

Review

A bimonthly publication of the Institute of Nuclear Power Operations

JULY/AUGUST 1996

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Industry leaders address higher-energy reactor cores

Get a group of senior nuclear executives together along with some fuel vendors to discuss problems with high-burnup cores and you can expect plenty of talk about safety margins, boron depletion, corrosion and economics. Relationships and communications may not seem likely agenda items.

They were, however, on the agenda at INPO's June workshop, "Achieving Excellent Performance in Higher-Energy Reactor Cores," and they were major recurring themes throughout the day. Key to dealing with the industry problem of unexpected changes occurring in higher-energy reactor cores is effective communications between fuel vendors and utility personnel as well as among executives, plant staffs, operations personnel and reactor engineers.

The INPO work-

and chief operating officer, Entergy Operations, Inc., cautioned against pushing too close to operating margins as utilities seek to drive up production and drive down costs with high-energy cores.

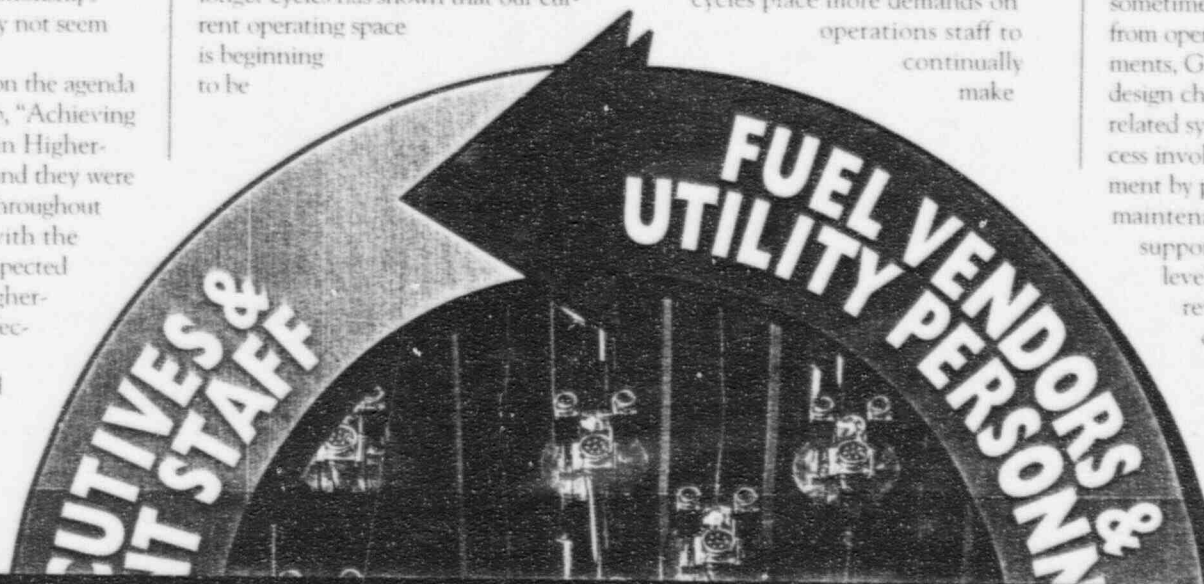
"Our experience today with the longer cycles has shown that our current operating space is beginning to be

impacted. This is now requiring us to make choices about operating margins," Yelverton said. "Entergy maintains its thermal and operating margins while asking itself what are the necessary margins and what is extra."

Higher-energy cores and longer cycles place more demands on operations staff to continually make

sound conservative decisions to avoid exceeding administrative or operating limits, according to INPO's Don Gillispie, vice president and director, Plant Support Division.

Changes to core design that place added demands on operators are sometimes made without involvement from operations and other key departments, Gillispie said. "When other design changes are made to a safety-related system, the design change process involves a high level of involvement by plant engineering, operations, maintenance and other affected support groups. There is high-level management oversight and review. Implementation is controlled, and supporting activities, such as procedure updates and operator training, are routinely conducted before the change is implemented. "In contrast to other plant design changes, core reload



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engineers.

The INPO workshop brought senior nuclear executives together to learn from recent industry events and to increase awareness about unanticipated conditions resulting from changes made to the core.

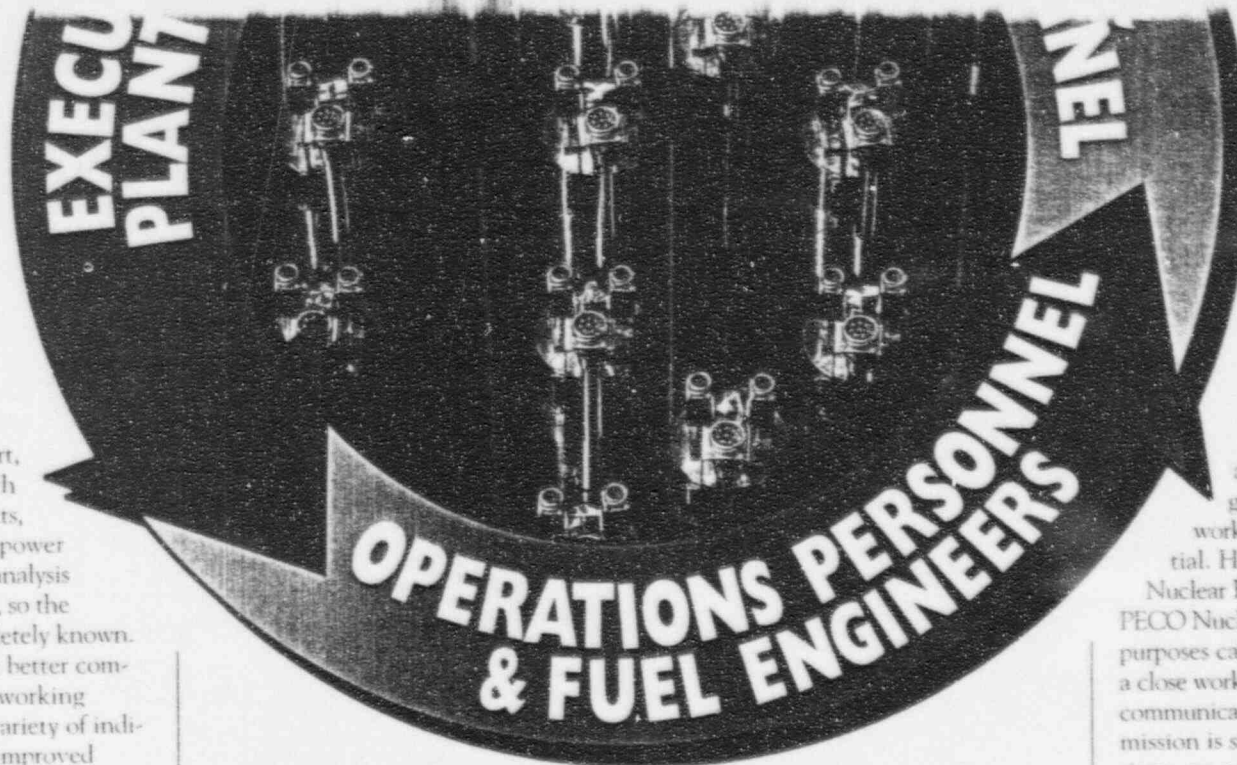
The recent industry events include failure of control rods to fully insert, corrosion of fuel rods with some through-wall defects, and anomalies in axial power distribution. Thorough analysis continues on the events, so the causes are not yet completely known. It is clear, however, that better communication and closer working relationships among a variety of individuals are essential to improved safety and plant performance.

Utility efforts to improve unit performance have resulted in significant changes to core designs to meet economic demands with more reliable cycle performance, higher capacity factors and shorter outages. The pace of those changes in core design has been rapid.

Recent events show that these changes can affect fuel performance and operating margins. The higher-energy designs are reducing margins to near core operating limits.

Balancing margins, economics

In his presentation, "Balancing Operating Margins and Economics in a Competitive Environment," Jerry Yelverton, executive vice president



Key to dealing with the industry problem of unexpected changes occurring in higher-energy reactor cores is effective communications between fuel vendors and utility personnel as well as among executives, plant staffs, operations personnel and reactor engineers.

other plant design changes, core reload is viewed as a highly specialized activity," he continued. "Plant and senior management are not heavily involved, and control of supporting activities is not as rigorous."

Communication focus

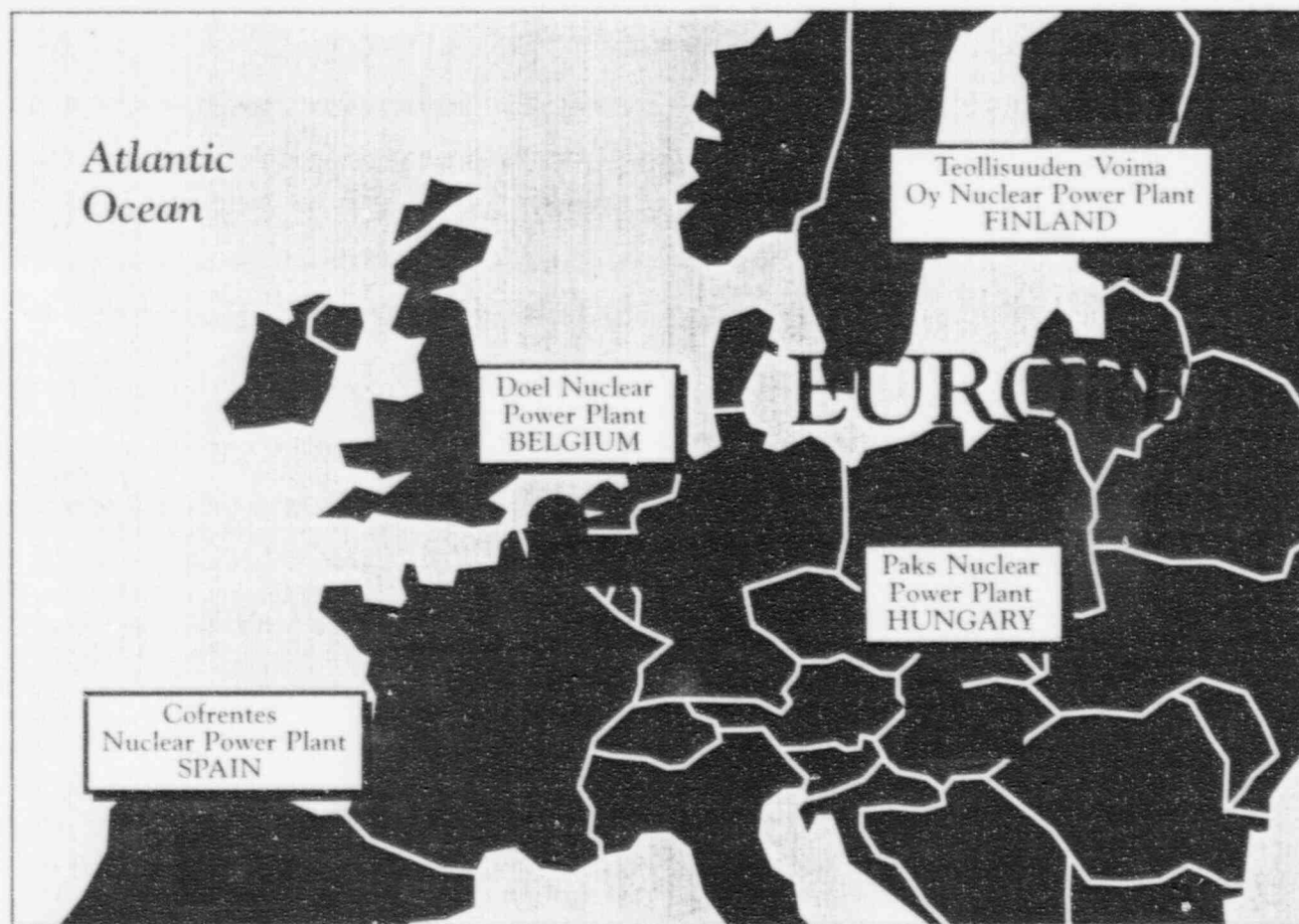
A panel of fuel engineers and operations managers agreed with Gillispie that good communications and working relationships are essential. Hugh Diamond, director, Nuclear Fuel and Services Division, PECO Nuclear, said that conflicting purposes can result when there is not a close working relationship or good communication. "The plant manager's mission is safety, no unplanned transients, no surprises," Diamond said. Senior management needs to clearly communicate where it wants to go and have everyone in alignment. "Site operations needs to understand and buy in," Diamond said.

Jack Woodard, executive vice president, Southern Nuclear Operating Company, joined a panel of fuel vendors to address "Considerations for an Effective Utility-Vendor Partnership for Improved Core Performance." Woodard said improvements in the utility-vendor relationship would lead to fewer core anomalies and quicker solutions to problems. That relationship must include senior nuclear executives.

"I believe the problem goes some-

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Finding new ideas on the international road



John Fenton peppers his language with descriptive phrases when he recalls his recent visit to Finland and Spain. "I felt like a young pup," says the maintenance consultant, work control, Monticello Nuclear Generating Plant. "It was my first international nuclear plant visit so I was wet

Entergy, Georgia Power, Northern States Power and TU Electric participated.

Planning for success

Team members found that the plants visited consistently focus on such things as teamwork, personal accountability and working across functional lines. They also learned

maintain and continually modernize the station through the use of a 10-year planning process. TVO management looks at modifications with the vision to operate the unit for another 40 years.

"This long-range look allows the plant to bundle large work projects into future outages and enables the station to maintain the desired outage durations," Smith says. Three different management review groups have been established for the planning process to focus on the station's next outage, the next three years and the next 10 years.

Outage planning was also a key element observed by PWR team leader Dan Keuter, general manager, Waterford 3 Steam Electric Station. Keuter says Doel's 10-year safety reassessment process helps determine what design changes will be implemented during outage periods and establishes the priority for engineering the changes.

Keuter also notes Paks' long-range strategy that focuses on reducing outage durations and increasing plant availability. Key aspects of the plan include defining the outage type (normal, short, long), defining the outage work scope for each type, developing a long-term outage plan and determining short- and long-term actions to support the outage strategy.

"Doel and Paks do a great amount of planning, and it pays off," says Keuter. "I think we in the United States sometimes justify our longer outages thinking our international

Team members found that the plants visited consistently focus on such things as working across functional lines, teamwork and personal accountability.

control, Monticello Nuclear Generating Plant. "It was my first international nuclear plant visit so I was wet behind the ears."

Fenton traveled to Teollisuuden Voima Oy Nuclear Power Plant in Finland and Cofrentes Nuclear Power Plant in Spain at the end of 1995. TVO is a twin 710-megawatt boiling water reactor, and Cofrentes is a 990-megawatt BWR. "Visiting the international sites was enlightening," says Fenton. "The trips exposed me to how our international peers do work differently, and sometimes more efficiently, than we do in the United States."

Fenton's visits were part of an industry initiative facilitated by Entergy Operations, Inc., to improve the performance of U.S. nuclear power plants. This was carried out by benchmarking outage management and work control processes at four European nuclear plants chosen because they have high capacity factors and short, effective outages. INPO and the Nuclear Energy Institute assisted Entergy with the initiative.

A 13-member BWR team that visited TVO and Cofrentes in the autumn of 1995 included representatives from Carolina Power & Light Company, Commonwealth Edison Company, Entergy, Georgia Power Company, Niagara Mohawk Power Corporation, Northern States Power Company and PECO Energy Company.

In addition, at the beginning of 1996, a 12-member pressurized water reactor team visited Belgium's Doel Nuclear Power Plant (two 392-megawatt units, a 970-megawatt unit and a 1,000-megawatt unit) and Hungary's Paks Nuclear Power Plant (four 460-megawatt units). Employees from Carolina Power & Light, Commonwealth Edison, Duke Power Company,

on such things as teamwork, personal accountability and working across functional lines. They also learned the plants emphasize long-range goal-setting, schedule adherence and understanding the characteristics unique to an individual site.

Bob Smith, work control and outage manager, Nine Mile Point Nuclear Station, says he was impressed with TVO's outage planning process. TVO senior management has established clear expectations to operate,

Nuclear. "I think we in the United States sometimes justify our longer outages thinking our international peers operate with different rules. But I found that their safety regulations are as strict, if not more strict than ours, and they still have short outages and high capacity factors."

Team members also observed that employees at the international plants consistently meet target dates set by

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BWR Benchmarking Team

Randy Hutchinson, team leader
George McMillin
Grand Gulf Nuclear Station

Tim Baughman
Nuclear Energy Institute

Kevin Carrabine
Ron DeGregorio
Limerick Generating Station

Ronald Crawford
LaSalle County Station

John Fenton
Monticello Nuclear
Generating Plant

Mike Googe
E.I. Hatch Nuclear Plant

Tom Hildebrandt
River Bend Station

Lou Pisano
Bob Smith
Nine Mile Point Nuclear Station

Steve Telford
INPO

Vaughn Wagoner
Carolina Power & Light Company

PWR Benchmarking Team

Dan Keuter, team leader
Waterford 3 Steam Electric Station

William Anfin
Catawba Nuclear Station

Tim Baughman
Nuclear Energy Institute

John Bierbrauer
Prairie Island Nuclear
Generating Plant

Richard Bond
Oconee Nuclear Station

Brazia Clark
H.B. Robinson Steam Electric Plant

Thomas Hargis
Vogtle Electric Generating Plant

William James
Arkansas Nuclear One

William Lang
INPO

Steve Smith
Dennis Wilken
Comanche Peak Steam
Electric Station

William Snow
Byron Station

Senior Nuclear Executive Workshop

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thing like this. You redesign the core, and certain parameters change. And where they're known, the vendor tells you those parameters change, and I think that senior management has a problem taking those parameters and effectively translating them into operational effects in the plant and making everyone aware of those potential effects."

It's important, Woodward said, to understand the responsibilities of the vendor and utility. "But you've got to have some kind of relationship to add all that (information) up and figure out what it means."

Utilities generally go back to the vendors when there is a fuel problem because the vendors have more expertise than the utilities, Woodward said.

"So if you're someone who's divorced from the vendor and you get into deep trouble, then solving the problem may be a lot more difficult because you don't have as many things in common."

Other panel members from Framatome Cogema Fuels, Westinghouse Electric Corporation, ABB Combustion Engineering, Inc., Siemens Power Corporation and General Electric Company agreed that developing a partnership with utilities is an important area where improvement needs to occur.

INPO plans to issue a Significant Operating Experience Report on the subject of higher-energy cores with recommendations for controlling changes to the reactor core. ■

Improvements in the utility-vendor relationship would lead to fewer core anomalies and quicker solutions to problems. That relationship must include senior nuclear executives.

In memory of Bill Lee



William S. (Bill) Lee, chairman emeritus of Duke Power Company, who served as the company's chairman from 1982 to 1994, died on July 10.

"Bill Lee's leadership and vision contributed enormously to the worldwide safety and success of nuclear power," said INPO President and CEO Zack Pate. "He played a key role in INPO's formation and served as its first chairman from 1979 to 1982.

"As its first chairman, he guided INPO from a concept, brought about by the accident at Three Mile Island, to a professional organization dedicated to promoting the highest levels of safety and reliability – to promoting excellence – in the operation of nuclear electric generating plants.

"Following the 1986 accident at the Chernobyl nuclear power station in Ukraine, he undertook a leadership role in bringing together top executives from utility organizations around the world for discussions in Paris, France. The result was the formation of the World Association of Nuclear Operators, which virtually every nuclear power plant operator in the world joined. As the first president of WANO, he won the respect and admiration of executives and operators alike throughout the world.

"He will be long remembered as a true visionary and as a great leader," says Pate.



Entergy Operations, Inc., in Jackson, Miss., recently hosted a meeting of the Academy Council, which meets three times a year to discuss training- and personnel-related matters in the nuclear power industry and to advise the executive director of the National Academy for Nuclear Training. The council normally meets at INPO headquarters, but because of the scheduling difficulties caused by the Centennial Olympic Games in Atlanta, Entergy volunteered to host the July 11 meeting. Here (left to right), Flo Mangan, general manager of plant services, South Texas Project Electric Generating Station; Bill Pearce, station manager, Quad Cities Station; and Dennis Koutouzis of INPO's Operations Training Department listen to a presentation on "Training in the Future" by Randy Hutchinson, vice president of operations, Grand Gulf Nuclear Station.

Other member utilities also accommodated changes during the Olympics. Entergy's Arkansas Nuclear One and Pennsylvania Power & Light Company's Susquehanna Steam Electric Station volunteered to host plant evaluation teams for the week prior to the teams' July and August evaluations. Vogtle Electric Generating Plant, operated by Georgia Power Company, hosted the team for its training accreditation visit. Usually, evaluation and accreditation teams prepare in Atlanta before visiting a site.

Thanks to these utilities and plants for making these accommodations.

Accreditation renewed

The National Nuclear Accrediting Board renewed the accreditation of 18 training programs at three plants during meetings on June 12-13.

June Accreditation Renewals

Duane Arnold
Energy Center
IES Utilities Inc.
6 technical training programs

H.B. Robinson Steam
Electric Plant
Carolina Power &
Light Company
6 operator training programs

Big Rock Point Plant
Consumers Power
Company
6 technical training programs

Finding new ideas on the international road

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management. "Workers have a keen awareness of scheduling and the importance of adhering to schedules, especially outage schedules and execution," Fenton says. "Work groups assume responsibility and hold themselves responsible for accomplishing quality work in a safe and timely manner."

In addition, work groups take an active role in suggesting and implementing improvements to increase availability, make work easier and improve work conditions.

Know thyself

The international visits increased the teams' awareness that each plant's culture contributes to its success and how it conducts business. Dennis Wilken, work process improvement manager, Comanche Peak Steam Electric Station, and a PWR team participant, says mimicking another

plant's best practice doesn't guarantee success.

"There is no one right way to be efficient or one way to do the right thing," he says. "To be successful you have to first understand your talent pool and the skills of your employees. Then you can decide what processes work best for you as a plant in order to achieve your goals."

Bringing it home

No matter what international insights the team members gained, they all agree they brought new perspectives and different ideas back with them. "I'll remember how our international counterparts did something and wonder if their way can help us here at my parent plant," Fenton says. ■

(Editor's note: Outage and Work Management Benchmarking, a report on the international benchmarking visits, was distributed to each member and participant administrative point of contact. Please check with your APOC before requesting a copy from INPO at (770) 644-8513.)

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.

Chemistry managers working meeting

September 26-27 Maintaining good system engineering for chemists (PWR)

Engineering managers working meetings

October 10-11 System engineering/technical support
November 14-15 System engineering/technical support
December 5-6 Design engineering

Engineering Supervisor Professional Development Seminar graduates



Graduates of the sixth Engineering Supervisor Professional Development Seminar are, from left (standing), Dennis Pristave, balance-of-plant group leader, LaSalle County Station; James L. Yates III, electrical systems supervisor, Watts Bar Nuclear Plant; Tom W. Dong, supervisor, Fermi-2; Peter R. Herran, seminar mentor, engineering manager, McGuire Nuclear Station; Douglas J. Britz, systems group engineer, Quad Cities Station; Patrick B. Corbett, project engineering manager, Vermont Yankee Nuclear Generating Station; Steven J. Robitzski, engineering supervisor, balance-of-plant systems, Salem Generating Station; Jason M. Laque, system engineering superintendent, Waterford 3 Steam Electric Station; Michael J. Licitra, manager, engineering support, Indian Point 3 Nuclear Power Plant; (seated) James Tuohy, manager, field engineering, Indian Point Station Unit No. 2; John C. Grubb, superintendent, design engineering, Monticello Nuclear Generating Plant; and Mark R. Barbee, supervisor, system engineering, electrical, Wolf Creek Generating Station.

New loaned

New document

October 10-11
November 14-15
December 5-6

System engineering/technical support
System engineering/technical support
Design engineering

Engineering support working meetings

September 12-13 Reactor protection system (BWR)
September 24-25 Turbine/electrohydraulic controls
October 22-23 Reactor engineering (PWR)
December 12-13 Auxiliary feedwater

Equipment performance working meetings

September 17-18 Advanced equipment data usage
November 7-8 Electrical components

Maintenance managers working meetings

September 17-18 Maintenance issues
December 10-11 Maintenance issues

Outage managers working meetings

November 12-13 Outage management (BWR)
November 14-15 Outage management (PWR)

Upcoming workshops

The Operations Managers Workshops will be held September 11-12 and November 13-14 at INPO headquarters. The theme for each session is "High Performance Operations: The Core Business."

INPO's annual CEO Conference will be held November 7-8 at the Renaissance Waverly Hotel in Atlanta.

Tollison heads up National Academy

Fred Tollison, senior vice president, Plant Evaluations, has been appointed director of the National Academy for Nuclear Training and assumes direction of Training and Education.

Tollison succeeds Bill Subalusky, vice president, Training and Education, who joined Commonwealth Edison as a reverse loaned employee in August. Subalusky is site vice president at LaSalle County Station and reports to Harry Keiser, the utility's chief nuclear operating officer. Subalusky's assignment is anticipated to be approximately 28 months.

New loaned employee

Abdy Khanpour joined INPO in July as an evaluator in the Engineering Support Department. Khanpour served as design basis project manager at Arizona Public Service Company's Palo Verde Nuclear Generating Station.

Liaison engineers

Hiroaki Nishi of Kansai Electric Power Company in Japan began his INPO assignment as a liaison engineer in the Outage Department in June. Nishi was a design engineer in the Nuclear Design and Construction Section, General Office of Nuclear and Fossil Power Production, at the utility's corporate office in Osaka, Japan.

Asa Hermansson of OKG AB in Sweden began her INPO assignment in July as a liaison engineer in the Chemistry Department. She served as a chemical engineer at Oskarshamn Nuclear Power Plant.

José Carlos Ritter of FURNAS Centrais Elétricas S.A. in Brazil began his INPO assignment in July as a liaison engineer in the Maintenance Department. Ritter served as technical support manager at Angra 1 Nuclear Power Plant.

New document issued

The preliminary Design Change Process Description (INPO AP-906) describes a design change process to assist member utilities in simplifying operations and support functions while maintaining high levels of safe and reliable plant operation. The document was facilitated by INPO with support from several member utilities.

This document was distributed to each member and participant administrative point of contact. Please check with your APOC before requesting from the INPO documents coordinator at (770) 644-8513.

Reverse loaned assignments

Walt Strodl, evaluator, Radiological Protection Department, joined Commonwealth Edison Company as a reverse loaned employee in July. He is health physics supervisor at Zion Station.

Ken Karr, director, Advanced Light Water Reactor Standardization Project, joined Commonwealth Edison Company as a reverse loaned employee in August. He is director, Performance Improvement, at the utility's corporate office.

Significant event reports issued to industry

Significant Event Evaluation and Information Network documents recently issued include:

Significant Event Report 8-96: Extreme Environmental Conditions Result in a Reactor Scram With Failure of Five Control Rods to Fully Insert describes an event that occurred during unusually cold weather conditions. These conditions resulted in extensive icing of the circulating water intake structure traveling screens and frazil ice accumulation on the safety-related essential service water system intake trash racks. The frazil ice accumulation on the essential service water trash racks blocked lake water flow to one of two essential service water pumps.

In response to the icing of the circulating water traveling screens and the subsequent effect the ice had on system operation, the reactor was manually scrammed. Following the scram, five control rods initially failed to insert fully, and the turbine-driven auxiliary feedwater pump was declared inoperable as a result of excessive water leakage from its packing. Two motor-driven auxiliary feedwater pumps were available. The five control rods fully inserted within approximately one hour after the manual scram.

After the event, it was found that a design error resulted in an inadequate supply of warm water being returned to the essential service water intake structure. This allowed frazil ice to accumulate and block flow to one pump. Operations personnel also mislabeled the essential service water system, which hastened the accumulation of frazil ice.

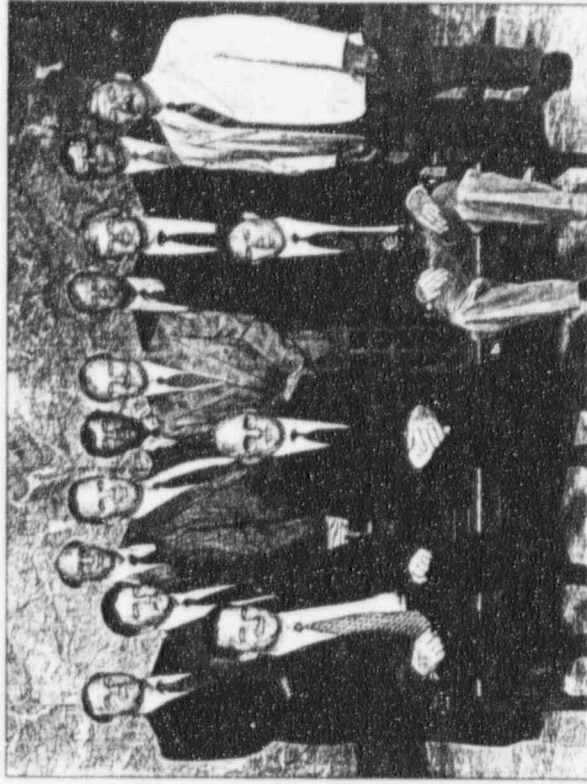
The five control rods that failed to fully insert are discussed in Significant Event Notice 134.

SER 9-96: Interrupted Control Rod Insertion on a Reactor Scram as a Result of Inappropriate Personnel Action describes an event involving startup tests following a refueling outage at an international plant. The neutron flux monitoring system input signal to reactor protection system train two was being tested with the reactor at 23 percent power. An operations instrument and control technician incorrectly returned the reactor protection system train two from the "test" mode to the "operation" mode while a simulated neutron flux overpower signal was inserted, resulting in a reactor scram. Control rods began to insert normally.

The technician immediately reset and cleared the reactor protection system scram signal with a local pushbutton, which repowered the control rod drives, stopping control rod inward motion.

Several seconds later, a second scram signal in both trains of the reactor protection system was generated by a high reactor period as source-range neutron monitors began to insert automatically as a result of the previous scram signal. Control rods began to insert. Because of the power reduction that occurred from the partial insertion of the control rods with the first scram signal, the startup range monitor high period signal immediately cleared, and the technician as-

Shift Supervisor Professional Development Seminar graduates



Graduates of the 44th Shift Supervisor Professional Development Seminar are, from left (standing), Randy D. Speroff, Dresden Station; Chester Fugate, Waterford 3 Steam Electric Station; Douglas Smith, Prairie Island Nuclear Generating Plant; Mark J. Andrews, Braithwood Station; Pat Ryan, Clinton Power Station; Richard F. Truax, Peach Bottom Atomic Power Station; Richard Vook, Donald C. Cook Nuclear Plant; Ronald T. Moore, Pickering A (Canada); Bruce C. Williams, seminar mentor, V. C. Summer Nuclear Station; Darl Enfinger, St. Lucie Nuclear Power Plant; (seated) Jeffrey K. Heaton, Byron Station; Jerry Evan Culp, McGuire Nuclear Station; and Terry R. Jenkins, Catawba Nuclear Station.

Maintenance Supervisor

rods again began to insert. Because of the power reduction that occurred from the partial insertion of the control rods with the first scram signal, the startup range monitor high period signal immediately cleared, and the technician was able to again reset and clear the reactor protection system signal with the local pushbutton. This action again restored power to the control rod drives, stopping control rod movement into the core.

The control room operators, unable to diagnose the cause of the plant transient, manually tripped the turbine generator and several minutes later, manually scrammed the reactor.

SER 10-96: Unidentified Overpower Condition Following a Substantial Loss of Feedwater Heating discusses an event in which a plant experienced two secondary system transients that resulted in overpower turbine runbacks when reactor power reached 109 percent. Following the second runback, actual reactor power remained near 104 percent for 30 minutes.

The first power excursion began when the low-pressure feedwater heaters were inadvertently bypassed, which caused extraction steam to isolate to the high-pressure feedwater heaters. Feedwater temperature dropped from 440 to 210 degrees Fahrenheit. Colder feedwater lowered coolant temperature, which increased reactor power. During recovery from the first transient, a heater drain tank design weakness caused a second loss of feedwater heating when extraction steam was unevenly admitted to the feedwater heaters, resulting in a second overpower condition and turbine runback.

SER 11-96: Loss of Off-Site Power, Reactor Scram, and Safety Injection With One of Two Emergency Diesel Generators Available describes an event in which a plant experienced a complete loss of off-site power while operating at 100 percent power. The event was initiated by the failure of two resistor bushings associated with potential transformers on the main power system that resulted in a phase-to-phase fault. Only one emergency diesel generator started and supplied power to its essential bus because the second emergency diesel generator was out of service for corrective maintenance.

SEE-IN products are transmitted to each member and participant using NUCLEAR NETWORK®. Check with your SEE-IN or NETWORK coordinator to request these documents. ■

Maintenance Supervisor Professional Development Seminar graduates



Graduates of the 16th Maintenance Supervisor Professional Development Seminar are, from left (standing), **Jimmy Wright**, instrument and control supervisor, Perry Nuclear Power Plant; **Eddie Langley**, maintenance coordinator, Grand Gulf Nuclear Station; **Robert G. Pittman**, instrument and control maintenance superintendent, Waterford 3 Steam Electric Station; **Steven Furstenberg**, seminar mentor, manager, electrical and mechanical maintenance, V.C. Summer Nuclear Station; **Joseph A. Kowalewski**, superintendent, electrical maintenance, Arkansas Nuclear One; **Candler C. Miller Jr.**, instrument and control superintendent, Vogtle Electric Generating Plant; **Phil M. Thompson**, supervisor, electrical/controls and instrumentation, Clinton Power Station; **Herbert L. Whitlock Jr.**, instrument and control supervisor, North Anna Power Station; **John L. MacIntyre**, material services general foreman, Diablo Canyon Power Plant; (seated) **Robert W. Armstrong**, nuclear electrical/instrument and control supervisor, Crystal River Unit 3; and **Hector Aponte**, mechanical maintenance supervisor, Laguna Verde (Mexico).

Survey results

Readers say *Review* is fulfilling mission

The results from our reader survey are in. You told us what you think about *Review*. You paid us some compliments, and most importantly, you gave us suggestions on how to improve the publication.

More than 350 readers completed the survey, which appeared in the January/February issue. Responses came from throughout the United States and Canada, and from as far away as Japan, Slovenia, South Africa and Switzerland.

We're glad that most of you react favorably to *Review*. Approximately 92 percent said *Review* is fulfilling its mission to provide readers with timely information on INPO and the National Academy for Nuclear Training. And, of course, we'll continue to keep you informed about how our members use INPO and National Academy resources.

One of the really pleasant surprises for us was the discovery that *Review* may have up to 27,000 readers, an audience much larger than we expected.

A reader profile

Who are you? Many readers (41 percent) are plant-level technical managers and supervisors, and 26 percent are technical or administrative professionals. Thirteen percent are managers at the corporate level, and 7 percent are senior managers.

How you rate us

You told us that you like to read articles about industry performance and issues as well as profiles of INPO programs and their benefits to members. In addition, readers are interested in significant event information and want to keep current on INPO workshop and seminar offerings.

A good number of you also enjoy the National Academy course graduate photos and like to know about loaned and reverse-loan employees.

A majority (78 percent) thinks *Review* contains the right mix of photography and graphics, though close to 16 percent want to see more photographs and graphics. The frequency of publishing bimonthly received an 83 percent approval rating. While 69 percent said they like the 11" x 17" format, 27 percent would prefer an 8 1/2" x 11" size.

Ninety-four percent rate the articles as generally the right length, and a majority (88 percent) thinks the main articles contain the right amount of technical detail.

Readers pass along *Review* after reading it. Forty-six percent give it to between one and five other people, 12 percent pass it on to between six and 10 people, and 9 percent say that more than 10 people read their copy. In all, this indicates we have up to 27,000 readers each issue.

Review readers continually seek out information that will enable

them to enhance plant performance and help them continue to be more effective in the work place. Many provided suggestions for future articles. These included international information, success stories on the use of NUCLEAR NETWORK[®], and industry use of INPO programs and their value to the industry.

We hope to address many of these topics in upcoming issues. Numerous readers, for example, wanted to know more about INPO's loaned employee program. As a result, the May/June issue included a feature article about

the involvement of five nuclear employees in the program.

Thanks again

There you have it, the results of *Review*'s reader survey. Thanks to all readers who took the time to answer our questions and offer their suggestions. Your feedback will help us do our job better so we can make *Review* more valuable to you on your job.

In addition, you may always use the reply form, located each issue on *Review*'s back page, to provide us with feedback and article suggestions. ■



Evaluators Robert Futch (left) and Lou Cortopassi, both of the Operations Department, discuss an article in a recent issue of *Review*. Futch is on loan to INPO from Farley Nuclear Plant.

and 7 percent are senior managers.

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