



## DEPARTMENTS

### EDITORIAL

ANS Technical Journals	14
At the ANS Nuclear Cafe	20
Backscatter	108
Calendar	6
Calls for Papers	12
Late News	17
Nuclear Notes	4
People	101
Recently Published	14

### ADVERTISING

Direct Answer	94
Index to Advertisers	93
Employment Ads Begin	107



### Coming up . . .

**December**—Special Section on Waste Management

**February**—Special Section on the Capabilities of the Nuclear Science User Facilities

### Members: View Nuclear News online!

At <[www.ans.org](http://www.ans.org)>, click on Member Center at the upper right of your screen. Log in with your email address and password (if you haven't already, you can create a password at <[account.ans.org](http://account.ans.org)>). Click on the heading for the current issue of *Nuclear News*.

## Special Section:

### Outage Management and Plant Maintenance 35

A unique approach to long-term reactor internals management  
BY CHAZ McFEATERS AND ROB DENIGHT 36

Perry's 29-day refueling outage is shortest in its operating history 42

Executing the Darlington refurbishment project—Year 1  
BY DICK KOVAN 50

Utility Working Conference: A closer look at Efficiency Bulletins 56

## Power 22

Turkey Point and St. Lucie plants prepared for Hurricane Irma landfall. Bechtel audit identified issues a year before Summer project cancellation. Renaissance Watch: An update on developments that may lead to new power reactors. Part owner Oglethorpe Power recommends completing Vogtle-3 and -4. Exelon to invest \$20 million in Quad Cities construction projects. NRC shifts Perry, Hope Creek in ROP action matrix. (See also Call for Papers, pp. 103–106, for the 2018 ANS Annual Meeting, June 17–21, Philadelphia, Pa.)

## Security 30

Engineer sentenced for selling nuclear secrets. DOE announces funding for grid resilience and security. HEU from Ghana's GHARR-1 research reactor returned to China. IAEA assessment finds China's nuclear security to be strong.

## International 70

Final major components installed at United Arab Emirates' Barakah plant. Brazil and China sign MOU on completing Angra-3. IAEA team reviews seismic safety at South Korea's Wolsong and Shin-Wolsong nuclear plants. Pre-restart inspection applications submitted for Japan's Genkai-3 and Ohi-3 and -4. Final freezing of "ice-wall" at Fukushima Daiichi approved. Pakistan's new prime minister inaugurates Chashma-4. Nuclear to remain key part of Ukraine's energy mix. NuScale Power launches SMR action plan for Britain.



p. 51

## Waste Management 76

Southern California Edison settles lawsuit over San Onofre spent fuel storage. DOE tests robot for decontamination and decommissioning work at Portsmouth Gaseous Diffusion Plant. Canadian Nuclear Safety Commission reviews draft environmental impact statement for Chalk River disposal facility. Government Accountability Office says DOE should plan for possible expansion of Waste Isolation Pilot Plant.

## Fuel 80

Lightbridge/Areva and X-energy/Centrus form partnerships for the development and manufacture of advanced nuclear fuel. IAEA fuel bank storage facility completed in Kazakhstan. Oman to fully fund Spain's Salamanca uranium mine; other business developments.

## Isotopes & Radiation 84

Cassini-Huygens spacecraft completes mission after two decades in space. Lawsuit against owners of NUMEC fuel plant dismissed.

## Education, Training & Workforce 86

ORISE releases results of 2016 survey on nuclear engineering degrees. IAEA course improves regulation drafting skills.

## Industry 88

GE Hitachi and ACR Nuclear advance SMR collaboration; other business developments. OneAIM wins Sellafield contract; other pacts. Various relay issues, software errors discovered; other 10 CFR Part 21 reports.

## Standards & Documentation 99

Standards approved and initiated, comments requested. NRC draft regulatory guide issued for comment; NUREGs issued.

## Editorial Staff

EDITOR & PUBLISHER

Betsy Tompkins

SENIOR EDITOR

Phyllis Ruzicka

ASSOCIATE EDITORS

Michael McQueen

Kaitlin Schuler

Tim Gregoire

Susan Gallier

INTERNATIONAL EDITOR

Dick Kovan

PRODUCTION EDITOR

Patricia A. Matas

DESIGN/DESKTOP EDITOR

Chris Salvato

CONTRIBUTING COLUMNISTS

Linda C. Byus

Bill Minkler

## Advertising & Circulation Staff

SALES MANAGER

Jeff Mosses

ADVERTISING/PRODUCTION

ASSISTANT MANAGER

Erica McGowan

ADVERTISING SALES ASSISTANT

Jessica Vazquez

## Editorial Advisory Committee

Jess C. Gehin, John G. Gilligan, and Kevan D. Weaver

## ANS Officers

PRESIDENT

Robert N. Coward

TREASURER

Darby S. Kimball

VICE PRESIDENT/  
PRESIDENT-ELECT

John E. Kelly

CHAIRMAN, ANS PUBLICATIONS

STEERING COMMITTEE

Donald G. Lorentz

## Administrative

EXECUTIVE DIRECTOR

Robert C. Fine

## ANS Headquarters

GENERAL NUMBER

708/352-6611

Fax 708/352-0499

www.ans.org

NUCLEAR NEWS EDITORIAL

708/579-8245

Fax 708/579-8204

nucnews@ans.org

NUCLEAR NEWS ADVERTISING

708/579-8226

800/NUC-NEWS

Fax 708/352-6464

www.ans.org/advertising

advertising@ans.org

INTERNATIONAL EDITOR

(DICK KOVAN)

902/455-3575

dkovan@ans.org

*Nuclear News* (ISSN: 0029-5574), Volume 60, Number 11. Published monthly (except during the month of April when issued twice monthly) by the American Nuclear Society, Incorporated, with business, executive, and editorial offices at 555 N. Kensington Ave., La Grange Park, Illinois 60526; telephone 708/352-6611. Subscription rate for 2017 is \$610, which includes complimentary electronic access, 2008 to current issue; for subscriptions outside North America, add \$70 for shipping and handling. Alternatively, subscription rate is \$535 for Electronic Access Only, 2008 to current issue. Single copy price (regular monthly issues) is \$48; add \$12 for postage and handling if being shipped to address outside North America. Single copy price for annual mid-April Buyers Guide is \$115; add \$15 for postage and handling if being shipped to address outside North America. Individual ANS members receive *Nuclear News* as part of membership. Replacement copies may be obtained at the single copy price, as long as copies are available. Inquiries about the distribution and delivery of *Nuclear News* and requests for changes of address should be directed to the American Nuclear Society. Allow six weeks for a change to become effective. POSTMASTER: Send change of address orders to *Nuclear News*, American Nuclear Society, 555 N. Kensington Ave., La Grange Park, Illinois 60526, or <nucnews@ans.org>.

*Nuclear News* is printed in New Richmond, Wis. 54017, by St. Croix Press, Inc. Nonprofit periodicals postage paid at La Grange, Illinois, and at additional mailing offices. Copyright © 2017 by the American Nuclear Society, Inc. Trademark registered in USA and Canada.

Opinions expressed in this publication by the authors are their own and do not necessarily reflect the opinions of the editors, the American Nuclear Society, or the organizations with which the authors are affiliated, nor should publication of author viewpoints or identification of materials or products be construed as endorsement by this publication or by the Society.

Texts of most *Nuclear News* articles are available on the LexisNexis database, from Mead Data Corporation.