We just completed our 44th Annual Power Industry Conference in Orlando. A big thanks to Ron Hicks and his POWID staff and the ISA staff for their work in organizing the conference! I hope everyone enjoyed himself or herself and hope you are planning on attending our 45th Annual POWID Conference in San Diego, 3-7 June 2002. Put it on your calendar now. If you want to present papers at POWID 2002 in San Diego, see the “Call for Papers” information on page 4.

Speaking of conferences, I hope everyone registered for and attended the ISA 2001 Instrumentation, Systems and Automation Conference and Exhibition. It was indeed Too Big To Miss! This year’s fall event was held in Houston from 10-13 September. Your ISA Division, POWID, hosted sessions on Monday, 10 September. For those of you who missed it, the first session was a panel discussion titled “Information Security for Networked Plant Control and Monitoring Systems,” lead by Joe Weiss of EPRI. His panelists included Stuart Katzke, Chief Scientist, Information Assurance Solutions Group, National Security Agency; John Tritak, Director Critical Infrastructure Assurance Office; Steve Lipner, Director Microsoft Corporate Security Center; and Peter Mudge Zatko, Chief Scientist and Executive Vice President of R&D@Stake. The second session was a panel session titled “Power Plant Operational Systems Security” lead by Robert Hubby, Consultant. This panel was composed of major control system suppliers and one user. The control system suppliers discussed information security and their systems. Panelists included William D. Brownlee, Manager of Core Technologies, ABB Automation – Power Generation Applications; Carl Staab, Fellow Engineer, Westinghouse Process Control, Inc; and Paul Forney of Invensys Process Automation. The third POWID session on Monday was a paper session titled “Modeling and Analysis of Power Plant Systems” and was developed by Robert Szczzerbicki of Max Controls. Marjorie Widmeyer, of Power Engineers, was the POWID coordinator for ISA 2001, and we thank her and the session developers for their efforts for the POWID participation in ISA 2001 in Houston.

Have you all taken advantage of the new optional member service to download ALL ISA STANDARDS online for only $25.00 a year? This is an outstanding optional membership benefit that all in our industry should take advantage of. Have you taken advantage of your regular ISA membership benefits such as your own e-mail address and e-mail forwarding service? You can get your own personalized ISA home-page too. A reminder, have you logged on to ISA and updated your personal profile with your latest e-mail address and phone numbers and mailing address? If you have not, please do so now. If you need assistance, please contact our ISA Staff representative, Loanna Overcash at (919) 990-9234 or lovercash@isa.org. This way we can be sure to reach you with our newsletter and notices of our conferences and other important ISA POWID news.

I hope you all had a great summer. I enjoyed meeting many of you at the 44th POWID Conference in Orlando in July and at ISA 2001 in Houston. I look forward to meeting even more of you next June at the 45th POWID Conference in San Diego.
This year’s POWID Achievement Award recipient is Leonard Gruber. Len was presented the award at the 44th Annual POWID Conference held in Orlando, FL in July of this year.

Len has been retired from the Board as well as from Westinghouse for over 7 years. While employed he spent over 35 years in the field of instrumentation and control. He was a long time ISA member and POWID Executive Committee and Standards member (35+ years). Len served on the board in many capacities including Session Developer, Paper Reviewer, General Chair in 1981 and 1986, as well as Program Chair in 1979. Len also served six years as Secretary/Treasurer, POWID Director and Past Director. Len was the President of the Pittsburgh local section in 1975 and 1976. Also to his credit is a long list of recruited members, many of whom are still serving on the current Executive Board.

CONGRATULATIONS LEN! On behalf of all the POWID Executive Committee, thank you for the years of service in helping to establish the guidelines and building the foundation that has made POWID the outstanding division that it is today.

**POWID Director, Gordon McFarland presenting award to POWID Achievement Award Recipient, Len Gruber**

**History of the POWID Achievement Award**

The POWID Achievement Award was created by the Power Industry Division in 1977 to recognize individuals within the ISA Power Industry Division for outstanding achievement, original design application, or special contribution towards the development of engineering concepts in the field of instrumentation and controls for the advancement of electric power generation.

This award is presented annually at the Spring Power Symposium to one candidate who is a member of ISA Power Industry Division and deemed qualified. Each candidate is reviewed by the POWID Honors & Awards Committee and approved by the POWID Board of Directors. The award has been made to:

- **Alfred Watson** Westinghouse Electric Corp. 1977
- **Oliver W. Durrant** Babcock & Wilcox Company 1978
- **Samuel G. Dukelow** Bailey Control Company 1979
- **Theodore C. Reitz** Gilbert Associates, Inc. 1982
- **Porter J. Womeldorf** Illinois Power Company 1983
- **Robert L. Criswell** Foster Wheeler Energy Corp. 1984
- **John E. Coles** New Orleans Public Service Co. 1985
- **Robert N. Buschell** EBASCO Services, Inc. 1986
- **Q. V. Chou** Ontario Hydro 1987
- **Peter J. Clelland** Philadelphia Electric Company 1988
- **Gordon McFarland** Combustion Engineering 1989
- **Paul Kenny** Forney 1990
- **Richard Hottenstine** Gilbert/Commonwealth 1991
- **Joe Weiss** EPRI 1992
- **Harold Hopkins** Utility Products of Arizona 1993
- **Marjorie A. Widmeyer** Washington Public Power Supply 1994
- **Edwin M. Good** Florida Power Corp. 1995
- **Robert N. Hubby** MAX Control Systems 1996
- **Robert W. Hill** Amtech Services 1997
- **Cyrus Taft** EPRI 1998
- **Ron Johnson** Sargent & Lundy 1999
- **Ron Hicks** Black & Veatch 2000
- **Leonard Gruber** Westinghouse 2001

**POWID SERVICE AWARD**

This is awarded for outstanding service in the field of instrumentation. The service of the individual is noteworthy, exemplary, or unique and exceeds the normal duties of the office held. The service is of a nature that advances the stature of the Power Division and/or ISA.

The 2001 recipients are Rudy Neustadter and Harold Sternberg. Rudy Neustadter has recently retired from the Raytheon Nuclear group. He has been very active with the Power Division especially in the area of Conference Programming. He has been a Session Developer for eight consecutive Conferences (1992-1999) and the ISA Program Chair for 2000 in San Antonio, Texas, as well as for 2001 in Orlando, Florida.

Harold Sternberg is employed by ABB (Bailey Controls) in Cleveland. He has been involved with our Executive Board for many years and his most recent position has been that of Editorial Review Coordinator for the Spring Conferences. Harold has fulfilled this very time-consuming job for the past four years. ISA requires that every published paper receive 3 reviews from industry leaders before they are eligible for presentation at conferences.
Future ISA / POWID International Conferences:

ISA Power Industry Division:
- San Diego, CA: Catamaran Resort – 3-7 June 2002

ISA EVENTS
- ISA President’s Winter Meeting: Jacksonville, FL: 9-13 February 2002
- ISA 2002 Chicago, IL: 21-24 October 2002

45th Annual ISA Power Industry (POWID) Conference

12th Annual Joint ISA POWID/EPRI Conference

Third Annual ISA POWID/EPRI/DOE Conference
3–7 June 2002
San Diego, CA

Conference Theme:
“e2002—A New Paradigm in Power Industry’s Use of IT”

Contacts for additional information:
Conference General Chair
Gary Cohee (412) 921-3226

ISA Program Chair
Dan Lee (440) 585-6063

EPRI Program Chair
Dr. Ramesh Shankar (704) 547-6127

DOE Program Chair
Goray Mookerjee (202) 586-6183

46th Annual ISA POWID Conference Call for Papers and Session Developers

The 2003 ISA Power Symposium will be held 15-20 June at the Woodlands Hotel in Williamsburg, Virginia. Remember to mark your calendars for this important event. We welcome proposals for papers and paper sessions on topics that have relevance to the areas of Instrumentation, Systems and Automation as they apply to, or affect, the Power Industry. If you are interested in participating as a Session Developer or would like to discuss your ideas for a paper please contact: Dale Evely at (205) 992-6649 or dpevely@southernco.com.
Call for Papers

The 45th Annual ISA POWID Conference will take place in San Diego, California 3–7 June, 2002 at the Catamaran Resort. We welcome your proposed paper on a range of Control System, Instrumentation, Information System and Technology topics. We will review all submissions and plan to publish accepted papers in the Conference Proceedings via CD-ROM.

Papers will be selected from the following topic areas:

The Changing Marketplace
✔ Dispersed Small-Scale Generation
   (Utility or Customer Owned)
✔ Distribution Retailing Wholesale
✔ Electricity Industry Restructuring
✔ Incorporating Small-Scale Generation
✔ New Product Development
✔ Public Programs
✔ Repowering Existing Facilities
✔ Retailing Generation Transmission
✔ Specialized Niche Applications, Remote Loads
✔ Strategic Planning

Economics
✔ Auctions/Competitive Bidding
✔ Business Process Re-engineering
✔ Cost Performance Analysis
✔ Decision Analysis
✔ Electricity Reform Abroad and U.S. Investment
✔ Facilities Planning and Design
✔ Finance – Risk Management
✔ Forecasting
✔ Risk Analysis
✔ Upgrade Justification

Energy Generation Technologies
✔ Advanced Control
✔ Advanced Instrumentation
✔ Co-Firing in Existing Facilities
✔ Co-Generation
✔ Dynamic Programming/Control
✔ Environmental
✔ Expert Systems/Neural Networks
✔ Fieldbus
✔ Fossil Power Plant Issues & Technologies
✔ Generation Transmission Distribution
✔ Improve Pumped-Storage Efficiency
✔ Information Systems
✔ Larger Central Farms and Groups of Generators
✔ Modeling and Simulation
✔ Network Reliability, Integrity and Security
✔ Nuclear Power Plant Issues and Technologies
✔ Photovoltaics
✔ Reliability
✔ Sensor Technologies
✔ Statistics/Quality Control
✔ Telecommunications
✔ Turbine Controls

Marketing & Sales
✔ Electric Market – Retail Electricity
✔ Marketing and Sales
✔ Operations Management
✔ Project Management
✔ Quality Management
✔ Research & Development

Guidelines for Submission:

- Intent to Present Application must be submitted electronically and in English.
- Include “2002 POWID Conference” on form.
- Must include a 200-word abstract.
- Suggested length limit for papers is 15 pages, including figures and illustrations

It is POWID Conference policy not to accept more than one paper from the same lead author. The lead author is the main contact. Submit your electronic Intent to Present Application including abstract to:

ISA Technical Conference Programs and Publications
67 Alexander Drive
PO Box 12277
Research Triangle Park, NC 27709
Phone: (919) 990-9303
Fax: (919) 549-8288
E-mail: rarriola@isa.org

Conference Web site: www.isa.org/~powid
(follow the pointers to the POWID Conference 2002)
1999 Best Technical Paper

The ISA Power Industry Division’s Spring Conference is a rich source of quality information captured in the numerous technical papers that are presented. Every paper receives a rigorous review by three industry specialists before it is accepted for presentation and publication at the conference. Each year the authors of the top three papers receive an honorarium, and the papers are selected for publication in the POWID newsletter. We are pleased to include the last (but certainly not the least) of the three best technical papers for 1999 “A Prototype Elemental Coal Analyzer Based on Pulsed Neutrons” by Michael Belbot, George Vourvopoulos, Phillip Womble, and Jon Paschal in this issue of What’s Watt for your reading pleasure.

A Prototype Elemental Coal Analyzer Based on Pulsed Neutrons

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keywords

on-line, coal analysis, pulsed neutrons

ABSTRACT

A neutron generator-based on-line coal analysis system has been developed, capable of measuring the major and minor chemical elements contained in coal. The system utilizes nuclear reactions produced from fast and thermal neutrons, as well as from neutron activation of isotopes with half-lives of seconds or minutes. Characteristic gamma rays detected with BGO (bismuth germanate \([\text{Bi}_4\text{Ge}_3\text{O}_{12}])\) detectors are used for the identification of the various chemical elements. A key feature of the analyzer is its ability to analyze automatically three distinct gamma-ray spectra, and produce the elemental content of coal as it moves through a coal chute. A prototype analyzer has been built, able to analyze several tons/hour of coal. The main features of the analyzer are self-calibration independent of the coal seam, better accuracy in the determination of elements such as carbon, oxygen, and sodium, and diminished radiation risk.
INTRODUCTION

A fast, accurate, and in real time method of determining the elemental composition of coal is important to the coal industry for pricing, quality control, and reduction of SO$_2$ emissions. Some of the elements such as C, O, H, and S can be used in an algorithm for the determination of the calorific value (BTU/lb) of coal. Other elements such as Si, Ca, Al, Fe can be used for the elemental ash composition. Measurement of S is dictated by the Clean Air Act Amendments$^1$ that requires control of SO$_2$ emissions from coal-fired power plants. Elements such as Na and Cl have deleterious effect on boilers, causing fouling and slagging.

Wet chemical ASTM (American Society for Testing and Materials) measurements of these parameters in coal$^2$ are very well established, but do not meet the need of the coal industry, because results can only be obtained hours or days after samples are taken. Continuous control of coal quality can be maintained by blending different types of coal, a method opted by nearly 50% of the coal-fired power plants affected by the Clean Air Act Amendments. For example, high sulfur coal that is cheaper and has higher BTU value is blended with lower sulfur coal that is more expensive and lower in BTU value. By adding controlled quantities of each, both the BTU and sulfur content can be controlled at minimum cost. Therefore, a real-time method of determining the elemental coal composition can provide the needed information for blending. Nuclear techniques using interactions of neutrons with coal fulfill this need, because the coal is analyzed within minutes as it travels on a conveyor belt or as it falls in a chute. These neutron interactions produce gamma rays that have energies unique to each element (for example, 1633 keV for sodium and 5420 keV for sulfur).

Currently, industrial coal analyzers use a radioisotopic neutron source such as $^{252}$Cf that emits neutrons with average neutron energy of 2 MeV. These analyzers employ the Prompt Gamma Neutron Activation Analysis technique (PGNAA) that relies on thermal neutron capture reactions. We have used the Pulsed Fast Thermal Neutron Analysis (PFTNA) technique$^{3,4,5}$ that uses a pulsed deuterium-tritium (d-T) sealed tube generator that produces 14 MeV neutrons. We have chosen this type of neutron source, because it enables one to use both fast and thermal neutron reactions. With a greater variety of neutron reactions and the ability to separate the fast from thermal reactions by using a pulsed source, it is possible to measure more elements and to measure them more accurately.$^5$

In this paper, we discuss a prototype on-line coal analyzer employing the PFTNA technique that we have developed and built at Western Kentucky University in collaboration with our industrial partner John B. Long Company, which manufactures coal-sampling equipment. In previous publications$^{3,4,5}$ the PFTNA technique was shown capable of measuring all the major and minor elements in coal. In particular, the laboratory experiments demonstrated that PFTNA could determine with good precision elements such as C, O, and Na, which are difficult to measure with a radioisotopic source. Prior to building a PFTNA-based prototype elemental coal analyzer, however, it was necessary to establish whether this technique could:

1) Provide the cornerstone of a system with a redundant set of self-corrections of the gamma-ray intensities so that the analyzer would self-compensate for elemental composition changes due to coal seam changes.
2) Measure with precision C and O in coal samples so that an accurate value of the coal calorific value can be established, irrespective of the rank of the coal flowing through the analyzer.

3) Measure on-line the Na content of coal over the complete range of Na values found in coal.

In the following sections, the data from the analysis of a large number of coal samples is presented. Based on these results, a prototype element coal analyzer was built and its key components are described.

**PFTNA-BASED ELEMENTAL ANALYSIS**

Twenty-five bituminous and sub-bituminous 200-kg coal samples were obtained from various coal seams in the United States and Canada. These coal samples were air dried to remove surface moisture and split (using the gross methods for splitting coke) according to ASTM guidelines to smaller 50 – 60 kg samples for PFTNA analysis. Smaller samples split from the original 200 kg were also sealed in plastic bags and analyzed at the Center for Coal Science at Western Kentucky University using chemical ASTM methods to determine their elemental composition.

The coal drums were irradiated by a pulsed neutron generator, producing 14 MeV neutrons in pulses several microseconds wide and with a frequency of several kilohertz. The high-energy neutrons interact with elements such as C and O emitting characteristic gamma rays. In between the neutron pulses, the fast neutrons within the coal bulk lose their energy through scattering with the light elements contained in coal initiating thermal neutron capture reactions. Such reactions measure elements such as H, S, and Cl through their characteristic gamma rays. For the measurement of Na, neutron activation is utilized, producing isotopes that have longer half-lives (on the order of seconds) than the fast and thermal capture reactions. The gamma rays produced from each category of nuclear reactions (fast neutron, thermal neutron, and activation reactions) are acquired and stored in different spectra. By acquiring the gamma rays in three different time windows, there is a significant reduction of the background as compared with the spectra taken with a radioisotopic source.

The analysis of the experimental data was performed using SPIDER, a de-convolution computer code developed for the automatic extraction of the intensities of the characteristic gamma rays. The de-convolution process treats the data as a linear combination of spectra from individual chemical elements. An example of the de-convolution process can be seen in Figure 1. A portion of a spectrum obtained from thermal neutron capture is shown, along with fitting results. The graph on the upper part of the figure shows the experimental data (points), the least-square fit of the data (solid line), and the background spectrum obtained in the absence of coal. At the lower part of the graph, the fitting errors for each data point are displayed. This de-convolution procedure has been programmed to take place automatically within a few seconds after the acquisition of a spectrum. Prior to the irradiation, the coal samples were placed in uniform containers, each of which held about 60 kg of coal. Bulk density variations were taken into consideration, by measuring the transmission through the coal sample of collimated 662 keV gamma rays from a $^{137}$Cs source. Figure 2 shows three plots of oxygen, carbon, and sulfur weight percentages from ASTM analyses versus the normalized number of counts/s obtained from the SPIDER analysis for the respective coal sample. The horizontal error bars are the normalized errors in counts given by SPIDER, and the vertical ones are the errors in the ASTM measurement. The solid line is a linear least squares fit to the data. Figure 2 also gives the maximum error in the weight percentage given by the fit. It is very important to note that the normalization applied to the data does not require any prior knowledge of the properties or composition of the coal. Therefore, for a given
instrumental configuration, a set of universal calibration curves are applicable to any coal sample with elements within or close to the ranges given in Figure 2. Note the ranges of weight percentages given in Figure 2 are typical of many different types of coal.

Along with the fast and thermal neutron capture gamma-ray spectra that established the graphs of Figure 2, smaller coal samples were irradiated with neutrons and the resultant activity was measured. These measurements indicated that it is possible to measure on-line the Na content of coal, in the range of values that can cause problems of fouling and slagging in boilers. Further discussion of the Na results will be presented in the next section of the paper.

The values presented in Figure 2 show errors larger than the errors the coal community would accept. For a given power plant or coal mine, these errors can be reduced through measures such as:

1) measurement of a smaller range of values for each element (it is not realistic that a coal-fired power plant will be blending lignite with subbituminous coal on a daily bases, or a coal mine will be producing both coal ranks)
2) Establishing tighter de-convolution fits by taking into consideration more chemical elements
3) Involving more than one laboratory for the chemical analyses of the samples.

Based on the above results, a prototype pulsed-neutron based elemental on-line analyzer was constructed.

PROTOTYPE ANALYZER

Figure 3 shows the prototype elemental analyzer, built on the pulsed neutron technique. The analyzer is housed in a temperature-controlled tractor-trailer, which is 8 feet high, 8 ½ feet wide and 48 feet long. The interior of the tractor-trailer is divided into two parts: a) the front part that houses the coal chutes and the electronic, nuclear, and computer-controlled equipment and b) the back part that houses the operators and the computer display screen. To protect the operators from the radiation emitted from the neutron generator, a maze of water tanks separates the two parts of the trailer. In this manner, the radiation at the back part of the trailer is well below the acceptable radiation occupational limits. The prototype is situated at a fenced area of Western Kentucky University’s Farm. A closed loop recirculating system for the movement of coal through the analyzer has been installed. This system was provided by John B. Long Co., our industrial partner. It is composed of a bucket elevator (about 66 feet high) that carries the coal through the feed chute to the analyzer, and an exit conveyor belt (about 15 feet long and a foot wide) that carries the coal back to the bucket elevator. The speeds of the bucket elevator and the exit conveyor belt are such that the main chute of the analyzer is always filled to the top of the trailer with coal. The prototype requires 600 kg of coal for its operation, and it can handle coal up to 10 cm (4 inches) top size.

Surrounding the coal chute are the neutron generator producing pulsed neutrons, several gamma-ray detectors for the measurement of gamma rays and a neutron detector for monitoring the yield of the neutron generator. The detection of Na and of other minor elements takes place through activation analysis. The gamma rays from the activation are detected with a different set of detectors. The data from the detectors, as well as all the data relevant to the operation of the analyzer are fed into a master computer program. The control program called “Master Program”, receives input and shows output on the main screen (see Figure 4). “Master Program” directs input into the subprogram “Control”. This
subprogram directs the various motors associated with the movement of coal through the analyzer to start and stop, controls the timing sequence of the gates within the coal chute system, and finally, starts, stops, and saves the data from the analog to digital converters. “Master Program” receives input from the subprogram “Diagnostics”. “Diagnostics” monitors the motors, signals whether gates have fully opened or closed, and observes the temperature and voltage of the gamma-ray detectors. Finally, “Master Program” receives data from the subprogram “Data Analysis”. “Data Analysis” receives spectral data from the detectors via the analog to digital converters. The spectral data are corrected for changes in neutron output and coal density. The box “Beam Monitors” represents these normalization parameters. Within “Data Analysis” spectra are summed and unfolded by the subprogram “Spider” (not shown) and results from the spectral de-convolution are sent to “Master Program”. These results are then shown on the main screen along with any warnings from “Diagnostics”. Figure 5 shows the computer screen seen by the operator of the analyzer, which is operated through a touch screen for ease of use. Separate screens display proximate (Figure 5), elemental (for example, carbon, oxygen, and chlorine), and ash analysis (sodium, silicon, and iron). Any errors detected by the “Diagnostics” are instantly displayed to the operator with instructions for corrective action.

The prototype analyzer was used for the realistic measurement of the Na content of coal. These measurements were different from the static coal measurements shown in Figure 2. Several coal samples each of approximate mass 100 kg were used for the Na measurements. Natural coal samples containing Na between 450 ppm (0.045% weight) and 9500 ppm (0.95% weight) were doped with controlled amounts of NaCl, in order to create coal samples containing up to 20,000 ppm (2% weight) of Na. The samples were activated at the prototype analyzer for a controlled amount of time and subsequently measured using the master program described above. Each measurement was repeated several times in order to establish the instrumental precision of the analyzer. Figure 6 shows the results of these measurements. The minimum detection limit for Na can be lowered, if it is required by the user. Such alteration is possible by changing the detector configuration and the neutron generator yield.

**CONCLUSIONS**

Although commercial analyzers using the PGNAA technique already exist, there are distinct advantages to using pulsed neutrons in the PFTNA technique. Because of the higher-energy neutrons used (14 MeV) C and O can be directly measured over their complete ranges in coal without the need for recalibration. The presence of large amounts of Na, deleterious to the power plant operations, can be detected on-line, which cannot be measured in $^{252}$Cf based analyzers. The radiation hazards are much less severe for neutron generators. Unlike a $^{252}$Cf source, when they are not energized, they do not produce neutrons. Therefore, this greatly reduces the shielding requirements of the source, because it only needs to be shielded when in operation. Because the prototype can be operated remotely (the computer need not be located inside the trailer), personnel can be protected by simply placing them a sufficient distance away. When the neutron generator needs replacement, a new one can be shipped by common carriers without special shielding requirements. (When the (d-T) generator is not used, the only radiation hazard is from the tritium beta decay that is completely stopped by the rugged stainless steel cylinder in which the (d-T) neutron generator tube is housed.) Even though the output of both (d-T) and $^{252}$Cf neutron sources decay with time, the $^{252}$Cf is a radioisotopic source which decays with a definite half-life (about 2 ½ years) whether it is used or not.
As of the time of this writing, the Western Kentucky University prototype is currently going through a final calibration procedure and will soon be ready for testing by the coal industry.

ACKNOWLEDGEMENTS

We thank our students R. Harris, P. Huffine, and J. Mitchell for their valuable help in sample preparation and the maintenance and operation of the prototype, C Campbell and M. Lamont for help in writing the data acquisition code. The help of J. Riley and his staff with the ASTM analysis is deeply appreciated. Research supported by the US Department of Energy Grant # DE-FC02-91ER75661, and National Science Foundation Grant # 9760056.

REFERENCES

Figure 1  Deconvolution of a coal sample thermal-neutron capture spectrum showing the energy of several principal gamma-ray lines. The dots are the data, the solid line drawn through them is the fit, the solid line below is the background, and the dotted line below that is the residual. Obtained from reference 5.
Figure 2  The calibration curves for oxygen, carbon, and sulfur obtained from laboratory measurements of static coal samples.
Figure 3  A photograph of the prototype coal analyzer built by The Applied Physics Institute of Western Kentucky University in partnership with John B. Long Company. The locations “front” and “back” refer to designations used in the text.
Figure 4  Flow diagram of the master computer program.
Figure 5  Computer main screen with parameters of importance to the analyzer operator.
Figure 6  Calibration curve for sodium obtained from measurements performed by the prototype coal analyzer.
To Our Newest POWID Members

We would like to welcome and acknowledge the following new POWID members. You, our newest members, are a big plus in our goal to increase and maintain our POWID membership. As new members, you are welcome and encouraged to participate in the Power Industry Division in the following areas: author a technical paper for our annual POWID Symposia; author a technical paper of the POWID sessions at the fall ISA Conference; volunteer your services to ISA and POWID activities; contribute to the POWID newsletter in the PowerTech Corner; and most of all, please share your comments and suggestions. Hopefully, you attended our 44th Annual Conference in Orlando, as well as the ISA President’s Fall Meeting and ISA 2001 in September. Please plan on attending the 45th Annual POWID Conference in San Diego, 2-7 June 2002. If you have any questions, please call any of the POWID board members listed on the back cover. Welcome to POWID!

New POWID Members

**February 2001**
- Ali Ataian
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- Julian Bailey
- Stuart L. Barge
- Marcello Burattini
- Jose Angel Camacho
- John M. Chitty
- Peter Collins
- Jo Cory
- Karen L. DePodesta
- Rejean L. Desjardins
- David Diaz
- Michael Chris Donegan
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- Brian Kelley
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- Carlos A. Trasada
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- Dennis J. Twomey
- Randy P. Vsetecka
- Dan Walter Whitesell
- Allen Williams
- Prakash Govind Zende
- Lika Zhonga

**March 2001**
- Naresh Agarwal
- Jean Asselin
- Paul A. Bellville, CCST
- Rajesh Bhan
- Guy Boivest
- Stephen F. Boothe, II
- Brandi Brogden
- Ramachandraiah Allam
- Patrick J. Coakley
- James Crawford
- Robert Crawford
- Gerald R. Cucci
- James Boyd Curtis
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- Philip Fredricks
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- Ann Tuck
- Gary M. Vezzoso
- Sergey Yazriv
- Salman Yusuf

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- David W. Aldrup
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- Robert J. Batten
- Christopher Beneke
- Michael Benkert
- Donald A. Black
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- James R. Cushman
- John L. Elder
- David Eng
- Gurinder Singh Garcha
- Jose Juan Garcia Crespo
- David Gromaksi
- Michael W. Gross
- Francis X. Hanley
- John Hansen
- John K. Hodson, Sr.
- David J. Hollek
- David Lee Keaton
- Young Koo Kim
- Brad R. King
- Sang D. Lee
- Sen Lin
- Danny Della Mastra
- Robert Martin
- Bob McMillan
- Raymond Moreno
- Scott Morgan
- Jeff Mullis
- Joe Neiser
- Michael O’Neal
- E. Theodore L. Ornaitz
- Thomas F. Palmer
- Richard Reyes
- Christopher Roderick
- Daniel Romo
- Tommy M. Rutledge
- Gary W. Scheer
- Darrel Scribner
- George C. Shelton
- Donville D. Smith
- Thomas A. Smith
- Jeff A. Stahl
- David M. Strange
- Srinivasan Sundaram
- Kevin M. Sweeney
- William Mark Toole
- Paul C. Tworkowski

**May 2001**
- Osmer Alcala
- James L. Beall
- Robert Burnell
- Rogerio Cardoso
- Joseph C. Christoffel
- Robert E. Cook
- James L. Davis
- Mark D. Diefenbach
- Colin Easton
- C. J. H. Fanoy
- Luciano Ferretti
- John N. Fletcher
- Thomas Gunnison
- Joseph J. Gutierrez
- Galen D. Hecht
- Ronald A. Johnson, P.E.
- David Jordan
- Edward Kaczynski
- Asgour Khamis
- Gufron Klok
- Liris C. Lopez
- Danny McFarland
- Ryan Miller
- James E. O’Shea
- Michael E. Pagano
- Jana Pelleus
- Jose A. Rodriguez
- Alex Roiz
- Joel Rosperich
- James Vincent Scales
- William Silver
- David Smrdel
- Thomas J. Sprankel
- Gary L. Swindell
- Mark Trefiak
- Carlos A. Trasada
- Heriberto Tovar Leon
- Stayton Uyeda
- Daniel Vetter
- Frank W. Kloer
- Ashour Khamis
- David Jordan
- Edward Kaczynski
- Asgour Khamis
- Gufron Klok
- Liris C. Lopez
- Danny McFarland
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- Michael E. Pagano
- Jana Pelleus
- Jose A. Rodriguez
- Alex Roiz
- Joel Rosperich
- James Vincent Scales
- William Silver
- David Smrdel
- Tom Swindell
- Gary L. Vanniere
- Silences Villages
- Gary David West
- Robert L. Westfall, PE
- Fei Long Yao
- Gary A. Young

**June 2001**
- Mohammed Ahmed Al Abbadi
- Curtis A. Benjamin
- Connie Bishop
- Curtis Burns
- Michael P. Casiglio
- Billy Ray Crawford
- Joseph Devan
- Steve Ellis
- Dilek Erdogan
- Emmett W. Farrar
- Jose Concepcion Ferreras, CSE
- Joseph Feesh, PE
- Mohamed Abdel Hamid
- Lynn Harweger
- Douglas Hodgges
- Guy Landau
- Stewart S. Laing
- Raymond Marks, PE
- Glenn Mayfield
- Kenneth R. Miller
- Sunil Mishra
- Stephen M. Nichol
- Courtney R. Ogles
- Marcus Page
- Caleb Parker
- Kathryn J. Pence
- Anthony C. Post
- Barry Rogers
- John C. Rutledge
- Craig Schiro
- Kyle Schmidt
- Richard E. Schmitz
- Keith Sleater
- Lynn Stephenson
- Marlin Swikert
- Terry E. Thompson
- Bryan Leland Wagner
- Tom Wheels
- Seth M. Yancey
- Hui Zhang
POWER INDUSTRY STANDARDS

SP67 - Nuclear Power Plant Standards
Chairperson: William Sotos
STPNOC
Wadsworth, TX

Scope
To develop standards for instrumentation and controls and to maintain, clarify, update, and provide application guidance on the standards already produced.

Purpose
SP67 is organized to be the focal point in ISA for documenting through standards publications: criteria, standards, practices, and procedures related to instrumentation and controls in nuclear power generating stations and associated industries.

SP77 - Fossil Power Plant Standards
Chairperson: Wayne Holland
Southern Company
Atlanta, GA

Scope
To develop instrumentation standards for use in fossil power plants.

Purpose
SP77 Fossil Power Plant Standards Committee is organized to be the focal point in ISA for documenting through standards publications: criteria, standards, practices, and procedures related to instrumentation controls in fossil power generating stations.

ISA67 COMMITTEE REPORT TO POWID & S&P BOARD
26 June 2001
Submitted by William G. Sotos

ISA67 Committee Status – Chairman W. Sotos

The committee did not meet in November as originally planned due to lack of members in attendance.

It is planned to discuss two new topics at the Orlando meeting in July 2001. The topics will be 1) development of a fiber optic cable installation standard and 2) the impact of new U.S. plants on nuclear standards.

Subcommittee Status

ISA67.01 - Transducer and Transmitter Installation for Nuclear Safety Applications; R. Gotcher, Chairman: The committee did not meet in November as originally planned due to lack of members in attendance.

ISA67.02 - Instrument Sensing Line Piping and Tubing Standards for Use in Nuclear Power Plants; R. Neustadter, Chairman: The ANSI/ISA-67.02.01-1999 standard has been published. ANSI/ISA-67.10-1994 has been balloted for withdrawal.

ISA67.03 - Reactor Coolant-Pressure-Boundary Leak Detection; I. Sturman, Chairman: This standard has been determined to be out of date and no longer used. It has been balloted and approved for withdrawal. There may be an interest with respect to new plants that is being investigated by the chairman.

ISA67.04 - Setpoints for Safety-Related Instrumentation Used in Nuclear Power Plants; R. Queenan, Chairman: This committee is very active and met both in November 2000 and February 2001. Bob Queenan has replaced Tim Hurst as chairman who is remaining active on the committee. The following Technical Reports are under development:

ISA-TR67.04.03, Indication Uncertainties and Their Relationship with Indicated Values
ISA-TR67.04.04, Effects of EMI/RFI on Instrumentation Setpoints and Indicators
ISA-TR67.04.07, Use of As Found/As Left Calibration Data
ISA-TR67.04.09, Graded Approaches to Setpoint Determination

ANSI/ISA67.04.01 and ISARP67.04.02 were both recently reaffirmed. The working groups on ISA-TR67.04.03 and ISA-TR67.04.09 have been meeting in an attempt to complete these documents and get them published.

ISA67.06 - Response Testing for Nuclear Safety-Related Instrument Channels in Nuclear Power Plants; J. Redmon, Chairman: The standard has been balloted and is currently in the final comment resolution stages.

ISA67.14 - Qualification and Certification of Instrument and Control Technicians in Nuclear Power Plants; No Chairman at present: ANSI/ISA-67.14.01-2000 has been reaffirmed and published.

ISA67.16 - Safety Related, Digital Based System Upgrades at Nuclear Power Plants; W. Sotos, Chairman: The committee did not meet in November 2000 and will not meet in Orlando this July. The committee is on the verge of becoming inactive.

ISA67.16 WG4 - Digital System Design Guide; P. Wicyk, Chairman: This working group has had low participation and did not meet in November 2000. It is likely that this committee will discontinue its efforts shortly.
**Call to Order**
The meeting was called to order at 5:05 p.m.

**Addition and change of order to the agenda:**
Ron Hicks visited the meeting to discuss the next SP77 meeting to be scheduled for the POWID Symposia the week of 7 July 2001 in Orlando, Florida. Since the schedule is due on Friday, 9 February, a move to address the meeting schedule first was made and seconded. The agenda changes were approved.

**Next meeting**
Suggestions for the next meeting at the POWID Symposia were discussed. The meeting will be scheduled for Monday, 9 July 2001 from 1:30 p.m. until 6:00 p.m. A room for 25 people was requested.

The following subcommittees will meet in conjunction with the SP77 meeting:
- **SP77.41 Combustion Controls**
- **SP77.42.02 Feedwater Controls**
- **SP77.14 Steam Turbine Controls**
- **SP77.80** will meet on Monday, 9 July 2001 beginning at 2:30 p.m. in a separate room from the above meetings.

**Approval of minutes from the last meeting**
SP77 last met in New Orleans in August 2000. Bob Hubby requested that in the future all minutes and agendas be posted to the SP77 committee web-page under the “Committee Archives” link.

**Subcommittee Reports**

**77.14 Steam Turbine Controls** – Wayne Holland chaired the subcommittee for Denny Younie in New Orleans. Wayne reported that the subcommittee met on Tuesday, 22 August 2000. There was a good turnout at the meeting with approximately 10 people in attendance.

Denny Younie and Wayne Holland will work on getting the body of the standard updated and back to Loanna Overcash.

**77.20 & 77.21** – No reports

**77.41 Combustion Controls** – Gordon McFarland will hand out assignments for this subcommittee in Orlando, Florida. He will also be soliciting help via e-mail before the meeting.

**77.42 Feedwater Controls** – Randy McSpadden has a working document. Everyone attending this meeting will be put on the list-server for this subcommittee. Information will be provided for others who are interested in subscribing to the list-server.

**77.43 Unit/Plant Demand Development** – Loanna Overcash will check with Cyrus Taft on the status of this.

**77.44.01 Steam Temperature Control System, Drum Units** – Published.

**77.44.02 Once-Through Units** – Just received ANSI approval. The document is in the final production process before publication.

**77.60.01** – Withdrawn

**77.60.02** Plant Human Machine Interface Alarms – Just published.

**77.60.05** – Need to incorporate changes and write letter to negative baloters.

**77.81 Continuous Emissions Monitoring Systems** – No report. Wayne Holland will check with J. Batug concerning this.

**Director’s Report**
Wayne Holland submitted the report. Wayne briefly outlined the new Standards policy that is being proposed for “free” standards. A letter is being submitted to the ISA Executive Board concerning this.

**SP5.1 Symbology Standards Liaison Report**
No report submitted

**Adjournment**
The meeting adjourned at 6:05 p.m.
Valve Sizing and Characterization

My first exposure to process control valves came on a Westinghouse combustion turbine in Myrtle Beach, South Carolina in about 1976. There was a problem with the fuel control valve on the turbine and I was trying to figure out what the problem was. After reading some Fisher instruction books for the valve, actuator, and positioner, I finally figured out that the valve was not stroked correctly and I was able to fix it. This gave me a taste of the relationship between control systems and control valves, but I really didn't know much about the valves. Of course, at that time I didn't know much about control systems either. A couple of years later I was working in an I&C design engineering group. Our group didn't select or size control valves, that was done by the piping group. However, I was fortunate enough to get to work with a couple of very knowledgeable piping engineers on some interesting projects and, as a result, picked up some knowledge of control valve sizing. One of the projects was finding the root cause of a turbine trip on 880 MW supercritical unit that ultimately resulted in considerable turbine damage. It turned out that the feedwater startup valve played a role in that event. Another project was a thorough review of the design of the condensate system on a similar unit. This involved looking into the sizing and characterization of condensate valves, heater drain valves and makeup and return valves. Over the years, I have had many other opportunities to check valve sizes and characteristics as I worked on various control system problems.

I don't make my living sizing control valves and I certainly don't consider myself an expert on the topic. But I think I do have a good perspective on the relationship between control system performance and control valve selection and I would like to share that perspective with you. Obviously, the following discussion has been greatly simplified but I think it still provides the big picture for valve selection.

Piping system designers must consider dozens of important valve properties when specifying control valves. These include materials, pressure rating, temperature rating, rangeability, reliability, noise level, cavitation, cost, and many more. Of the many valve properties, only two are related to control system performance. These are the valve capacity and the valve characteristic. The capacity describes how much fluid can flow through the valve at a given pressure drop and is generally related to the valve’s size. The characteristic defines how the capacity of the valve changes as the valve stroke changes. There are three primary characteristics: equal percentage, linear, and quick opening. In an equal percentage valve, the capacity increases slowly when the valve is almost closed and much faster when the valve is nearly open. A quick opening valve is just the opposite of the equal percentage valve. In a linear valve the capacity increases at the same rate as the stroke throughout the travel of the valve. These three basic characteristics are shown in Figure 1. When the valve characteristic is considered independently of the system, as in Figure 1, it is referred to as the inherent valve characteristic.

The valve actuator selection also has an impact on the control system performance although it is technically not part of the control valve. The actuator determines the speed of response of the valve and this may have a big influence on the overall system response time.

Another important point to always keep in mind is that a control valve is always part of a larger system and you must have some understanding of the whole system to pick the proper control valve. In
particular you must understand how the operating pressures in the system vary with the flow through the system. This is the essence of control valve selection.

Figure 1

There are three attributes of the any system being controlled that greatly impact the control system performance. These are linearity, repeatability, and time response. Linearity means that the system responds with equal magnitude throughout its operating range. Repeatability means that the system response does not change over time; it is consistent from day to day. The time response indicates how quickly the system responds to commands from the control system. The control valve selection has a direct effect on the linearity and the time response of a system.

It might seem that to get a linear system response you would always want to use a linear control valve characteristic. If only it were so simple. Unfortunately, fluid systems are usually quite nonlinear so the control valve must be selected to compensate for the fluid system’s nonlinearity to make the overall system linear. Two of the most common causes of fluid system nonlinearity are centrifugal pump curves and pressure drop characteristics. A typical pump head-flow curve is shown in Figure 2. Notice that the pressure (head) produced by the pump decreases as the flow through the pump increases. Also notice that this relationship is not a straight line, i.e., it’s nonlinear. Now consider the simple formula for pressure loss in a piping system in Equation 1:

\[ DP = k (\text{Flow})^2 \]  

(1)

Obviously, this is also a nonlinear relationship. If the flow rate in a pipe doubles, the pressure drop goes up four times. Since the fluid systems are usually nonlinear, it often takes a nonlinear valve to compensate and make the combined system as linear as possible.
With these preliminary ideas out of the way, let's take a closer look at control valve sizing and characteristic selection on a simple water flow system. We will not be considering valve response time in this article, only size and characteristic.

Let's consider a typical fluid system consisting of two tanks, a centrifugal pump, a control valve, and some pipe as shown in Figure 3. The system is designed to control the level in Tank 2 by regulating the flow from Tank 1 with the control valve. This is a simplified version of many plants' condensate systems where water is pumped from the condenser hotwell to the deaerator with the objective of controlling the water level in the deaerator. Here are the characteristics of this system we have to deal with. First, the pressure in Tank 1 does not change with flow through the system. Second, the pump discharge pressure decreases as the flow through the system increases (see Figure 2). Third, the pressure drop through the piping increases proportionally with the square of the flow through the system. Fourth, the pressure in Tank 2 increases linearly with flow through the system (related to a turbine extraction pressure).

The first step in selecting the control valve for any application is to determine the required flow capacity of the valve. In this case you know the system's design flow rate, the pump characteristics, the pressures in both tanks as a function of load, and the pressure drop in the piping system as a function of flow. The only unknown pressure in the system is the pressure drop across the valve at the 100% design flow rate. It is up to the designer to select this. The tradeoff is that you need a certain amount of pressure drop even at 100% flow to maintain some controllability with the valve but any extra pressure drop results in more pumping power cost. Usually this pressure drop would be based on the overall pressure drop in the system and a 5% to 15% figure is reasonable. Once the design pressure drop across the valve is selected, it is a fairly easy calculation to determine the required valve capacity at the 100% flow rate. The other factor the designer must select is how far open the control valve should be at the 100% flow rate. You always need some margin to account for inaccuracies in the design data and equipment performance changes (e.g., pump wear). There are two ways to look at the valve opening margin. One is in terms of the valve position and the other is in terms of the valve capacity. I think it makes more sense to think in terms of the valve capacity and a number in the range of 80%-90% is reasonable for most situations. Depending on the selected valve's characteristic, the percent valve position might be more or less than the percent valve capacity.
Now we know the desired valve capacity at the 100% operating point and we also know how that capacity relates to the full capacity of the valve. We can now go to the vendor’s valve catalog and pick out a valve with the appropriate valve capacity. Unfortunately, you will rarely find one with precisely the desired capacity. Time for more judgement. Should you pick the one that is a little bigger or a little smaller? This is not always a simple question to answer but more often the valve that is a little bigger will be the best choice.

Now that you have selected a valve capacity, you need to determine the best valve characteristic. There is an easy way to tell which type of characteristic you need based on the available pressure drop in the system. If the available pressure drop goes up as the flow goes up, you will need a quick opening valve. If the available pressure drop goes down as the flow goes up, you will need an equal percentage type valve. And, if it stays about the same throughout the flow range, you will need a linear valve.

It should be apparent in the example system above that the available pressure drop in the system is going down as the flow through the system goes up (pump head down, friction loss up, downstream pressure up). So, it is likely an equal percentage valve would be needed. To verify that the equal percentage trim will provide the most linear installed characteristic it is necessary to calculate the valve position at a minimum of three flow rates. The installed valve characteristic is the flow versus lift relationship of the valve when it is operating in the actual system. It is also useful to look at both the selected trim as well as the next closest option, in this case a linear trim. Since neither trim will provide a perfectly linear response, it becomes another judgement as to which is the best for this application. If neither one is a clear winner in the linearity sweepstakes, then it probably doesn’t matter which one you choose. Any minor nonlinearities can be easily corrected using a function generator in the digital control system. (You do have a digital control system, don’t you?)

There you have it, valve sizing made simple in 15 minutes. I know its really not quite that easy, but hopefully this discussion has given you a better understanding of matching a control valve to a system to achieve a linear installed response.

As always, I welcome your comments and suggestions. Thanks for reading this far.

Cyrus W Taft, PE Chief Engineer, EPRI I&C Center
Call (865) 717-2017 or fax (865) 717-2020 or e-mail cwtaft@compuserve.com
POWID ExCom Meeting - February 2001

The 128th meeting of the ISA POWID Executive Committee was held on 5 February 2001 in Albuquerque, NM, in conjunction with the ISA President’s Winter Meeting.

Attendance:

<table>
<thead>
<tr>
<th>Members Present</th>
<th>Members Absent</th>
<th>Others Present</th>
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<tbody>
<tr>
<td>Dan Antonellis</td>
<td>Jim Batug</td>
<td>Frank Brogan</td>
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<tr>
<td>Gary Cohee</td>
<td>Don Christopher</td>
<td>Harry Elliott</td>
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<tr>
<td>Danny Crow</td>
<td>Dale Evely</td>
<td>Randy McSpadden</td>
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<tr>
<td>Ron Hicks</td>
<td>Robert Hill</td>
<td>Charles Morris</td>
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<tr>
<td>Wayne Holland</td>
<td>Ron Johnson</td>
<td>John Murray</td>
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<tr>
<td>Bob Hubby</td>
<td>Don Labbe</td>
<td>Howard Nekimken</td>
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<tr>
<td>Roger Hull</td>
<td>Dan Lee</td>
<td>Loanna Overcash</td>
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<tr>
<td>Gordon McFarland</td>
<td>Jason Makansi</td>
<td>Matricia Smith</td>
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<tr>
<td>David Roney</td>
<td>Milton Neher</td>
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<tr>
<td>Marland Stanley</td>
<td>Rudy Neustadter</td>
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<tr>
<td>Tom Stevenson</td>
<td>Michael Skoncey</td>
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<td>Joe Vavrek</td>
<td>Robert Smoak</td>
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<td>Robert Webb</td>
<td>Harold Sternberg</td>
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<tr>
<td>Marjorie Widmeyer</td>
<td>Robert Szczerbicki</td>
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<tr>
<td>Denny Younie</td>
<td>Cyrus Taft</td>
<td>Joe Weiss</td>
</tr>
<tr>
<td></td>
<td>Reed Wiegle</td>
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I. MEETING CALLED TO ORDER

Gordon McFarland, POWID Director, called the meeting to order at 1:00 p.m.

II. INTRODUCTION OF MEMBERS AND GUESTS

All attendees introduced themselves. A sign-in sheet was distributed. The POWID Executive Committee roster was distributed and updated by the attendees.

III. APPROVAL OF THE PREVIOUS MINUTES

A motion to approve the minutes as written from the 21 August 2000, POWID EXCOM meeting conducted at ISA EXPO 2000, held at the Convention Center in New Orleans, Louisiana was made and seconded. Before a vote was taken, Bob Hubby requested that the minutes be amended to revise the date in the first sentence in Section III from 17 January 2000 to 17 June 2000. With this correction so noted, the minutes were approved as amended by the POWID Executive Committee members.

IV. AGENDA ADDITIONS AND / OR CORRECTIONS

Chairman Gordon McFarland asked the EXCOM members if there were any additions, deletions, or corrections to be made to the meeting agenda. The following topics were suggested and added to the New Business Heading, after some preliminary discussion:

- Long Range Planning Committee Status
- Division Symposia: Guidelines for Division Sponsored Events
- Honorariums for other ISA Divisions
- Student Competition

V. FINANCIAL REPORT

Bob Szczerbicki submitted his Treasurer’s Report. The report showed a balance of approximately $11,000 in the treasury. It also noted a $2,700 Honorarium for our Division’s participation at ISA EXPO 2000, and $33,398.19 to be transferred to the POWID account in late October 2000, as a result of the POWID 2000 Spring Conference held in San Antonio.

VI. COMMITTEE REPORTS

1. SP67

Reed Wiegle was not in attendance and a report was not received.

2. SP77

Wayne Holland submitted a written report on SP77.

3. Honors & Awards

Milt Neher was not in attendance and did not submit a report.

4. Newsletter

Dan Antonellis was present and submitted a written report. Dan verbally reported that the Fall 2000 newsletter was electronically mailed to ISA Headquarters for publication on 16 October 2000. It was printed and distributed by ISA in mid-January 2001. Dan acknowledged that errors had been introduced on conference dates and on the company affiliations for several individuals cited, due to columns not aligning properly.

5. Publicity

Joe Vavrek was in attendance and said that a written report would be submitted. Joe said that he planned to have the POWID Conference scheduled for Walt Disney World in Orlando in June 2001 advertised in the April or May 2001 edition of Power Magazine.
6. Membership

Danny Crow was in attendance but a written report was not submitted. Danny referenced the ISA 1991-2000 Division Membership Report and noted the decline in POWID membership over this ten year period, and that a similar trend was occurring in most other A&T and I&S Divisions. Danny said that new younger members are not entering POWID, and noted the average age of those attending the POWID EXCOM meeting. From this, discussions ensued concerning how the leadership of POWID could attract and retain new members, particularly how to recruit younger members to ensure continuity as our older membership retires and becomes less active in ISA and POWID. Gordon McFarland and Danny Crow agreed, as an action item, to get the POWID membership roster sorted by company to review to see if company membership trends could be learned from this process.

7. Editorial Review

Don Labbe was not in attendance. Don is the new Editorial Review Chairman, replacing Harold Sternberg, and is coordinating the review of papers for the POWID 2001 Conference.

8. Historian

Bob Webb was in attendance, but did not submit a written report. Bob reported that he had received the historic files on the Power Industry Division from Harold Hopkins, past POWID Historian, but had not had the opportunity to review the contents of the files.

9. Nominating

Roger Hull was in attendance and reported that three new EXCOM members had been nominated and approved by the POWID EXCOM during our last meeting in New Orleans during ISA 2000. Those new members are:

-Dale Evely
-Marland Stanley
-Denny Younie

Roger noted that, with the appointment of these new members, the POWID Executive Committee Board was up to its full compliment of members.

10. Long Range Planning

Ron Hicks was in attendance but the Long Range Planning Committee had not met during the ISA President’s Winter Meeting as planned. Ron initiated a discussion on the purpose and make-up of the LRPC. Ron felt that the LRPC should be more involved in the strategic issues facing the Power Industry Division, such as maintaining a strategic business plan and that the responsibilities for site selection recommendations should be delegated to a site selection sub-committee to the LRPC. He also felt that there should be a permanent staff for the LRPC and that staff should consist of the following:

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
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<tbody>
<tr>
<td>Current Director</td>
<td>Gordon McFarland</td>
</tr>
<tr>
<td>Director-Elect</td>
<td>Past Director</td>
</tr>
<tr>
<td>Membership Chairman</td>
<td>Publicity Chairman</td>
</tr>
<tr>
<td>Newsletter Chairman</td>
<td>Training Chairman</td>
</tr>
</tbody>
</table>

11. Web Page

Gary Cohee was in attendance and submitted a written report on the Web Page. Gary reported the following progress has been made on the POWID Web Page:

- The POWID roster has been updated
- Work is proceeding on getting Internet Search Engines to recognize POWID Web Site
- Information continues to be added to the 2001 Orlando Conference page
- 2002 San Diego Conference has been added and will be updated as info is received

Gary also reported that the POWID Web Site had received 643 “hits” during 1999 and 1647 “hits” during 2000, indicating a healthy growth in use as our membership has become more aware of its existence.

12. Professional Development

Tom Stevenson was in attendance and reported that PDH certificates will be given out at the Orlando 2001 POWID Conference as they were at the 2000 POWID Conference. Tom said he was looking into automatic name placement on the certificates, perhaps by using card/scanning devices.

VII. OLD BUSINESS

a. Strategic Alliance Between Power Industry Division and Vendors

Director Gordon McFarland initiated a discussion regarding establishing strategic alliances with select vendors that serve the Power Industry with instrumentation and control system products and services and those who have a continuing presence / participation with ISA POWID activities. Some of the areas where a strategic alliance with select vendors could result in mutually beneficial agreements were the following:

- Vendor advertisements in POWID Newsletters
- Vendors sponsoring coffee/refreshment breaks at POWID Conferences
- Vendors allowed limited advertisement space on POWID Web Page
- Vendor product/service displays in prominent locations at POWID Conferences
- Vendors allowed to develop Session(s) at Conferences using papers on their products/services applications

Continued on next page
Roger Hull noted that only one vendor responded to his October 2000 request regarding an interest in establishing a strategic alliance. The definition of a vendor for purposes of a strategic alliance could include the suppliers of services and equipment. It was also pointed out that the arrangements with the vendors for the 2001 POWID Orlando Conference could serve as a guideline for future vendor alliances.

VIII. NEW BUSINESS

a. Report From Past Director

Roger Hull reported that the Power Industry Division had been selected as the ISA I&S Department Outstanding Division for the third year in a row. The recognition/award was announced at the ISA Honors and Awards Ceremony held during ISA EXPO 2000 in New Orleans.

b. Hotel Location for POWID 2002 Conference in San Diego

Director Gordon McFarland reported that we have until June 2001 to finalize the contract for the Catamaran Hotel in San Diego at a rate of $137 per night plus taxes. Gordon wanted to see if the POWID EXCOM Board was interested in considering having the 2002 POWID Conference in Las Vegas instead of in San Diego, and coordinate the timing of the event to be consecutive with the ISA Regional Event scheduled there. There was ultimately overwhelming support for the early and originally planned date of 2 June 2002.

c. SCS (Society for Modeling and Simulation) Collaboration with ISA

Mr. Lou Birta, Sr. VP of SCS, wrote a letter to Roger Hull in January 2001 recalling the activity between the SCS and ISA several years ago that had all but vanished in recent years. Mr. Birta questioned if there were any linkages that still existed and should be revived. Mr. Birta concluded that with the new interest in modeling emerging in the Power Industry, he felt that it would be mutually beneficial for ISA and SCS to revive their past collaborative efforts. POWID Director Gordon McFarland asked the POWID EXCOM members if they knew of any ties with POWID and the SCS in the past. There was no acknowledgement of any previous collaboration.

d. Conference Call on EPRI Initiative on Security Issues for Information Systems with Joe Weiss

Joe was not able to attend the POWID EXCOM meeting in Albuquerque due to schedule conflicts. A telephone conference call, therefore, was arranged with the POWID Executive Committee and Joe Weiss of EPRI to discuss the topic of security issues for information systems.

e. Long Range Planning Committee Status

No further discussion was warranted under the New Business part of the agenda.

f. ISA Division Symposia Guide

The guidelines that ISA holds the Divisions accountable for was discussed.

g. Honorariums for Other Divisions

Ron Hicks discussed having honorariums as enticements for other ISA Divisions and Districts and other entities to participate with POWID in our Conference programming. Ron felt that it was appropriate for the magnitude of the honorariums to be set by the Conference General Chairperson. Ron reported that $1,000 had been allocated for honorariums for the POWID 2001 Conference and suggested $500 as a general budget amount for future Conferences.

h. Student Competition

Laura Crumpler spoke before the POWID EXCOM Board on behalf of ISA Staff to promote POWID support for the ISA program for international student competition. Laura was seeking POWID support in the following areas:
- Provide technical questions to test students on (Laura needs about 15 questions from each Division)
- Financial Support
- Manpower (judges, evaluators, etc.)

After Laura’s presentation, the board approved a motion to provide $500 for financial support to the student competition program. Danny Crow, Tom Stevenson, Roger Hull, and Ron Hicks agreed to serve as POWID volunteers to assist with the ISA Student Competition program.

i. Emerging Technologies on Discovery Channel (Ad Hoc)

Danny Crow initiated a POWID Board discussion on whether we should offer a forum to the people who put together a program on the Discovery Channel on Cable TV for new technologies. Instead of putting this issue into a motion for the Board to consider, Ron Hicks suggested that he would pursue this and report back to the Board at a future date.

j. Scholarship Award for POWID Achievement Award Recipient (Ad Hoc)

Director Gordon McFarland suggested that we raise the amount of the POWID Achievement student scholarship award to $4,000 to reflect our Division’s more healthy financial situation. Gordon also suggested that a motion be worded such that the $4,000 award would be made retroactive to the student(s) selected by the 1999 and 2000 POWID Achievement Award recipients. After some discussion on whether those students receiving scholarships ultimately develop an interest in ISA and the Power Industry Division, the motion was approved with one dissenting vote.

Continued on next page
IX. ISA/POWID CONFERENCES

San Antonio – June 2000 – Marge Widmeyer / Rudy Neustadter

There was little to add about last year’s POWID Conference in San Antonio

Orlando – July 2001 – Ron Hicks / Rudy Neustadter

Ron Hicks, conference chairperson, discussed the details of the 2001 POWID Conference.

San Diego June 2002 – Gary Cohee

Gary Cohee volunteered to be the General Chair for the 2002 POWID Conference. Gary submitted a budget for this Conference to the POWID EXCOM Board, and reviewed some of the details of that budget during the EXCOM meeting. After the discussion, POWID Director Gordon McFarland raised a motion to the Board that the budget submitted to the Board by Gary be approved as submitted. The POWID Board approved the motion

Gary requested volunteers for session developers for 2002 conference. Tom Stevenson will do the 2002 training sessions.

Williamsburg, Virginia 2003

The location selected and approved by the POWID Long Range Planning Committee, with assistance from ISA Meeting Planning Staff, is Williamsburg, Virginia. POWID Director Gordon McFarland requested a volunteer for the General Chairperson for the POWID 2003 Conference.

X. ISA EVENTS

New Orleans-August, ISA EXPO 2000

Roger Hull reported that the POWER Industry Division received $2,700 out of a maximum possible funding of $4,000 for our participation in the ISA EXPO 2000 in New Orleans. This participation was for session developers, serving on panels, and reviewing papers.

Houston, Texas 9-13 September, ISA 2001

Marjorie Widmeyer is coordinating the POWID participation at ISA 2001. Bob Hubby reported that technology themes are continuing for ISA 2001 but this will be the last year for this type format. POWID receives $300 for each Session a POWID member chairs, $200 for participating in a panel session, and $150 per paper reviewer, who is required to review three papers. To volunteer to be a paper reviewer, you can sign up by going to the ISA web site for this event.

XI. NEXT EXECUTIVE COMMITTEE MEETING

Gordon McFarland advised that the next POWID Board meeting will be Sunday, 8 July 2001, 12:00 noon to 3:00 p.m. at the Walt Disney Coronado Resort, in Orlando, Florida, during the POWID Conference.

The next POWID Long Range Planning meeting is scheduled for Saturday evening, 7 July at the Walt Disney Coronado Springs Resort, tentatively scheduled from 6:00 p.m. until 7:00 p.m.

XII. ADJOURNMENT

The POWID Executive Committee meeting was adjourned at 4:48 p.m.
<table>
<thead>
<tr>
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