



B&W/MMS User Group Newsletter

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MMS User Group Conducts First Meeting

The B&W/Modular Modeling System (MMS) User Group held its first meeting March 12-13 at the Lynchburg Hilton in Lynchburg, Va. Babcock & Wilcox, EPRI's designated code coordinator and commercial licensing agent for the MMS, hosted the event. There were 32 attendees representing the Electric Power Research Institute, B&W, utilities and architect engineering firms. Seven of the eight charter members were represented — Duke Power, Southern California Edison, Philadelphia Electric, Bechtel Power, TVA, Detroit Edison and

Niagara Mohawk. Oak Ridge National Laboratory was the only member not represented. Several non-member organizations also attended.

The User Group bylaws were amended and unanimously accepted. The group elected officers, who will also serve on the Advisory Committee, and at-large members of the Advisory Committee. Biographical information on each person the group elected is included in this newsletter. Elected were:

President: Charles Sayles, Southern California Edison

Vice President: Dave Weber, Philadelphia Electric

Secretary: Chuck Arndt, Detroit Edison

At-large Advisory Committee members:

- Marvin Belew, TVA
- Ted Kulczycky, Niagara Mohawk Power
- Norm Stambaugh, Duke Power

EPRI is represented on the Advisory Committee by Frank Wong and Murthy Divakaruni; Phil Bartells is the B&W representative.

During the afternoon session, MMS users made presentations on applications and experiences. Tom Wilson of B&W then discussed the enhancements B&W made to MMS during 1984. Next on the agenda was a presentation by Dr. Alex Long of Expert-EASE Systems Inc. on the MMS-EASE+ pre and post-processor, followed by a presentation by Norm Stambaugh of Duke Power on pre-release experience with MMS-EASE+. The first day concluded with an MMS-EASE+ demonstration conducted by Ross Schaack of B&W.

The second day of the meeting opened with the Advisory Commit-



Ross Schaack of B&W demonstrates MMS-EASE+ at User Group Meeting.

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The President's Corner

As president of the B&W/MMS User Group, I intend to have a letter in each issue of the group newsletter. In this first letter I would like to thank those who elected me as the first president of the User Group. I consider this both an honor and a special responsibility. The responsibility is the role that all of us have as members of the User Group. MMS is the first code that EPRI has commercialized in this manner; the way that we develop the role of this User Group will set a precedent for other codes that EPRI may release and commercialize in the future.

The key to a successful User Group will be the guidance that we give B&W concerning our needs for services and code improvements. There are several ways that members can provide input to the commercializers. The primary way is the User Group meetings. I intend to structure the meetings so that the primary focus will be reports from you, the users.

We need to share problems that we have not been able to resolve and useful features or methods that we have found in working with MMS. Meetings will also provide a chance to suggest new areas in which we want the commercializer to provide additional services or make program improvements. In this regard, I request that as you use MMS between now and the next meeting, keep in mind how you might report what you are doing. I will be writing to you again before the next meeting with more on the format of the users report.

Another way that members can give guidance to the commercializer is by direct communication with B&W. If this does not work, you can directly contact the officers of the User Group.

To help both B&W and the User Group Advisory Committee set priorities, I urge you to complete the users survey, which was sent out with the minutes of the first User Group meeting.



Charles Sayles

If I can be of any help to you, please feel free to call me at (818) 302-1756.

Good Luck!

May your models initialize quickly, and your transient analyses be free of numerical instabilities.

Charles Sayles
User Group President

B&W Develops Enhanced Version of MMS

To encourage membership in the MMS User Group, B&W has developed an enhanced version of the MMS that is only available to members. This software consists of the EPRI MMS plus additional modules and features developed by B&W. It is configuration-controlled by B&W on a semi-annual basis. In addition, it is being coordinated with the MMS-EASE + pre- and post-processor software described on page 6.

The additional modules that were developed by B&W in 1984 and are in the B&W-released version of the MMS are:

- **PZRB** — PWR pressurizer. The pressurizer establishes and maintains the reactor coolant system pressure within prescribed limits. It is a vertical, cylindrical vessel with a bottom surge line and internal electric heaters and spray nozzle. The pressurizer acts as a steam surge chamber and

water reserve to accommodate reactor coolant density changes. The PZRB module is a non-equilibrium model with no iterative pressure search required.

- **RX1** — PWR single node reactor model. This module represents a PWR of the type designed by Westinghouse, Combustion Engineering, and B&W. Its intended use is to represent the thermal-hydraulic and neutronic phenomena necessary to simulate a PWR for control and intermediate or long-term operation. No flux shape correction factors are used to approximate the axial power distribution and neutron detectors are not simulated. A point kinetics approximation is used with three groups of delayed neutrons and three decay heat groups.

- **UTSGA** — PWR natural cir-

ulation U-tube steam generator. The model employs a detailed representation of the thermal-hydraulics and uses the drift-flux formulation in the boiling and unheated riser regions. The secondary side is divided into five regions: steam dome, downcomer, subcooled, boiling and an unheated riser/separator region. The primary side is divided into four regions corresponding to division of tubes into hot and cold regions and additional division between subcooled and boiling.

- **UTSGE** — PWR natural circulation U-tube steam generator with pre-heater. This module utilizes the same formulation as UTSGA. The secondary side is divided into six regions: steam dome, downcomer, preheater subcooled, preheater boiling, boiling and an unheated riser/separator region. The primary is divided the same as UTSGA.

Group Membership Grows to 12 in April

Four additional organizations joined the User Group in late April, bringing the total membership to 12. Nine of the 12 are Electric Power Research Institute members. B&W's goal is to increase the membership to 25 by the end of March, 1986.

Group members and their primary uses of MMS are:

- Duke Power — UTSG level control studies for McGuire, secondary plant analysis and control system optimization for Oconee.
- Southern California Edison — Full plant simulation of San Onofre Nuclear Units 2 and 3. Operations and control analysis.
- Detroit Edison — Boiling Water Reactor analysis and BOP studies for Fermi 2, including operations and control. Fossil plant analysis with an emphasis on BOP controls.
- Philadelphia Electric — Models for fossil circulating fluidized bed boiler and simulator qualification for Peachbottom 2 (BWR). Also may use in developing a Coal Gasification Combined Cycle Simulator.
- Niagara Mohawk — Cycling study for 800 MWe fossil plant, analyze steam temperature control problems and air heater problems on Albany Units 1-4 and Dunkirk Units 1 and 2.
- TVA — Auxiliary feedwater control system model for Sequoyah. Plan to develop a model of the secondary plant for use in the EPRI/Westinghouse digital feedwater control system development for Sequoyah. Fossil unit cycling studies and simulation of the Atmospheric Fluidized Bed Boiler System 160 MWe demonstration unit at Paducah, Ky.
- Bechtel Power — Models of Diablo Canyon and Palo Verde nuclear units with emphasis on secondary plant analysis. Also full plant simulation of Potomac River Unit 4 (fossil unit).
- Oak Ridge National Laboratory — Full plant model of Baltimore Gas and Electric's Calvert Cliffs Units 1 and 2. The model will be used to identify safety implications of control system failures for the U.S. Nuclear Regulatory Commission.
- Cleveland Electric Illuminating Co. — Fossil applications to simulate processes and equipment to analyze them for application for new control techniques and hardware.
- Arizona Public Service Co. — Full plant analysis for Palo Verde Units 1, 2, 3, and safety analysis scoping for use with RETRAN.
- Utah Power and Light — Fossil applications, model Gadsby Unit 3, validate MMS. Use for retrofit studies and optimization on existing units and for control system tuning. Use for up and down scaling of fossil designs and cost analysis.
- Empresarios Agrupados, SA, Madrid, Spain — Typical architect/engineering studies, including operations and controls for nuclear and fossil units.

B&W Targets Enhancements For 1985

In response to direction from the Advisory Committee, B&W has given the committee its plan for making MMS enhancements in the coming year. Though the plan is too detailed to be printed in full, highlights of it are listed below:

- MMS-EASE+ Software — This software package is being developed using B&W funding. The initial release was announced in late April. Completion of the BOP and fossil modules and system testing of the final version are slated for July.
 - Extended Range Capability — Work that was started by B&W in 1984 will be completed in 1985 to extend MMS module formulations to model reverse flow, wet steam, and low-flow scenarios.
 - Steady-state Finders — The new ACSL TRIM algorithm will be tested using models contributed by users. The MMS module library will be reviewed to identify problem modules. Documentation on the use of the new TRIM algorithm will be supplied to members and resolution of any outstanding issues (including acquisition of new steady-state software, if necessary) will be accomplished.
 - Control Modules — Nomenclature for typical control modules will be assigned and the macros will be developed. The modules will be tested and incorporated into the MMS-B&W version and the documentation.
 - Controls Analysis Tools — A survey of User Group needs and controls analysis software availability will be conducted. A set of software will be selected for implementation into the MMS-B&W. Advanced instruction on its use will be provided to User Group members.
- Numerous other tasks have been identified and will be scheduled at a later date.

Meeting...

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tee presenting a prioritized list of recommended code enhancements for B&W to consider.

Phil Bartells said B&W will review the list and re-prioritize its code enhancement plan to conform to Advisory Committee suggestions.

In other business, Lance Smith of B&W's Lynchburg Research Center discussed large-model problems and control analysis tools. Pat Whitten of B&W's Fossil Power Division in Barberton, Ohio discussed MMS on the HP 9000. Professor Dave Hetrick, from the University of Arizona, presented an alternative to the ACSL trim function for determining steady state for the system. He claims both accuracy and time savings for his INCON SS algorithm. Randy May of S. Levy, Inc. gave an overview presentation of the BWRX module.

The next User Group meeting will be hosted by Bechtel Power Corporation at Bechtel's San Francisco offices on Sept. 17-18, 1985.



Lance Smith demonstrates MMS in Tokyo

Seminar Conducted in Japan

A three-day MMS overview seminar was conducted Feb. 13-15 in Tokyo, Japan. The seminar was hosted by Nuclear Data Corporation and was well received by the 20 attendees. Representatives were sent by several governmental and research organizations, including MITI, CRIEPI, JAERI, and NPETC, and other organizations, such as Power Reactor & Nuclear Fuel Development Co., Electric Power Development Co., Ltd., Mit-

subishi, Toshiba, Bailey-Japan, and Chubu Electric.

Lance Smith and Phil Bartells conducted the seminar. They were assisted by Bailey-Japan personnel when language difficulties were encountered.

The seminar concluded with an interactive demonstration of MMS using NDC's facilities, which are interfaced with the B&W Computer Service Bureau.

Profiles...

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vanced digital feedwater control system for PWRs that will be installed in Sequoyah.

Marvin earned a bachelor's degree in electrical engineering from the University of Kentucky.

Theodore Kulczycky Advisory Committee Member

Since joining Niagara Mohawk Power Corporation (NMPC) in 1982, Ted Kulczycky has been a project engineer responsible for managing various plant improvement projects at NMPC's fossil fueled steam and combustion turbine generating stations. His responsibilities include developing and controlling a project's scope, budget and schedule. Typical projects have covered plant-wide digital data acquisition systems, generator relay protection upgrades, control upgrades utiliz-

ing computer models for design and evaluation, and a fuel cell control study.

Prior to joining Nigara Mohawk, Ted was a project engineer at Republic Steel Corporation with responsibility for the management and engineering of plant projects involving instrumentation and control. He was also a project manager responsible for the management and engineering of industrial control equipment from receipt of order to completion at Western Controls Incorporated.

Ted earned a bachelor's degree in electrical engineering from Illinois Institute of Technology and is a Registered Professional Engineer in New York and the Province of Ontario.

Norman Stambaugh — Advisory Committee Member

Norm Stambaugh is employed

by Duke Power Company in the area of nuclear performance. He previously worked for five years in the instrumentation and controls area. Norm is a graduate of Duke University with a bachelor's degree in electrical engineering.

He began using MMS two years ago with the goal of improving the reliability and performance of Duke's nuclear units. He primarily uses MMS to build small to medium sized system models that are detailed enough to enable specific recommendations to be made that can be directly applied to systems in the plant.

Norm has been closely involved with MMS since its pre-release, and with B&W and Expert-EASE Systems in the development of new modules, detailed control system modeling, and the MMS-EASE+ pre- and post-processing package.

Officers and Committee Members Profiled

Editor's Note: To help acquaint readers with the MMS User Group's new officers and Advisory Committee members, this section of the newsletter includes biographical information on each person.

Charles Sayles — President

Charles Sayles is a senior engineer in the nuclear analysis group of Southern California Edison's (SCE) general offices in Rosemead, California. He received his doctorate in nuclear engineering from Iowa State University and is a licensed Professional Engineer in California with chemical, mechanical and nuclear specialties.

Charles has been with SCE for two and one-half years. Prior to joining Edison, he was on the staff of the Atomic International Division of Rockwell International for 19 years. He was involved in the various aspects of LMFBR design, including fuel performance, core design, system testing, design, and analysis. Many of these assignments involved transient thermal-hydraulic analyses.

Charles is a member of the American Nuclear Society and the American Institute of Chemical Engineers. He is vice chairman and is on the Board of Directors of the Los Angeles section of the American Nuclear Society and is in charge of the ANS Speaker's Bureau.

Charles has published over 15 technical papers dealing with the various aspects of advanced nuclear reactor design and is listed in "Who's Who in California." He and his family frequently spend their weekends at their mountain cabin north of Los Angeles where they cross-country ski in the winter and hike in the summer.

David Weber Vice President

Dave Weber is a graduate of Drexel University, where he earned

a master's degree in electrical engineering in 1976. He has been with Philadelphia Electric Company in the Research and Testing Division since 1973. Dave is a Registered Professional Engineer in electrical engineering and control systems in Pennsylvania.

Dave has extensive experience modeling and simulating utility power plants for control system analysis. His recent projects include providing technical support to the EPRI CGCC Simulator Program, being responsible for coordination and the technical aspects of a Liquefied Natural Gas Plant modeling study, and working as a consultant to EPRI on the Cool Water Program Test Committee. Dave has published more than 20 papers and reports and is a member of Power Engineering Society and Automatic Controls, Instrument Society of America, and Society for Computer Simulation.

Dave is currently utilizing MMS on these projects: Colorado-Ute Circulating Fluidized Bed BOP modeling effort. EPRI-sponsored Gasification Combined-Cycle Simulator Program, and an in-house modeling effort on Peach Bottom Unit 2 (BWR).

Charles Arndt — Secretary

Chuck Arndt is a principal engineer in the power systems engineering department of Detroit Edison. He is a Registered Professional Engineer in Michigan and is a member of IEEE. Chuck earned a bachelor's degree in electrical engineering from the University of Michigan and a master's degree in electrical engineering from Wayne State University.

Chuck joined the engineering research department of Detroit Edison in 1964 and spent several years in the area of instrumentation and measurements. For the past 10 years, he has worked in the system analysis group of research, where he specializes in mathematical simulation and control of fossil and nuclear power

plant systems. He has published seven papers on generator control, spray cooling modeling, overall power plant dynamic model development, control studies, and code evaluation.

Chuck has been using MMS since it was first available on a pre-release basis, with primary emphasis on the development of a BWR plant model.

Chuck is married and has four children. His hobbies include amateur radio and cross-country skiing, but some of his most pleasurable times are spent sailing "Flying Scotts," a type of sailboat, on Lake St. Clair.

Marvin Belew Advisory Committee Member

Marvin Belew is a principal electrical engineer at Tennessee Valley Authority. He has 20 years of nuclear power plant design construction experience. His responsibilities have included the design modification and maintenance of the Oak Ridge Reactor, writing test procedures and performing preoperation tests for commercial nuclear plants, performing electrical engineering design for boiling water reactors, supervising a BWR instrument and control design section, and ensuring the technical adequacy of all instrument and control design work on TVA power plants.

Marvin is the lead engineer for TVA's Office of Engineer's MMS work. He has participated in the EPRI MMS User's group since its inception. This work includes modeling the Sequoyah Nuclear Power Plant auxiliary feedwater system for a startup transient; modeling the balance of plant portion of TVA's atmospheric fluidized bed combustion demonstration plant, which will be connected to the boiler model being developed by TVA to form a complete power plant model; and modeling of the Sequoyah Nuclear Power Plant to perform design studies of the EPRI/Westinghouse-developed ad-

