

# RSIC Newsletter

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## Oak Ridge National Laboratory

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*It's the men behind who "make" the man ahead.—Merle Crowell*

## NCRP Moves to Involve Other Organizations

The National Council on Radiation Protection and Measurements (NCRP) Annual Report for 1991 describes efforts to involve other organizations in the Council's work. Firstly, the list of those given the opportunity to review drafts of NCRP reports will be expanded to open the review to the members of Collaborating Organizations. Review was limited to members of the Council and those organizations participating in the special liaison program (primarily government agencies). With more than forty professional and scientific organizations with a strong interest in radiation protection and measurement, the NCRP expects to capitalize on their ability to identify issues that need to be treated in NCRP reports and to assess the potential impact of proposed recommendations.

Secondly, a decision was made to expand the list of Collaborating Organizations. The NCRP recognizes that the Collaborating Organizations can provide input to its activities from a wider segment of the community. At the same time, the relationships established with these organizations encourage wide dissemination of information about the Council's activities, interests, and concerns.

The publication of several NCRP reports was also noted in the annual report. They can be obtained from NCRP, 7910 Woodmont Ave., Suite 800, Bethesda, MD 20814.

NCRP Report No. 108, *Conceptual Basis for Calculations of Absorbed-Dose Distributions*

NCRP Report No. 109, *Effects of Ionizing Radiation on Aquatic Organisms*

NCRP Report No. 110, *Some Aspects of Strontium Radiobiology*

NCRP Report No. 111, *Developing Radiation Emergency Plans for Academic, Medical or Industrial Facilities*

Commentary No. 6, *Radon Exposure of the U.S. Population—Status of the Problem*

Commentary No. 7, *Misadministration of Radioactive Materials in Medicine—Scientific Background*

Proceedings No. 12, *Health and Ecological Implications of Radioactively Contaminated Environments*

## CHANGES TO THE COMPUTER CODE COLLECTION

Two changes were made to the computer code collection during the month. The contributor of an existing version provided corrections to the code and an existing code package was replaced with a newly frozen version.

### CCC-522/VARSKIN

The contributors of this package at Battelle Pacific Northwest Laboratory, Richland, Washington, have provided a correction to the Pa-234 entry in the BETADATA.DAT file. Users may write RSIC for information on how to correct the file. VARSKIN computes the radiation dose to the skin from radioactive contamination of the skin. The dose is computed at a specified depth from a source, ranging in size from a point to a disk having the 100-cm<sup>2</sup> area. VARSKIN runs on an IBM PC with 640 K random access memory. An 8087 math coprocessor is desirable. The Microsoft Version 3.31 was used to create the executable files in the package. References: NUREG/CR-4418, PNL-5610 (Aug. 1987); *Health Physics* 58(5), 665. Fortran 77; IBM C.

### CCC-545/SCALE-4.1

A newly frozen version of this modular code system for performing standardized computer analyses for licensing evaluation has been contributed by Technical Applications of the Computing and Telecommunications Division of Oak Ridge National Laboratory. The SCALE system was developed for the NRC to satisfy a need for a standardized method of analysis for the evaluation of nuclear fuel facility and package designs. SCALE-4.1 incorporates minor changes to correct errors or deficiencies in SCALE-4.0 and runs on either IBM mainframes under MVS or Cray computers under UNICOS. Some enhancements and additions include:

- 1) SAS2 — Capability was added to deplete light element nuclides in the clad, and a modification was made to the area and volume calculations to

properly handle fuel lattices on a triangular pitch.

- 2) ENDF/B-V fission yields were added to the ORIGEN-S large fission-product library, and the small fission-product library was removed.
- 3) To facilitate stand-alone operation of the ORIGEN-S code, 36 sets of ORIGEN-S burn-up dependent libraries were added.
- 4) An AMPX utility module CORECTOL was added to allow conversion of old SCALE (AMPX master) libraries to the form required by NITAWL-II.
- 5) A new PC input processor for the SCALE criticality sequences called OFFSCALE was added.
- 6) A new PC input processor for ORIGEN-S called ORIGINATE has been added.
- 7) XSDRN and KENOV.a sample cases have been rewritten to use the 27 group neutron library.

COMMENT, a program to convert the source files between IBM and Cray, is included to facilitate code conversion. The IBM version was compiled under OS/VS2 using the IBM VS compiler (Level 2.2.0) and Assembler level H on an IBM 3090 computer. The Cray version was compiled using CFT77 on a Cray X-MP under UNICOS version 6 and is written in Fortran, with the exception of one C routine.

The changes required to convert HEATING6.1 and the other thermal analysis modules from Fortran IV to "standard" Fortran 77 are extensive and involve a restructuring of the code. Since there have been no changes to the thermal analysis modules from the SCALE-4.0 release, they run only on the IBM and have not been implemented under

UNICOS.

The package requires three 9-track, 2400-foot, 6250-bpi tapes for transmittal, plus one DS/HD (1.2 or 1.44 MB) diskette for transmittal. We can write the tapes either IBM standard label or non-label (either EBCDIC or ASCII). The contributors have

prepared some notes to recipients which are available to users upon request in order to review changes. References: NUREG/CR-200, ORNL/NUREG/CSD-2/R4 Volumes 1, 2, and 3 (Draft March 1992). Fortran 77 and Assembler for IBM and Fortran 77 and C for Cray.

## CONFERENCES, COURSES, SYMPOSIA

RSIC attempts to keep its users/contributors advised of conferences, courses, and symposia in the field of radiation protection, transport, and shielding through this section of the newsletter. Should you be involved in the planning/organization of such events, feel free to send your announcements and calls for papers to RSIC.

### Two ANS Topicals Issue Call for Papers

#### Emergency Preparedness Topical

The Long Island Section and the Environmental Sciences Division of the American Nuclear Society (ANS) has issued the first call for papers for the *4th Topical Symposium on Emergency Preparedness and Response*, to be held April 26–29, 1993, in Long Island, New York. The symposium will focus on the expanding responsibilities of the emergency planner in new phases of the nuclear industry and in non-nuclear areas. Papers are requested on the following and related topics:

- ! Emergency Preparedness during outages, fuel handling and decommissioning; Emergency Preparedness for transport of irradiated fuel; Emergency Preparedness for non-commercial facilities; new regulations and guidance.
- ! How new technologies are being used to assist in the assessment of emergencies and the implementation of procedures, including geographical information systems, PC-based interactive response procedures, and new algorithms being used for determination of Protective Actions.
- ! How new communications technologies have changed the way the media responds to emergencies; how Emergency Preparedness personnel need to be prepared for the new media.
- ! How the lessons learned in the development of nuclear power plant emergency plans are being applied to other emergencies, including hurricanes, ice storms causing large electric power disruptions, oil and toxic material spills, and gas emergencies.

The deadline for submission of the title and a 50-word summary is **May 15, 1992**. Summaries should be submitted to Brant Aidikoff, Technical Program Chairman, LIANS, Box 436, Upton, New York 11973 (phone 516-436-4256).

#### Visitors to RSIC

During the month the following persons came for an orientation visit and/or to use RSIC facilities: *D. Hunter*, of Kadena AFB, Okinawa; *S. K. Benesch*, Fermi National Accelerator Laboratory, Batavia, Illinois; *Jack Courtney*, Louisiana State University, Baton Rouge; and *J. Petraglia*, Sandia National Laboratory, Albuquerque, NM.

## Reactor Operations Experience

The Long Island Section and the ANS Reactor Operations Division is sponsoring the *16th Biennial ANS Topical Meeting on Reactor Operations Experience: Present & Future Technologies—Applying Lessons Learned*, to be held August 15–19, 1993, in Long Island, New York. The Symposium will provide an international forum for the discussion of the technical and scientific issues based on the collective operation experience of both commercial power reactors and test, research, and training reactors. Authors are invited to submit papers on topics related to accident management, facility management, plant performance, operator training and performance, innovations in procedures, maintenance improvements, applications of PRA, control room enhancements, advance instrumentation and control, plant modifications, life extension, use of simulators, self assessment and root cause analysis, surveillance testing, TRTR activities, DOE class A&B reactors, and new reactor design. The deadline for submission of three copies of 1000-word summaries is **August 1, 1992**. Submit your summaries to Robert E. Hall, Brookhaven National Laboratory, Bldg. 130, Upton, New York 11973 (phone 516-282-2144, Fax 516-282-3957).

## Calendar

Your attention is directed to the following events of interest.

### May 1992

*4th World Conference on Neutron Radiography*, May 11–14, 1992, San Francisco. Contact: Lolita Cox, Technical Secretary, WCNR-4, P.O. Box 1217, North Highlands, CA 95660 (phone 916-922-9263).

*Radiation Protection Instrumentation*, May 11–15, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

*Radiation Safety Principles and Procedures*, May 11–15, 1992, Raleigh, North Carolina, a short course sponsored by North Carolina State University. Contact: K. V. Mani, Nuclear Engineering Dept., Burlington Engineering Laboratories, Box 7909, North Carolina State University, Raleigh, NC 27695-7909 (phone 919-515-3385).

*Simulation of Subsurface Flow and Contaminant Transport by Finite Element and Analytical Methods*, May 11–15, 1992, Penn State. Contact: Barbara Impellitteri, Penn State, 410 Keller Conference Center, University Park, PA 16802-1304 (fax 814-865-3749).

*Counting Statistics*, May 12–15, 1992, Chicago, a

technical short course offered by Woodson Associates, Inc., P.O. Box 2665, Gaithersburg, MD 20886 (phone 301-990-0751, Fax 301-990-6153).

*8th International Radiation Protection Association Conference*, May 17–22, 1992, Montreal, Canada. Contact: G Webb, NRPB, IRPA 8 Secretariat, Chilton, Didcot, Oxon OX11 0RQ, United Kingdom.

*Occupational Internal Dosimetry*, May 18–22, 1992, Oak Ridge, Tennessee, a short course sponsored by the Oak Ridge Associated University, REAC/TS. Contact: Registrar, REAC/TS, ORAU, P.O. Box 117, Oak Ridge, TN 37831-0117 (phone 615-576-3131).

*Meeting on Radiation Safety in Uranium Mining*, May 25–29, 1992, Saskatoon, Sask., Canada. Contact: L. D. Brown, Canada phone 306-787-4486.

*International Symposium on Numerical Transport Theory*, May 26–28, 1992, in Moscow. Contact: Prof. T. A. Germogenova, The Keldysh Institute of Applied Mathematics, USSR Ac. of Sci., Miusskaya Sq. 4, Moscow A-47, 125047, USSR (fax 095-972-0737). Participants from the U.S. may contact Prof. Paul Nelson, Dept. of Nuclear Engg., Texas A&M University, College Station, TX 77843-3133 (fax 409-845-6443).

### June 1992

*32nd Annual International Conference of the Canadian Nuclear Association and the 13th Annual Conference of the Canadian Nuclear Society*, June 7–10, 1992, Saint John, New Brunswick. Contact CNA/CNS, 144 Front St. W, Suite 725, Toronto, Ont., Canada M5J 2L7 (phone 416-977-7620).

*American Nuclear Society Annual Meeting*, June 7–11, 1992, Boston, Massachusetts. Contact: Mary Keenan, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 708-352-6611).

*10th Topical Meeting on Technology of Fusion Energy*, June 7–11, 1992, Boston, Massachusetts, sponsored by the American Nuclear Society and the U.S. Department of Energy. Contact: Stephen O. Dean, Fusion Power Associates, 2 Professional Drive, Suite 248, Gaithersburg, MD 20879 (phone 301-258-0545).

*Embedded Topical Meeting on Risk*

*Management—Expanding Horizons*, Boston, June 8–10, 1992, sponsored by several ANS divisions and other organizations. Contact: Technical Program Chair Ronald A. Knief, ERCE, P.O. Box 7010, Mechanicsburg, PA 17055-7010 (phone 717-691-1141) or ANS Meeting Dept. 555 N. Kensington Ave., La Grange Park, IL 60525 (phone 708-579-8258).

*Environmental Radiation Surveillance*, June 8–12, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

*In-Place Filter Testing Workshop*, June 8–12, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

*Planning for Nuclear Emergencies*, June 15–19, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

**July 1992**

*1992 Nuclear and Space Radiation Effects Conference*, July 13–17, 1992, in New Orleans. Contact: Nelson S. Saks, NSREC Technical Program Chairman, Naval Research Laboratory, Code 6813, 4555 Overlook Ave., Washington, DC 20375-5000 (phone 202-767-2534, Fax 202-767-0546).

*Management and Disposal of Radioactive Wastes*, July 13–17, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

*Techniques in Nuclear Radiation Shield Analysis*, July 13–17, 1992, a course sponsored by the University of Texas at Austin. Contact: Continuing Engineering Studies, The University of Texas at Austin, College of Engineering, ECJ 10.324, Austin, TX 78712 (phone 512-471-3506, Fax 512-471-0831).

*15th International Conference on High Energy Accelerators*, July 20–24, 1992, Hamburg, Fed. Rep. of Germany. Contact: F. Willeke, Deutsches Elektronen-Synchrotron, Notkestrasse 85, 2000 Hamburg 52, FRG

*Advanced Workshop on Nuclear Emergency Planning*, July 20–24, 1992, Boston, Massachusetts, a short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

**August 1992**

*SLOPOS5, 5th International Workshop on Slow-Positron Beam Techniques for Solids & Surfaces*, Aug. 6–10, 1992, Jackson Hole, Wyoming, USA. Contact: Eric H. Ottewitte, Idaho National Engineering Laboratory, P.O. Box 1625, Idaho Falls, ID 83415-2114 USA (phone 208-526-1751; Fax 208-526-9267).

*Basic Radiation Safety & Management*, Aug. 13–14, 1992, Newport Beach, California, a seminar presented by Stan A. Huber Consultants, Inc. Contact: Stan A. Huber Consultants, Inc., 200 N. Cedar Road, New Lenox, IL 60451 (phone 815-485-6161; Fax 815-485-4433).

*Nuclear Technologies for Space Exploration*, Aug. 16–19, 1992, Jackson Hole, Wyoming. Contact: Dr. David Woodall, University of Idaho, College of Engineering, Moscow, ID 83843 (phone 208-885-6479).

*Occupational and Environmental Radiation Protection*, Aug. 17–21, 1992, Boston, Massachusetts, a

short course offered by Harvard School of Public Health. Contact: Mary F. McPeak, Assoc. Dean for Continuing Education, 677 Huntington Ave., Boston, MA 02115 (phone 617-432-1171; Fax 617-432-1969).

*Spectrum 92: ANS Topical Meeting on Nuclear and Hazardous Waste Management*, Aug. 23–27, 1992, Boise, Idaho. Contact: Technical Program Chair Dieter Knecht, WINCO, P.O. Box 4000, MS-5213, Idaho Falls, ID 83403 (phone 208-526-3627).

### September 1992

*IRRMA '92, Topical Meeting on Industrial Radiation and Radioisotope Measurement Applications*, Sept. 8–11, 1992, Raleigh, North Carolina. Contact: William F. Troxler, Troxler Electronic Laboratories, Inc., P.O. Box 12057, Research Triangle Park, NC 27709 (phone 919-549-8661).

*8th International Meeting on Radiation Processing*, Sept. 14–19, 1992, Beijing, China, sponsored by the International Atomic Energy Agency. Contact: International Meeting on Radiation Processing, P.O. Box 1012 (30), Beijing 100 822, China.

*6th Annual INEL Computing Symposium*, Sept. 22–24, 1992, Idaho Falls. Contact: Teri Williams, EG&G Idaho, Inc., P.O. Box 1625, Idaho Falls, ID 83415-2602 (phone 208-526-9728).

*14th International Conference on Plasma Physics and Controlled Nuclear Fusion Research*, Sept. 30–Oct. 7, 1992, Wuerzburg, Germany, sponsored by the International Atomic Energy Agency. Contact: IAEA, Conference Service Section, P.O. Box 100, A-1400 Vienna, Austria.

### October 1992

*International Symposium on Nuclear Data Evaluation Methodology*, Oct. 12–16, 1992, Upton, New York,

sponsored by Brookhaven National Laboratory. Contact: C. L. Dunford, Brookhaven National Laboratory, NNDC/197D, Upton, New York 11973.

*Selection and Preparation of Witnesses for Environmental Litigation*, Oct. 22–23, 1992, a course sponsored by the University of Texas at Austin. Contact: Continuing Engineering Studies, The University of Texas at Austin, College of Engineering, ECJ 10.324, Austin, TX 78712 (phone 512-471-3506, Fax 512-471-0831).

### November 1992

*1992 ANS/ENS International Meeting*, Nov. 15–20, 1992, Chicago. Contact: General Chair James D. Shiffer, Pacific Gas & Electric Co., 77 Beale St., San Francisco, CA 94106 (phone 415-973-4684).

*Basic Radiation Safety & Management*, Nov. 19–20, 1992, Chicago, Illinois, a seminar presented by Stan A. Huber Consultants, Inc. Contact: Stan A. Huber Consultants, Inc., 200 N. Cedar Road, New Lenox, IL 60451 (phone 815-485-6161; Fax 815-485-4433).

### April 1993

*Joint International Conference on Mathematical Methods and Supercomputing in Nuclear Applications*, Apr. 19–23, 1993, Karlsruhe, Germany. Contact: H. Kuesters, KFK/INR, Postfach 3640 D-W-7500 Karlsruhe 1, Germany, or W. Werner, GRS, D-W-8046 Garching, Germany.

*4th Topical Symposium on Emergency Preparedness and Response*, to be held April 26–29, 1993, in Long Island, New York. Contact: Brant Aidikoff, Technical Program Chairman, LIANS, Box 436, Upton, New York 11973 (phone 516-436-4256).

## MARCH ACCESSION OF LITERATURE

The following literature cited has been ordered for review, and that selected as suitable will be placed in the RSIC Information Storage and Retrieval Information System (SARIS). This early announcement is made as a service to the shielding community. Copies of the literature are not distributed by RSIC. They may generally be obtained from the author or from a documentation center such as the National Technical Information Service (NTIS), Department of Commerce, Springfield, Virginia 22161.

*RSIC maintains a microfiche file of the literature entered into SARIS, and duplicate copies of out-of-print reports may be available on request. Naturally, we cannot fill requests for literature which is copyrighted (such as books or journal articles) or whose distribution is restricted.*

This literature is on order. It is not in our system. Please order from NTIS or other available source as indicated.

## RADIATION SHIELDING LITERATURE

**Book.** . *Tables and Graphs of Atomic Subshell and Relaxation Data Derived from the LLNL Evaluated Atomic Data Library (EADL), Z=1-100.* . Perkins, S.T.; Cullen, D.E.; Chen, M.H.; Hubbell, J.H.; Rathkopf, J.; Scofield, J. . October 1991

**BNL-19302, Vol. I.** . *Cross Section Evaluation Working Group Benchmark Specifications.* . September 1991

**BNL-NCS-17541 4th Edition.** . *ENDF/B-VI Summary Documentation.* . Rose, P.F. ed. . October 1991

**BNL-NCS-44945 Rev 10/91.** . *Data Formats and Procedures for the Evaluated Nuclear Data File ENDF-6.* . Rose, P.F., ed. . October 1991

**Health Phys., 62, 190-193.** . *An Intercomparison of Neutron Dosimeters and Detectors for In-Containment Dosimetry.* . Auman, L.E.; Miller, W.H.; Graham, C.C.; Stretch, C.D.; Welty, T.J.; West, L. Jr. . September 1991

**Health Phys., 61, 843-848.** . *Monte Carlo Calculation and Silicon Detector Measurement of the Hot Particle Dose.* . Chung, M.; Levine, S.H.; Jester, W.A. . December 1991

**Health Phys., 62, 16-28.** . *Fallout Risk Following a Major Nuclear Attack on the United States.* . Harvey, T.F.; Shapiro, C.S.; Wittler, R.F. . January 1992

**Health Phys., 62, 2-9.** . *Determining the Lower Limit of Detection for Personnel Dosimetry Systems.* . Roberson, P.L.; Carlson, R.D. . January 1992

**Health Phys., 62, 215-222.** . *Neutron Response of a Polyethylene-Moderated Superheated Drop Detector.* . Wang, C.K.C. . March 1992

**Health Phys., 62, 223-227.** . *Detection and Determination Limits for Thermoluminescence Dosimetry.* . Hirning, C.R. . March 1992

**Health Phys., 62, 228-234.** . *Application of Glow Curve Analysis Methods to Improve TLD-100 Dose Reassessment Performance.* . Delgado, A.; Gomez Roz, J.M.; Muniz, J.L.; Portillo, J.C. . March 1992

**Health Phys., 62, 250-256.** . . Steidley, K.D.; Greener, A.W. . March 1992

**Health Phys., 62, 29-40.** . *Internal Dose Following a Major Nuclear War.* . Peterson, K.R.; Shapiro, C.S. . January 1992

**Health Phys., 62, 58-64.** . *Environmental Dose Assessment for Low-Level Radioactive Effluents Discharged from Tokai Reprocessing Plant.* . Shinohara, K.; Asano, T. . January 1992

**Nucl. Sci. Eng., 110, 237-253.** . *A Multidimensional Multigroup Diffusion Model for the Determi-*

*nation of the Frequency-Dependent Field of View of a Neutron Detector.* . van der Hagen, T.H.J.J.; Hoogenboom, J.E.; van Dam, H. . September 1991

**Nucl. Sci. Eng., 110, 254-261.** . *Unbiased Combinations of Nonanalog Monte Carlo Techniques and Fair Games.* . Booth, T.E.; Pederson, S.P. . September 1991

**Nucl. Sci. Eng., 110, 262-274.** . *Boundary Conditions to Describe the Reactor Reflector.* . Temesvari, E.; Makai, M. . September 1991

**Nucl. Sci. Eng., 110, 275-281.** . *Distributed Neutron Sources in a Semi-Infinite Medium.* . Ganapol, B.D. . October 1991

**Nucl. Technol., 97, 253-263.** . *Generation of a Library for Reactor Calculations and Some Applications in Core and Safety Parameter Studies of the 3-MW Triga Mark-II Research Reactor.* . Bhuiyan, S.I.; Khan, A.R.; Sarker, M.M.; Rahman, M.; Ara, Z.G.; Musa, M.; Mannan, M.A.; Mele, I. . July 1991

## COMPUTER CODES LITERATURE

CTA-IEA v-R1-011/87 (In Portuguese) . . . . . ENDF/B-V

Comments on ENDF/B-V Covariance Files and Data Interpretation Subroutines. . . . . Borges, A.A.; Vasconcelos, M.P. . . . . Centro Tecnico Aeroespacial; Sao Jose dos Campos, SP, Brazil. . . . . 1987. . . . . INIS MF only

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A Computer Model to Determine the Primary Contributors to Relative Radiation Dose Received by Astronauts. . . . . Lazareth, O.W.; Divadeenam, M.; Ludewig, H.; Powell, J.R. . . . . American Institute of Physics. . . . . January 1991

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Radiation Effects on Polyethylenes. . . . . Suzuki, T.; Oki, Y.; Numajiri, M.; Miura, T.; Kondo, K.;

- Tanabe, Y. Ishiyama, M.; Ito, Y. . . National Laboratory for High Energy Physics, Tsukuba, 305, Japan; Mitsui Petrochemical Industries, Chiba, 299-01, Japan; University of Tokyo, Tokaimura, 319-11, Japan. . . November 1991
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Reference Manual for the CONTAIN 1.1 Code for Containment Severe Accident Analysis. . . . . Washington, K.E.; Murata, K.K.; Gido, R.G; Gelbard, F.; Russell, N.A.; Billups, S.C.; Carroll, D.E.; Griffith, R.O. . . . Sandia National Labs., Albuquerque, NM; NRC, Washington, D.C. . . . July 1991. . . INIS MF;
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