportunity for all INPO employees to help improve the Institute's effectiveness by either participating on a self-assessment team or by contributing their ideas during the self-assessment of their division.

"INPO expects its members to conduct self-assessments and to hold themselves to high standards," says Jim Lynch, staff assistant, Government Relations, and coordinator of the self-assessment effort. "We wanted to look at ourselves with the same standards we expect of our members."

Gary Fader, Events Analysis department manager, led a team that conducted a self-assessment of INPO's Engineering and Outage Management/ALWR work groups. Fader says that like a plant evaluation, the idea was to

gather pertinent information, organize it into meaningful segments and provide results from which improvements can be made.

"My team included two INPO employees and Joe Jensen, who is on loan to INPO from Northern States Power. We prepared for the self-assessment by reviewing information like the departments' procedures, jurisdiction statements, goals and objectives, and action tracking lists. We then interviewed all employees of the departments to obtain their impressions and suggestions on how to improve efficiency and effectiveness. We found people very open and willing to provide input," Fader says.

Rity Howell, on loan to INPO's Plant Assistance Division from Carolina Power & Light Company, participated on a team that conducted a self-assessment of the Institute's training and accreditation areas. "It was a thorough self-assessment," Howell says. "Members of the self-assessment team worked diligently to gather meaningful information and deliver a useful product. INPO has benefited and will continue to benefit from the self-assessment program."

Each team provided a report at the conclusion of its self-assessment to INPO management and division directors. The reports were also widely shared with INPO permanent and on-loan employees. Action plans

have been developed to address improvement items identified in the assessments. INPO's Advisory Council was briefed on the self-assessment effort in January and April, and the Institute's Board of Directors received updates at its January and March meetings.

The next steps in INPO's self-assessment initiative are to follow up on the effectiveness of key corrective actions taken in response to findings and to develop a method for line managers to take the lead in self-assessing their areas of responsibility. Claude Cross, vice president, assistant to the president, and self-assessment project leader, says, "We will continue to involve a variety of INPO personnel in our self-assessment work as the program moves forward." ■

*The review is a starting point for making self-assessment a more integral part of normal business at INPO.*

*Joe Jensen (left), on loan to INPO from Northern States Power, discusses self-assessment results with Jim Lynch, coordinator of the self-assessment effort.*



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June 30, 1997

MEMORANDUM FOR: Darlene Huyer  
Anstec, Inc.

FROM: Tremaine Donnell, INPO Coordinator  
Records and Archives Services Section  
Information and Records Management Branch  
Office of Information Resources Management

SUBJECT: ESTABLISHMENT OF DATA RECORD FOR INPO  
DOCUMENTS

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A handwritten signature in cursive script, reading "Tremaine Donnell", is positioned above the typed name and title.

Tremaine Donnell, INPO Coordinator  
Records and Archives Services Section  
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