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## NRC-Developed System Codes Now Running on PCs

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For the past 30 years, the government and the nuclear industry have invested hundreds of millions of dollars for research and technical assistance programs to better understand how nuclear power reactors behave under normal, off-normal, and severe accident conditions. Most of the knowledge acquired from these programs has been assimilated into major computer codes that describe nuclear reactor behavior and accident consequences under various scenarios. Until very recently, most of these codes were so large and complex that they could run effectively only on such mainframe systems as the CRAY and the Control Data Corporation CDC 7600. As a result, staff members who needed to get information from these codes had to use the codes on a mainframe computer system operated by outside contractors. This has resulted in such unfavorable and costly consequences to the agency as:

1. High cost and long waiting times for results of requested computer runs;
2. Restriction of runs to major problems with no allowance for multiple "what if" runs to help the staff analyze multiple accident scenarios;
3. Isolation of the users from the intimate physical and mathematical details of the codes required to familiarize themselves with the codes' strengths and weaknesses; and

4. Overreliance on the contractor for evaluation of the results.

Now, however, the situation is changing rapidly. The swift advances in personal computer technology are making it possible for NRC staff to run many of the NRC computer codes on PCs (with standard enhancements) at their workplace. To take advantage of this improving state of affairs, the Office of Nuclear Regulatory Research (RES) has recently contracted through the Small Business Innovative Research (SBIR) program for the development of PC-based full-scale versions of many NRC codes complete with plotting packages and a user-friendly interface program. The contractor, Risk Management Associates, inc. (RMA), also supplied the source codes as well as a compilation system on five "enhanced" PCs. The staff can therefore not only run these codes on site, but can also examine, modify, and recompile the original source code, if necessary, for specialized scenarios or "what if" problems.

Compiled versions of these codes can be run on an IBM-PC-compatible desktop computer with an Intel 80386 main CPU (central processing unit), an Intel 80387 math coprocessor, and 7 megabytes of extended RAM (random access memory). Codes such as CORCON, FRAPCON, MINET, and PRAMIS require less RAM, but any code can be executed if sufficient RAM is available. As stated earlier, the source codes are also available along with the compilation tools required to allow users to modify the code on the five special PCs supplied by RMA.

Future modifications to the five RMA-supplied PCs are expected to decrease, by an order of magnitude, the execution times for typical problems by using the new Reduced Instruction Set Chip (RISC) processor running in the background under the new Windows 3.0 environment. Thus users of the RMA machines can have full use of their PCs for other tasks while simultaneously executing long-running MELCOR or RELAP5 problems on the RISC chip board.

In addition to the RMA-supplied codes listed above, RES also has PC versions of other codes of use to the NRC staff. The IRRAS (discussed in the May 1991 *Research News*) and SARA codes can be used to do fault tree analyses and front-end PRA computations. Finally, RES has recently developed and obtained computer codes for analysis of toxic gases and radionuclides in reactor control rooms as part of the resolution of Generic Issue 83, "Control Room Habitability." These codes have been named CRH, EXTRAN, and FRFP and are being tested by both RES (SAIB) and NRR.

It should be noted that running some of the more complex codes such as RELAP, MELCOR, and SCDAP/RELAP requires (1) experience in understanding the underlying principles used in each code, (2) familiarization with and access to input data and (3) proper interpretation and usage of the output files. Thus the user should have access to user manuals for the codes and, preferably, some formal training and guidance.

In conclusion, RES developed a PC-based calculational capability whereby the NRC staff can perform in-house analyses using codes developed by the agency over the past 25 to 30 years. This capability does not eliminate the need for contractual projects; however, it does allow the staff to expend agency funds more efficiently and to gain a better understanding of the strengths and weaknesses of our current analysis packages.

The 16 codes currently (or soon to be) on site at Nicholson Lane/South are listed here, and an asterisk indicates codes currently available.

- **MELCOR\***  
A severe accident code for core, containment, and fission product behavior used in PRA (probabilistic risk assessment) analyses
- **RELAP5\***  
A thermal-hydraulic systems code for both PWR and BWR general system applications.
- **MACCS\***  
A consequence analysis code for radiological effects of fission product release scenarios.
- **CONTAIN\***  
A general containment behavior code, most of which is embedded in MELCOR.
- **STCP\***  
The Source Term Code Package is a group of severe accident codes with a function similar to MELCOR but made up of earlier codes such as MARCH, TRAP/MELT, and CORCON (see below).
- **CORCON\***  
A code describing the behavior of liquid corium and concrete interactions.
- **ORIGEN2\***  
A code that computes the core inventory of fission products.
- **BWRSAR\***  
A core behavior code for severe accidents in BWRs (some modules are being incorporated into MELCOR).
- **EVNTREE**  
A code that processes event trees in PRAs to calculate their frequencies of occurrence (used in NUREG-1150).
- **PRAMIS**  
A code that computes risk for given sequence frequencies and consequence analyses (used in NUREG-1150).

- **XSOR**  
A parametric code for computing source terms for various scenarios. For a specific source term via a MELCOR or STCP calculation, XSOR approximates the total source term (used in NUREG-1150).
- **FRAPCON**  
A steady-state operation fuel element behavior code.
- **FRAP-T6**  
A transient (LOCA, ATWA, etc.) fuel element behavior code.
- **MARCH\***  
An early severe accident core behavior code used in STCP.
- **MINET\***  
A thermal-hydraulic behavior code for analyzing transients in liquid-metal reactors.
- **SCDAP/RELAP**  
A highly detailed core and thermal-hydraulic behavior code for severe accident and accident management analyses.

## **RES/WBB and CNWRA Sponsor Workshop**

### **DRA/WMB**

On July 23-25, the RES Waste Management Branch (WMB) and the Center for Nuclear Waste Regulatory Analyses (CNWRA) sponsored a workshop in San Antonio, Texas, on the role of natural analogs in geologic disposal of high-level nuclear waste. Approximately 50 technical experts from throughout the United States met to discuss the potential uses and applicability of natural analogs to the problems facing the HLW disposal program. Dr. Linda Kovach (RES/WMB), the NRC project manager for the workshop, Dr. Ralph Cady (RES/WMB), Dr. John Bradbury (NMSS/HLHF), and Dr. William Ott (RES/WMB) participated in the workshop along with representatives from CNWRA and the Department of Energy and its contractors. Technical experts were invited to bring in special perspectives in such areas as vol-

canism, regional tectonics, and oil and mineral exploration.

The first day was devoted to background presentations to develop a common base for the working group sessions. The second and third days involved discussions in four working groups: Waste Package/Waste Form, Near-Field Processes/Environment, Far-Field Processes/Environment, and Tectonics/Volcanism. The final session involved a summary presentation from each working group and an open discussion of the working group summaries. Aside from specific technical recommendations, it was clear that almost all participants agreed on several aspects of the use of analogs:

1. Significant effort needs to be applied to understanding how repository processes and systems work on the spatial (kilometers) and temporal (thousands of years) scales pertinent to repository performance. In order to have "reasonable assurance" that predictive methods are credible, they must be supported by data relevant to these scales and time periods.
2. Natural analogs are the only way to address model applicability over the regulatory periods of concern. They are also the best source of information for large-scale systems.
3. Natural analog studies need to be carefully evaluated against appropriate criteria aimed at ensuring the applicability of their results. Such criteria have been proposed by the Natural Analog Working Group (NAWG) sponsored by the Commission of the European Communities. The NRC representative to NAWG is Dr. Kovach.
4. Appropriate natural analogs represent opportunities that must be carefully developed. The scope is often too large for one sponsor to handle. International cooperative efforts that maximize the effectiveness of the investigations and ensure involvement of the best technical experts offer the best chance of success (e.g., the International Alligator Rivers Analog Project, which is supported by five countries).

## Variations in Material Properties of Linde 80 Weld Metal Measured

DE/MEB

The staff of the Heavy Section Steel Irradiation Program at Oak Ridge National Laboratory are completing work to measure and document the variation in copper content and initial Charpy-V and RT<sub>NDT</sub> properties of Linde 80 weld metal from the reactor vessel of the canceled Midland plant. It is noted that Linde 80 weld metal was used in fabricating the Yankee Rowe reactor vessel. The Midland specimens were from the beltline circumferential weld and the circumferential weld joining two shell courses at the main coolant nozzle elevation. The weld wire and flux are typical of the wire and flux used for some 16 other reactor vessels fabricated by Babcock and Wilcox.

The variation in weld metal properties representing the entire circumference and through the thickness is:

Copper content	0.21 to 0.46%
RT <sub>NDT</sub>	-22 to +54°F
CV upper shelf	66 to 79 ft-lb

This wide variation in such critical properties has been suspected but had not been documented so dramatically. These data were used by the RES staff in the sensitivity study of the Yankee Rowe reactor that served as background for the Commission decision on Yankee Rowe on July 31, 1991. The data will be added to the data base for future probabilistic analyses of the 17 reactor vessels containing Linde 80 weld metal.

### 30 Titles Added to Listing of NPAR Reports

N. N. Kondic, DE/EMEB, and E. L. Hill,  
PMPDAS/RES

Revision 2 to NUREG-1377, "NRC Research Program on Plant Aging: Listing and Summaries of Reports Issued Through June 1991," published in July, added 30 titles to the listing of reports generated in the Nuclear Plant Aging Research (NPAR) program. NUREG-1377, first published in 1989

and revised in 1990, was prepared to assist those involved in addressing the aging and the potential for license renewal of nuclear power plants to locate information being generated in the NPAR program. Revision 2 contains a listing and index of reports that were issued through June 1991 and summaries of those reports. Each summary describes the elements of the research covered in the report and outlines the significant results. For the convenience of the user, the reports are indexed by personal author, corporate author, and subject.

The NPAR program, conducted by RES, is a comprehensive hardware-oriented engineering research program focused on understanding the aging mechanisms of components and systems in nuclear power plants. The program also focuses on methods for simulating and monitoring the aging-related degradation of these components and systems. In addition, it provides recommendations for effective maintenance to manage aging and for the implementation of the research results in the regulatory process.

Most of the reports generated in the NPAR program contain a description of the components or systems being examined and identify the principal stressors leading to aging. They frequently contain an analysis and statistical assessment of failure data obtained from Licensee Event Reports and other sources of component failure data for operating nuclear power plants. Current surveillance and monitoring practices are also reviewed and, when identifiable, recommendations are made for improvements.

### National Academy of Sciences Committee on Fracture Characterization and Fluid Flow Meets in Washington

DRA/WMB

The initial meeting of the National Academy of Sciences Committee on Fracture Characterization and Fluid Flow was held in Washington, DC. The principal objective of the committee is to prepare a study report that reviews, synthesizes, and integrates recent research concerning techniques and approaches to fracture characterization and fluid flow in rock fractures. The study is funded in

part by RES. RES was requested by the Committee Chair to provide a brief overview of NRC research issues and ongoing studies to address them. Short overviews were provided on nuclear waste, mining, tunneling, dams, and underground reservoirs (i.e., oil, gas, water, and geothermal) as they relate to fracture characterization and fluid flow. The committee prepared a draft study outline and is beginning a literature review.

### **Criteria Being Developed for Accident Management Plans**

A report, NUREG/CR-5543, "A Systematic Process for Developing and Assessing Accident Management Plans," that describes an approach for developing criteria to be used by NRC staff for assessing the adequacy of licensees' accident management programs has been issued. This report, the first of two on this approach, describes a prototype process for developing an accident management program based on the five framework elements of an accident management plan. Based on this process, a preliminary set of assessment criteria are derived. These preliminary criteria will be refined and improved after the prototype process is validated through application, which is currently in progress, and will form the basis for the second report.

### **Study Provides a Unified Interpretation of Thermal Mixing Experiments**

Thermal mixing in relation to pressurized thermal shock has been examined in experiments throughout the world in a variety of scales ranging from 1/5 to full scale. The University of California at Santa Barbara used the regional mixing model and the associated computer programs REMIX and NEWMIS to interpret these data in a comprehensive fashion. These interpretations indicate that cooldown transients and the degree of stratification can be predicted with confidence. The results of this work have been published in NUREG/CR-5677, "A Unified Interpretation of 1/5 to Full-Scale Thermal Mixing Experiments Related to Pressurized Thermal Shock." This report includes universal stratification solutions in graphical form and a simple procedure for hand calculation.

### **Report Published on Availability of Instrumentation During Severe Accidents**

NUREG/CR-5691, "Instrumentation Availability for a Pressurized Water Reactor With a Large Dry Containment During Severe Accidents," covers work by Idaho National Engineering Laboratory in support of the NRC Accident Management Research Program. It evaluates the availability of instruments to supply accident management information during a broad range of severe accidents for a pressurized water reactor with a large dry containment. Results from this evaluation include (1) identification of plant conditions that would affect instrument performance and information needs during severe accidents, (2) definition of envelopes or parameters that would be important in assessing the performance of plant instrumentation for a broad range of severe accident sequences, and (3) assessment of the availability of plant instrumentation during severe accidents. These results form a technical basis for NRC staff evaluation of industry's capability to effectively monitor and diagnose the progression of severe accidents, to prescribe preventive or mitigative actions, and to evaluate the effectiveness of accident management actions.

### **International Cooperative Group—Radiation Damage Mechanisms—Meets**

The third meeting of the International Cooperative Group—Radiation Damage Mechanisms (ICG-RDM) in Raleigh, North Carolina, was followed by a one-day workshop on the applicability of dpa (displacements per atom) as a damage parameter for reactor irradiations. The ICG-RDM, initiated by the NRC, is now an ad hoc group encompassing membership from eleven different countries to exchange information on detailed studies of reactor irradiation damage mechanisms. The members are limited to those actively involved in such studies at their home laboratories, so the discussions can get to the fine details of the radiation damage process. From such discussions, however, general conclusions are drawn concerning how damage is created and how it might be avoided, and what directions can be charted for future efforts. The group drew very close to agreement on

several damage mechanisms, including the effect of copper and the generation of matrix defects by knock-on atoms. Cooperation and exchange of materials between members continues to be outstanding; clearly, this is a primary benefit of this endeavor.

The workshop on the applicability of dpa as a damage parameter was equally well attended. Here, the peripheral issue of the influence of thermal neutrons on embrittlement of PWR support structures was also thoroughly discussed. While no clear answer was possible about thermal neutrons, the workshop did feel that dpa was the best possible damage parameter available for use today and should supplant the fluence greater than 1 MeV currently in use.

### **UMCP Conducts Experiments on Safety During Reactor Shutdown**

The University of Maryland at College Park (UMCP) has conducted a series of shutdown safety experiments in their thermal-hydraulic facility, which models Babcock and Wilcox (B&W) plant geometry. Parameters varied were those that could affect reflux cooling effectiveness during a loss of residual heat removal while in shutdown operation, e.g., water level, power level, venting, and feed and bleed operation, to obtain experimental data on the ability to establish reflux or boiler/condenser modes of cooling during shutdown. The issue of greatest concern is the pressure rise needed for steam to reach condensing surfaces in the steam generators when empty spaces in the reactor coolant system (RCS) are filled with air. If the pressure rise needed is sufficiently great, temporary structures in the RCS could be blown out, leading to a loss-of-coolant accident. There are effectively no applicable experimental data available. The UMCP facility is the only operational facility in the world modeling the B&W once-through steam generators. It is believed that the steam generator design is a key factor in the system response. As with most thermal-hydraulic experiments, the purpose of the UMCP experiments is to provide an understanding of the phenomena that occur, not a direct demonstration of power plant operation. Therefore, significant analyses of the experimental data will be re-

quired before the true significance to plant operation is understood.

### **Report Published on Severe Accident Management**

A report, NUREG/CR-5702, "Accident Management Information Needs for a BWR with a Mark I Containment," was issued as part of a program to identify plant information necessary for plant personnel to (1) diagnose that an accident is in progress, (2) select and implement strategies to prevent or mitigate the accident, and (3) monitor the effectiveness of these strategies. This study used the same methodology as a similar study reported in NUREG/CR-5513 (April 1990), which identified the information needs for a PWR with a large dry containment. The recent study concluded that there is insufficient instrumentation to determine if the containment remains inerted and if the containment boundary is being challenged once molten core material has penetrated the reactor vessel. A follow-on study is in progress to determine the effect of a wide range of severe accident environments on the capability of existing BWR instrumentation.

### **RES Hosts 19th Water Reactor Safety Meeting**

More than 600 persons—from the United States and abroad, and from government, industry, academia, public interest groups, and the NRC staff—attended the 19th Water Reactor Safety Information meeting sponsored by the Office of Nuclear Regulatory Research.

Chairman Selin opened the three-day session with a discussion of the priorities he has set for his tenure. Also at the opening session, Eric Beckjord, Director, RES, welcomed the participants. At the plenary session Tuesday afternoon, Mr. Beckjord discussed developments in the RES program.

Breakout sessions were held on a variety of topics including severe accident research, pressure vessel and piping integrity, advanced reactor research, metallurgy and nondestructive examination, structural engineering, aging of components, advanced passive light-water reactors,

human factors research, human factors issues related to advanced passive light-water reactors, severe accident policy implementation, earth sciences, probabilistic risk assessment, accident management, and thermal hydraulics. RES employees who were session chairs included Charles Ader, David Bessette, Jack Burns, Frank Coffman, James Costello, Farouk Eltawila, James Johnson, Norman Lauben, Richard McMullen, Zoltan Rosztochy, Charles Serpan, Brian Sheron, and Gerald Weidenhamer.

The meeting was held October 28 to 30 at the Bethesda Pooks Hill Marriot. The program was coordinated by Brookhaven National Laboratory.

## Regulatory Guides

### Active Regulatory Guides Issued During FY 1991

Regulatory Guide 1.84, Revision 27, "Design and Fabrication Code Case Acceptability—ASME Section III, Division 1." Issued 11/90. Contact: E. Woolridge, RES/DE/MEB.

Regulatory Guide 1.85, Revision 27, "Materials Code Case Acceptability—ASME Section III, Division 1." Issued 11/90. Contact: E. Woolridge, RES/DE/MEB.

Regulatory Guide 1.147, Revision 8, "Inservice Inspection Code Case Acceptability—ASME Section XI, Division 1." Issued 11/90. Contact: E. Woolridge, RES/DE/MEB.

Regulatory Guide 5.66, "Access Authorization Program for Nuclear Power Plants." Issued 6/91. Contact: S. Frattali, RES/DRA/RDB.

Regulatory Guide 7.11 (DG-7001), "Fracture Toughness Criteria of Base Material for Ferritic Steel Shipping Cask Containment Vessels with a Maximum Wall Thickness of 4 Inches (0.1 m)." Issued 6/91. Contact: W. Campbell, RES/DE/EMEB.

Regulatory Guide 7.12 (DG-7002), "Fracture Toughness Criteria of Base Material for Ferritic Steel Shipping Cask Containment Vessels with a Wall Thickness Greater Than 4 Inches (0.1 m) But

Not Exceeding 12 Inches (0.3 m)." Issued 6/91. Contact: W. Campbell, RES/DE/EMEB.

### Draft Regulatory Guides Issued During FY 1991

Draft Regulatory Guide DG-1008, "Reactor Coolant Pump Seals." Issued 4/91. Contact: J. Jackson, RES/DSIR/EIB.

Draft Regulatory Guide DG-1009, "Standard Format and Content of Technical Information for Applications To Renew Nuclear Power Plant Operating Licenses." Issued 12/90. Contact: J. Vora, RES/DE/EMEB.

Draft Regulatory Guide DG-3003, "Format and Content for the License Application for the High-Level Waste Repository." Issued 11/90. Contact: C. Prichard, RES/DE/WMB.

Draft Regulatory Guide DG-4002, Proposed Supplement 1 to Regulatory Guide 4.2, "Guidance for the Preparation of Supplemental Environmental Reports in Support of an Application to Renew a Nuclear Power Station Operating License." Issued 8/91. Contact: D. Cleary, RES/DSIR/RPSB.

Draft Regulatory Guide DG-5002, "Material Control and Accounting for Uranium Enrichment Facilities Authorized To Produce Special Nuclear Material of Low Strategic Significance." Issued 2/91. Contact: H. Tovmassian, RES/DRA/RDB.

Draft Regulatory Guide DG-8003, Proposed Revision 1 to Regulatory Guide 8.25, "Air Sampling in the Workplace." Issued 9/91. Contact: S. McGuire, RES/DRA/PPHEB.

### Regulatory Guides Withdrawn During FY 1991

Regulatory Guide 1.2 (Safety Guide 2), "Thermal Shock to Reactor Pressure Vessels." Withdrawn 6/91. Contact: A. Hiser, RES/DE/MEB.

Regulatory Guide 1.17, Revision 1, "Protection of Nuclear Power Plants Against Industrial Sabotage." Withdrawn 5/91. Contact: S. Frattali, RES/DRA/RDB.

Regulatory Guide 1.58, Revision 1, "Qualification of Nuclear Power Plant Inspection, Examination,

and Testing Personnel." Withdrawn 6/91. Contact: O. Gormley, RES/DRA/ARGIB.

Regulatory Guide 1.64, Revision 2, "Quality Assurance Requirements for the Design of Nuclear Power Plants." Withdrawn 6/91. Contact: O. Gormley, RES/DRA/ARGIB.

Regulatory Guide 1.88, Revision 2, "Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records." Withdrawn 6/91. Contact: O. Gormley, RES/DRA/ARGIB.

Regulatory Guide 1.123, Revision 1, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants." Withdrawn 6/91. Contact: O. Gormley, RES/DRA/ARGIB.

Regulatory Guide 1.144, Revision 1, "Auditing of Quality Assurance Programs for Nuclear Power Plants." Withdrawn 6/91. Contact: O. Gormley, RES/DRA/ARGIB.

Regulatory Guide 1.146, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants." Withdrawn 6/91. Contact: O. Gormley, RES/DRA/ARGIB.

Draft Regulatory Guide SG 301-4, "Standard Format and Content Guide for Access Authorization Plans for Nuclear Power Plants." Withdrawn 5/91. Contact: S. Frattali, RES/DRA/RDB.

## RULEMAKINGS

### Final Rulemakings Published During FY 1991

RM025, Criteria and Procedures for the Reporting of Defects and Conditions of Construction Permits (10 CFR 21, 50). Final rule published in *Federal Register* 7/31/91 (56 FR 36081), effective 10/19/91. Contact: W. Jones, AEOD.

RM033, Standards for Protection Against Radiation (10 CFR 2, 19, 20, 30, 31, 32, 34, 35, 39, 40, 50, 51, 70). Final rule published in *Federal Register* 5/21/91 (56 FR 23309). Correction published 5/24/91 (56 FR 23956). Amended 7/15/91 (56 FR 32071). Contact: H. Peterson, RES/DRA/RPHEB.

RM077, Access Authorization Program for Nuclear Power Plants (10 CFR 73). Final rule published in *Federal Register* 4/25/91 (56 FR 18997). Correction published 5/29/91 (56 FR 24239). Contact: S. Frattali, RES/DRA/RDB.

RM095, Quality Management Program and Misadministrations (10 CFR 2, 35). Final rule published in *Federal Register* 7/26/91 (56 FR 34104), effective 1/27/92. Contact: A. Tse, RES/DRA/RDB.

RM100, Custody and Long-Term Care of Uranium and Thorium Mill Tailings Disposal Sites (10 CFR 40). Final rule published in *Federal Register* 10/30/90 (55 FR 45591), effective 11/29/90. Contact: M. Haisfield, RES/DE/WMB.

RM119, Notifications of Incidents (10 CFR 20, 30, 31, 34, 39, 40, 70). Final rule published in *Federal Register* 8/16/91 (56 FR 40757), effective 10/15/91. Contact: J. Mate, RES/DRA/RDB.

RM129, Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events (10 CFR 50). Final rule published in *Federal Register* 5/15/91 (56 FR 22300), effective 6/14/91. Contact: A. Hiser, RES/DE/MEB.

RM133, Monitoring the Effectiveness of Maintenance at Nuclear Power Plants (10 CFR 50). Final rule published in *Federal Register* 7/10/91 (56 FR 31306), effective 7/10/96. Contact: R. Riggs, RES/DSIR/SAIB.

RM165, Emergency Response Data System (10 CFR 50). Final rule published in *Federal Register* 8/13/91 (56 FR 40178), effective 9/12/91. Contact: M. Au, RES/DRA/RDB.

RM190, Enforcement of Nondiscrimination on the Basis of Handicap in Federally Assisted Programs (10 CFR 4). Final rulemaking published in *Federal Register* 12/19/90 (55 FR 52136). Contact: E. Tucker, SDBU.

RM197, ASNT Certification of Industrial Radiographers (10 CFR 34). Final rule published in *Federal Register* 3/19/91 (56 FR 11504). Correction published 5/1/91 (56 FR 19920). Contact: D. Nellis, RES/DRA/RPHEB.

RM218, Revisions to Procedures To Issue Orders, Deliberate Misconduct by Unlicensed Persons



(10 CFR 2, 30, 40, 50, 60, 61, 70, 72, 110, 150). Final rule published in *Federal Register* 8/15/91 (56 FR 40664), effective 9/16/91. Contact: J. Lieberman, OE.

RM253, Operators' Licenses (10 CFR 2, 55). Final rule published in *Federal Register* 7/15/91 (56 FR 32066), effective 8/14/91. Contact: R. Gallo, NRR.

RM262, Fitness-for-Duty Programs (10 CFR 26). Final rule published in *Federal Register* 8/26/91 (56 FR 41922), effective 9/25/91. Contact: E. McPeck, NRR/DRIS/RSGB.

RM277, Submitting Applications for the Licensing of Test and Research Reactor Operators Directly to Headquarters (10 CFR 55). Final rule published in *Federal Register* 10/11/90 (55 FR 41334), effective 11/13/90. Contact: D. Lange, NRR.

RM281, Operations Center Area Code Telephone Number Change (10 CFR 20, 50). Final rule published in *Federal Register* 1/10/91 (56 FR 944), effective 1/10/91. Contact: M. Au, RES/DRA/RDB.

RM282, Statement of Organization and General Information, Minor Amendments (10 CFR 0, 1). Final rule published in *Federal Register* 11/15/90 (55 FR 47740). Contact: D. Grimsley, ADM/DFIPS.

RM285, Access Authorization Fee Schedule for Licensee Personnel (10 CFR 11, 25). Final rule published in *Federal Register* 2/14/91 (56 FR 5926). Contact: D. Kidd, ADM/SEC.

RM298, Assistance to Prospective Petitioners (10 CFR 2). Final rule published in *Federal Register* 3/12/91 (56 FR 10359). Contact: D. Grimsley, ADM/DFIPS.

RM300, Revision of Fee Schedules, 100% Fee Recovery (10 CFR 52, 71, 170, 171). Final rule published in *Federal Register* 7/10/91 (56 FR 31472). Correction published 8/9/91 (56 FR 37828). Contact: G. J. Holloway, OC.

RM304, Change in Commercial Telephone Number for Region V (10 CFR 20, 21, 73). Final rule published in *Federal Register* 4/26/91 (56 FR 19258), effective 4/26/91. Contact: D. Meyer, ADM.

RM305, Imports from South Africa (10 CFR 110). Final rule published in *Federal Register* 8/13/91 (56 FR 38335), effective 8/13/91. Contact: R. Hauber, IP.

RM307, Change in Commercial Telephone Number for Region V (10 CFR 20, 21, 73). Final rule published in *Federal Register* 8/21/91 (56 FR 41448), effective 9/2/91. Contact: D. Meyer, ADM.

#### Proposed Rulemakings Published During FY 1991

RM128, Licenses and Radiation Safety Requirements for Large Irradiators (10 CFR 19, 20, 21, 30, 36, 40, 51, 70, 170). Proposed rule published in *Federal Register* 12/4/90 (55 FR 50008). Contact: S. McGuire, RES/DRA/RPHEB.

RM141, Codes and Standards for Nuclear Power Plants (ASME Code, 1986/1987/1988 Addenda, 1989 Edition) (10 CFR 50). Proposed rule published in *Federal Register* 1/31/91 (56 FR 3796). Contact: G. Millman, RES/DE/EMEB.

RM215, Material Control and Accounting Requirements for Uranium Enrichment Facilities Producing Special Nuclear Material of Low Strategic Significance (10 CFR 2, 40, 70, 74). Proposed rulemaking published in *Federal Register* 12/17/90 (55 FR 51726). Contact: G. Gundersen, RES/DRA/RDB.

RM256, Environmental Review for Renewal of Operating Licenses (10 CFR 51). Proposed rule published in *Federal Register* 9/17/91 (56 FR 47016); comment period ends 12/16/91. Contact: D. Cleary, RES/DSIR/RPSIB.

RM286, NRC Licensee Reinvestigation Program (10 CFR 25). Proposed rule published in *Federal Register* 7/31/91 (56 FR 36113). Contact: D. Kidd, ADM/SEC.

RM289, Decommissioning Funding for Prematurely Shutdown Power Reactors (10 CFR 50). Proposed rule published in *Federal Register* 8/21/91 (56 FR 41493). Contact: R. Wood, NRR.

RM290, Uranium Enrichment Regulations (10 CFR 2, 40, 50, 51, 70, 75, 110, 140, 150, 170). Proposed rule published in *Federal Register* 9/16/91

(56 FR 46739); comment period ends 12/2/91. Contact: C. Nilsen, RES/DRA/RPHEB.

RM302, DOE-L or DOE-Q Reinvestigation Program for NRC-R Access Authorization Renewal Requirements (10 CFR 11). Proposed rule published in *Federal Register* 9/30/91 (56 FR 49435). Contact: R. Castaneira, NMSS/SGDB.

### Rulemakings Terminated During FY 1991

RM103, Safety Related and Important to Safety in 10 CFR Part 50 (10 CFR 50). Proposed rulemaking terminated per Commission memo dated 6/24/91; rule no longer needed. Contact: O. Gormley, RES/DRA/ARGIB.

RM145, General Licenses (10 CFR 31, 32). Uninitiated rule terminated per report to EDO 7/1/91. Contact: RES/DRA/RDB.

RM206, Requires Notification of Follow-up Surveys or Decontamination Actions Taken by Licensees After Release of Site. Uninitiated rule terminated 12/90. Contact: C. Feldman, RES/DRA/RPHEB.

RM207, Requires Former Licensees to Meet More Stringent Standards After License Termination Based on Interim Standard. Uninitiated rule terminated 3/14/91; NMSS to recommend licensing condition, put on hold by Commission. Contact: RES/DRA/RPHEB.

RM208, Codify "Reopener" Clause for Terminated Licenses. Uninitiated rule terminated 3/15/91; NMSS to recommend licensing condition, put on hold by Commission. Contact: RES/DRA/RPHEB.

RM216, Guidance and Rulemaking on Use of Monoclonal Antibodies (10 CFR 35). Uninitiated rulemaking terminated 6/28/91 (combined with RM223). Contact: RES/DRA/RPHEB.

RM224, Nonpower Reactor Rulemaking Issues (10 CFR 73). Uninitiated rulemaking terminated 6/28/91 (combined with RM293). Contact: RES/DRA/RDB.

RM232, Comprehensive Review of Part 21 for Non-Reactors Facilities (10 CFR 21). Uninitiated

rulemaking terminated 6/28/91 (combined with RM295). Contact: H. Tovmassian, RES/DRA/RDB.

RM233, General and Exemption License Under Section 40.22 (10 CFR 40). Uninitiated rulemaking terminated 6/28/91 (combined with RM292). Contact: C. Mattsen, RES/DRA/RPHEB.

RM234, Timely Cleanup of Major Spills (10 CFR 50). Uninitiated rulemaking terminated 6/28/91; no need for rulemaking at this time. Contact: J. Malaro, RES/DRA/RPHEB.

RM244, Effects of Relicensing Options on Decommissioning Funding (10 CFR 50). Uninitiated rulemaking terminated, topic included within RM148. Contact: C. Feldman, RES/DRA/RPHEB.

RM248, Modify Existing Exemptions To Conform to BRC Policy (10 CFR 2, 20). Proposed rulemaking terminated by SRM dtd 3/19/91 in favor of rulemakings RM270-RM275. Contact: RES/DRA/RPHEB.

RM260, Advanced Reactor OBE/SSE Ratio (10 CFR 52). Uninitiated rulemaking terminated; rulemaking activity combined with RM147. Contact: N. Chokshi, RES/DE/SSEB.

RM271, Revision of Source Material Exemptions (10 CFR 40). Uninitiated rulemaking terminated 6/28/91 (combined with RM292). Contact: R. Meck, RES/DRA/RPHEB.

RM272, Removal of Prohibition of Radioactive Materials in Foods, Beverages, and Cosmetics (10 CFR 30). Uninitiated rule terminated 3/19/91; SRM directed staff not to proceed with rulemaking. Contact: R. Meck, RES/DRA/RPHEB.

## PETITIONS FOR RULEMAKING

### Petitions Completed During FY 1991

PRM-50-50, Subject: Technical Specifications, Petitioner: Charles Young. Denial of petition published in *Federal Register* 1/17/91 (56 FR 1719). Contact: M. Fleishman, RES/DRA/RDB.

PRM-51-1, Subject: Design and Construction of Zero-Release Low-Level Radioactive Waste Disposal Facility, Petitioner: Sierra Club, North

Carolina Chapter. Denial of petition for rulemaking published in *Federal Register* 7/25/91 (56 FR 34035). Contact: M. Haisfield, RES/DE/WMB.

PRM-73-9, Subject: Design Basis Threat for Radiological Sabotage of Nuclear Reactors, Petitioner: Nuclear Control Inst., Comm. to Bridge the Gap. Denial of petition published in *Federal Register* 6/11/91 (56 FR 26782). Contact: C. Sawyer, NMSS.

## POLICY STATEMENTS

### Policy Statements Completed During FY 1991

PS07, Residual Radioactive Contamination Criteria Applicable to Decommissioning (10 CFR 30,

40, 50, 51, 70, 72). Interim criteria terminated by SRM dtd 3/19/91; see rulemaking RM211. Contact: R. Meck, RES/DRA/RPHEB.

PS20, Possible Safety Impacts of Economic Performance Incentives. Final policy statement published in *Federal Register* 7/24/91 (56 FR 33945). Contact: A. Gody, NRR/PDTSB.

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