

# ASQ Statistics Division Newsletter

Volume 6, Number 3, June 1985

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# Incoming Chair's Message 1985-6 Offers Challenges and Opportunities

**By Pete Jacobs**

The coming year offers many challenges and opportunities for members of the Statistics Division. The Division, founded in 1979, is six years old. It has grown to a membership of over 5,700 and is the second largest division in ASQC. Through the leadership and efforts of many individuals during the embryonic years of the organization, a number of outstanding programs have been conceived and developed.

I want to personally thank our outgoing chairman, Bill Mead, for his valuable contributions to the continued growth and success of our organizations. Bill has been actively involved in the Division from its inception. He has contributed to the development of many of our fine activities.



## **MANY CONTINUING ACTIVITIES**

I am happy to report on the 1985-86 plans for a number of our well-established and very successful programs.

### **"How to" Booklet Series**

Nine volumes of the ASQC Basic References in Quality Control: Statistical Techniques booklet (often referred to as the "How to" series) are now available. John Cornell and Sam Shapiro will continue to serve as co-editors of the series. They invite prospective authors and reviewers to contact them. As additional booklets are published, tutorials will continue to be offered by the authors at ASQC conferences. The "How to" booklet series has been one of the most valuable contributions made by the division to ASQC and the field of quality. I encourage you to read and utilize this excellent material as well as to consider authoring a booklet in the series.

### **Fall Technical Conference**

Steve Bailey is the Statistics Division Program Chairman for the 29th Annual Fall Technical Conference co-sponsored by the Division and the Chemical and Process Industries Division, ASQC, and the Section on Physical and Engineering Sciences, ASA. The conference will be held in Corning, New York on October 24 and 25, 1985. Immediately preceding the conference on Wednesday, October 23, 1985, Tom Barker will present a one-day short course entitled "Quality Engineering by Design: The Taguchi Method." The short course is being coordinated by the Statistics Division. This is the first year that we

are a co-sponsor of the conference. We look forward to a long and beneficial association with the FTC.

## **Annual Quality Congress**

Eva Chen is the Statistics Division representative on the program committee for the 1986 Annual Quality Congress. Next year is the 40th anniversary of the ASQC national congress. The conference will be held at the Disneyland Hotel in Anaheim, California on May 19-21, 1986. The conference theme is "The Fundamentals and Future of Quality."

## **Annual Conference on Applied Statistics**

The 41st Annual Conference on Applied Statistics will be held on December 2-4, 1985 at Del Webb's Claridge Casino Hotel in Atlantic City, New Jersey. In previous years the conference has been held in Newark, New Jersey. Short courses will be conducted the weekend preceding the conference. Frank Alt is the Statistics Division representative on the program committee. The conference is co-sponsored by the Metropolitan Section and the Statistics Division, ASQC, and the Biopharmaceutical Section, ASA. The objective of the conference is to present new techniques and statistical applications in the biopharmaceutical and quality fields.

## **Division Newsletter**

The Division newsletter continues to serve as an excellent vehicle to communicate the activities and plans of the organization. We extend hearty and well-deserved congratulations to Ed Mykytka for a professional and very thorough job of editing the newsletter during the past two years. This year Ed is Division chairman-elect and will retire as editor. Tony Salvia has been chosen as his successor. We are planning to publish the newsletter on a quarterly basis. Your input on its content is certainly welcomed.

## **Standards Committee**

A longstanding activity of the Statistics Division is the development, review, and revision of ANSI/ASQC standards in the areas of quality program requirements, procedures, specifications, and definitions. We are currently reviewing a number of standards. I will mention just two of the many activities in this area.

Harry Wadsworth is coordinating the review of three standards: ANSI/ASQC A1-1978 Definitions, Symbols, Formulas and Tables for Control Charts, ANSI/ASQC A2-1978 Terms, Symbols and Definitions for Acceptance Sampling, ANSI/ASQC A3-1978 Quality Systems Terminology. Several reviewers are immediately needed to work on these three standards.

Bob Perry is forming a committee to review ANSI/ASQC Z1.4-1980 Sampling Procedures and Tables for Inspection by Attributes and ANSI/ASQC Z1.9-1980 Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming.

Ozzie Willner is chairman of the statistics Division Standards Committee which coordinates the ASQC standards work. Please contact Ozzie, Harry, or Bob if you are interested in contributing to this activity. We need the help of additional qualified reviewers. This is an excellent opportunity to become involved in the national and international standards arena.

## **CHALLENGE FOR 1985-86**

As we continue to develop as an organization, we are challenged to grow and increase our scope of activities. The primary mission of the Division is to promote the effective use of statistical methods in the field of quality wherever they may be most appropriately used. We are a service organization attempting to assist others to do their jobs better.

For the coming year I propose the goal of expanding our sphere of influence by increasing the number of collaborative activities with the divisions and local sections of ASQC as well as with other professional organization. Let us take a leadership role by using and by helping others use statistics as an important tool to improve quality and hence productivity. There are four areas in which I plan to concentrate our efforts:

### **Speakers List**

As a result of many inquiries from both within and outside ASQC, the Statistics Division has embarked on a program to develop a speakers list. The purpose of this list is to identify individuals who are willing to present papers, talks, or short courses concerning various aspects of quality and statistical techniques and methodologies. Mike Mazu, our Education Committee Chairman, is coordinating this effort. The Statistics Division is in an excellent position to serve as a resource to all of ASQC. We will be making an important contribution to the quality profession by providing knowledgeable and qualified speakers. I encourage you to participate in this very fine program. Perhaps you are in a position to encourage your local section or another division to use this list for program planning.

### **Division Liaisons**

As a service division it is vital that we develop and nurture beneficial working relationships with other organizations of the society. In an effort to promote better communications with ASQC divisions and identify additional worthwhile collaborative projects, we are hoping to enlist the involvement of individuals who hold dual membership in the Statistics Division and one or more other divisions of the society. These individuals are in an excellent position to serve as liaisons between the Statistics Division and the other divisions of ASQC. Please contact me if you are willing to assume liaison responsibilities with another ASQC division.

### **Councilors To Work With Local Sections**

The Statistics Division has a network of regional councilors who serve as liaisons between the various local sections of ASQC and the division. There is one elected regional councilor for each of the fifteen regions. Each region contains from six to twenty-two sections. The Statistics Division has co-sponsored sessions at local conferences with the Akron-Canton Section (Region 8) and the Minnesota Section (Region 12). Mike Mazu will be working with the regional councilors to assist in establishing collaborative projects with the local sections.

## **ASA Committee On Quality and Productivity**

The American Statistical Association recently formed a Committee on Quality and Productivity. The primary goals of the committee are to foster:

- Improved awareness of the role of statistics in quality and productivity improvement,
- Improved training programs for those within and outside the statistical community,
- Improved communication among statisticians.

Frank Alt will serve as the Statistics Division liaison to this committee. Dick Freund, another division member, is currently representing the society on the ASA committee. Our desire is to establish a closer working relationship with ASA in the area of quality and productivity.

Your involvement is necessary for us to successfully conduct our planned activities. I want to challenge each of you to actively participate in the many and varied programs of the division. Their success depends upon your support. I welcome your comments and suggestions and invite you to write or phone me.

*There is no comparison between that which is lost by not succeeding and that which is lost by not trying.*  
*-Francis Bacon*

# Outgoing Chair's Message

## Thanks for the Support

Suddenly, the end of my term as your chairman is here, and I have a lot of people to thank.

First off, there's Mike Mazu, who is Education Chairman of the Division. He has just recently issued a Statistics Division speakers list. It took quite a bit of work on his part, plus some of the regional councilors, to put it together. There are 74 different names on the list, and a lot more topics than that. With the emphasis currently being placed on Statistical Process/Quality Control these days, you should contact your regional councilor, or Mike directly to obtain the services of some of these speakers for your local meetings. These speakers know what they're talking about.



Then there are John Ramberg and Peter Jacobs, immediate past chairman and incoming chairman of the Division, respectively. They labored tirelessly and persistently to make the Statistics Division a full co-sponsor of the Fall Technical Conference. Let me again urge you to make plans to go to Corning, N.Y., this October to attend this meeting. It promises to be a dandy.

Ed Mykytka deserves special praise. He has been carrying two offices for the past two years-treasurer and newsletter editor, and doing a bang-up job of both. He'll be chairman-elect next year. To go from essentially no newsletter to this rather classy publication in only a few months is an impressive effort. I can't say much for his skills as a photographer, but nobody's perfect.

The Statistics Division had an excellent program at the 39th Annual Quality Congress, no thanks to me. I misunderstood the cut-off date, and then had to ask Lynne Hare to bail me out. With only a few days to work, he assembled a fine group of speakers and topics, and I appreciate it.

Two unsung heroes of the Division are John Cornell and Sam Shapiro. They are the co-editors of the ASQC Basic References in Quality Control, sometimes known as the Statistical Booklet Series. They cajole experts into writing a booklet, shepherd them through the process, edit, and work with Milwaukee to get it published. Each and every one of the authors also deserves special thanks. Not one of them, editor or author, has received a dime for all that work.

Finally, let me thank all of you who elected me chairman of the second largest and fastest growing of all of the ASQC divisions. Half-dozen years ago, when we were laboring to form the Statistics Division, I estimated an ultimate membership of one thousand. At last count, there were 5700 of us, and still growing. So much for my competence at estimations! I am unabashedly proud of being chairman of the Statistics Division, and now (but not then) I thank Harry Wadsworth and Dick Freund for talking me into the line of succession. It's been a fascinating, rewarding, and frustrating experience. Pete Jacobs will be on stage next; you're in good hands.

# Fall Technical Conference: October 24-25

"Statistical Methodology: the tools to get to Total Quality" will be the theme of this year's Fall Technical Conference to be held in Corning, New York on October 24 and 25.

This conference will consist of three simultaneous sequences of sessions in the areas of Statistics and Quality Control, in tutorial format or groups of brief presentations.

A highlight of the conference will be the delivery of the W. J. Youden Memorial Address by Ronald D. Snee of the Du Pont Company. In addition, conference attendees will be able to hear addresses by James R. Houghton, chairman of the board of Corning Glass Works and John Neter, president of the American Statistical Association.

This marks the first year that the Statistics Division is a full co-sponsor of the conference along with the Chemical and Process Industries Division (CPID) of ASQC and the Section on the Physical and Engineering Sciences of the American Statistical Association.

Registration fees are \$75 for the complete two-day conference, including luncheons. Fees for the pre-conference short-course are \$40. More detailed information regarding fees or conference activities can be obtained by phoning conference chairman Nell Werner at (607) 974-6444 or Dan Pearl (CPID chairman) at (919) 878-6316 or writing to:

Fall Technical Conference P.O. Box 1361 Corning, New York 14830.

A block of 85 rooms has been reserved for conference attendees at the Corning Hilton, the convenient site, with additional blocks of rooms at both the Lodge-on-the-Green and the Painted Post Holiday Inn, which are located approximately 4 miles west of Corning. Courtesy shuttles will bring conference attendees from these hotels to the Hilton each morning prior to the short course or conference and return after the last afternoon session. Lodging arrangements and information should be obtained directly from these hotels at the following addresses. (Be sure to mention the conference by name to obtain the group rate.)

Corning Hilton  
Denison Parkway  
Corning, New York 14830  
(607) 962-5000

Lodge-on-the-Green  
Routes 15 & 417  
P. O. Box 150  
Painted Post, New York 14870  
(607) 962-2456

Painted Post Holiday Inn  
Routes 15 & 417 -  
Painted Post, New York 14870  
(607) 962-5021

# Short Course On Taguchi Methods To Precede FTC

An innovation in this year's Fall Technical Conference will be the presentation of a short course entitled "Quality Engineering by Design-The Taguchi Approach," by Tom Barker. The course will precede the conference on Wednesday, October 23.

Dr. Genichi Taguchi is a noted Japanese specialist who advocates building quality methods into the engineering process rather than reserving quality as a problem for the Quality Control or Production Departments. The course will present Taguchi's integrated system of developing specifications as well as engineering and manufacturing the product to the specifications. Participants will gain an understanding of the Taguchi approach to quality and the use of experimental designs.

Tom Barker has 20 years of experience working at the Joseph Wilson Center for Technology at Xerox Corporation. He has been involved with the Taguchi method since 1982. He has taught classes at the Rochester Institute of Technology, where he received the Outstanding Teacher Award for his teaching excellence in 1983.

The course, restricted to 60 participants, will last from 8:00 am to 5:00 pm on Wednesday. The \$40 fee will include lunch and a discussion hour after the course.

# Joint ASA-ASQC Activities Planned to Celebrate National Quality Month

The ASA Committee on Quality and Productivity, jointly with ASQC and the ASA Council of Chapters, is encouraging ASA Chapters to plan joint program activities with ASQC Sections for National Quality Month in October. Joint programs could include speakers from either (or both) organizations, training seminars, audio-visuals (e.g. the Juran Tapes), or informal industrial-academic mixers.

Robert L. Mason, Chair of the ASA Council of Chapters, has compiled a list of 64 Chapters which have local ASQC Sections in their vicinity. He is preparing a mailing to officers of these Chapters and Sections inviting each to contact the appropriate officer of the other organization to discuss a joint meeting or program for October. In order to facilitate this effort the Council of Chapters is compiling a National Speakers List and will identify speakers who have expertise in quality and productivity topics. Further information on the National Speakers List can be obtained from Bob (C/O Fuels and Lubricants Research Division, Southwest Research Institute, San Antonio, TX 78284. (512) 684-5111).

# Statistics Division Minipaper Optimal Target Settings

**By Benjamin Fine  
Fairfield University**

A common situation in the foodstuff industry is the following. By law or FDA regulation there is a fixed weight  $W_0$  or volume  $V_0$  below which the produced food product must be sold at discount. Assuming the production machinery is in control but can be adjusted for different target values, what is the optimal target value setting?

In this note we give a formula for the optimal target setting assuming that the distribution of product is normal with an adjustable mean  $U$  representing the target value and a fixed (for all settings of the mean) standard deviation. We then present a brief example showing the increase in profits at the optimal setting compared to several other possible settings.

We identify the following quantities:

$W_0$  = Measurement below which the product must be sold at discount. In the usual cases in the foodstuff industry this is weight or volume, but it can be any other measurable characteristic.

$P_2$  = Selling price of the product at non-discount.

$P_1$  = Selling price of the product at discount.

$K$  = Cost per unit for materials. It is assumed that the variable cost of production is in terms of materials cost.

$S$  = Product standard deviation. Assuming the machinery is in control this will be the same for all target settings.

$U$  = Target setting = Production mean.

If we let  $X$  denote the amount of the product characteristic in a finished item (which we assume has normal distribution with mean  $U$  and standard deviation  $S$ ), then the profit per item is

$$\text{Profit} = \begin{cases} P_1 - KX, & \text{if } X < W_0 \\ P_2 - KX, & \text{if } X \geq W_0 \end{cases}$$

The optimal setting for the target value  $U$  is the value of  $U$  which maximizes the expected profit per unit. The latter turns out to be

$$E[\text{Profit}] = P_2 - KU - (P_2 - P_1) \text{Prob}[X < W_0].$$

Maximizing the expected profit we find so that the optimal value for  $U$  is

$$(1) U = W_0 + ST \text{ where}$$

$$(2) T = \sqrt{2 \ln \left( \frac{P_2 - P_1}{\sqrt{2\pi} KS} \right)}$$

(A complete derivation is available upon request from the author.)

As an example, suppose we have a pastry item which retails for \$.72 per item. By FDA regulation, if its weight is below 460 gms, it must be sold off-price and labeled accordingly. A discount outlet sells it at \$.48 per item. The cost per materials is \$.11 per lb = .0002426 per gm., while the standard deviation of production weight is 8 gms. In terms of the variables;

$$\begin{aligned} W_0 &= 460 \\ P_2 &= .72 \\ P_1 &= .48 \\ K &= .0002426 \\ S &= 8 \end{aligned}$$

The correction factor T given in (2) computes to 2.7924. This then gives the optimal target setting as U = 482.34 gms. In the [table](#), we give the profit below the maximal for a production run of 1000 items as against four naive target settings. The first at 492 gms represents 4 standard deviation (sd's) above the cutoff. This would essentially give no product at discount. The second at 484 is 3 sd's above the cutoff giving about 1% at discount. The third and fourth are at 480 and 476, 2.5 and 2 standard deviations above the cutoff respectively. The 480 setting will produce .62% at discount while 476 will produce about 2% at discount. The differences in profits at larger production runs should be the above figures multiplied by the appropriate ratios of produce run sizes.

*Benjamin Fine is a Professor of Mathematics and Statistics at Fairfield University, Fairfield, Connecticut, 06430. During 1984-85 he was a visiting professor at the University of California - Santa Barbara. He also heads a consulting service: QED Associates, 24 West Bank Lane. Stamford, Connecticut, 06902.*

**Table 1**

Target Setting	Profit on 1000 items	Difference from optimal
476	699.11 constant *	-3.30
480	602.11 constant *	-.30
482.34 (optimal)	602.41 constant *	
484	602.30 constant *	-.11
492	600.68 constant *	-1.73

\* The constant includes all non-variable production costs.

# 1985-86 Statistics Division Directory

## Officers

### Chairman:

Peter J. Jacobs  
3M Company  
224-4E-02 3M Center  
St. Paul, MN 55144  
(612) 733-4257

### Chairman-elect:

Edward F. Mykytka  
Industrial Engineering Dept.  
207 Dunstan Hall  
Auburn University, AL 36849  
(205) 826-4340

### Secretary:

Ronald G. Askin  
Systems and Industrial Engineering  
University of Arizona  
Tucson, AZ 85721  
(602) 621-6551

### Treasurer:

Lynne Hare  
Thomas J. Lipton, Inc.  
800 Sylvan Avenue  
Englewood Cliffs, NJ 07632  
(201) 894-7441

## Committee Chairmen

### 1986 Annual Quality Congress:

Eva Chen  
Rolm Corporation M/S 705  
4900 Old Ironsides Drive  
Santa Clara, CA 95050

(408) 986-7435

**41st Conference on Applied Statistics:**

Frank B. Alt  
University of Maryland  
College of Business  
College Park, MD 20742  
(301) 454-6315

**29th Fall Technical Conference (1985):**

Steven P. Bailey  
Applied Statistics Group  
Engineering Department  
E. I. duPont deNemours Company  
Louviers Building,  
Wilmington, DE 19898

**30th Fall Technical Conference (1986):**

William H. Woodall  
Department of Statistics  
P. O. Box 41010  
Lafayette, LA 70504  
(318) 231-5297

**"How To" Booklet Series:**

John A. Cornell  
Department of Statistics  
(IFAS)  
411 Rolfs Hall  
University of Florida  
Gainesville, FL 32611  
(904) 392-1946

Samuel S. Shapiro  
Dept. of Mathematical Sciences  
Florida International University  
Tamiami Trail  
Miami, FL 33199  
(305) 554-2030

## **Standards:**

Ozzie Willner  
Westinghouse Electric Corporation  
Bettis Atomic Power Laboratory  
P. O. Box 79  
West Mifflin, PA 15122  
(412) 476-5954

## **Newsletter Editor:**

Antony A. Salvia  
Quality Control Institute  
Penn State-Behrend  
Station Road  
Erie, PA 16563  
(814) 898-6240

## **Education:**

Michael J. Mazu  
Memory Products Division  
Stolle Corporation  
1501 Michigan St.  
Sidney, OH 45365  
(513) 498-6209

## **Examining:**

Robert L. Perry  
McDonnell Douglas Electronics  
P. O. Box 426  
St. Charles, MO 63301  
(314) 925-4428

## **Liaison with ASA Committee on Quality and Productivity:**

Frank B. Alt  
University of Maryland  
College of Business  
College Park, MD 20742  
(301) 454-6315

## Nominating and Long-Range Planning:

William M. Mead  
Manager, Quality Analysis  
Babcock & Wilcox  
P. O. Box 785  
Lynchburg, VA 24505  
(804) 522-5555

# 1985-86 Regional Councilors

### Regional 1:

James R. King  
Technical Aids for Engineering and  
Management  
P. O. Box 25  
Tamworth, NH 03886  
(603) 322-8843

### Region 2:

Donald J. Baird  
Xerox Corporation  
800 Phillips Road  
Building 200-2  
Webster, NY 14580  
(716) 422-7329

### Region 3:

Thomas Calvin  
(IBM Corporation)  
13 Malstorne Road  
Wappingers Falls, NY 12590  
(914) 463-2016

### Region 4:

Ian B. MacNeill  
Director, Statistics Laboratory  
Eng. & Math. Sciences Bldg

University of Western Ontario  
London, Ontario N6A 5B9  
(519) 679-2196

### Region 5:

Frank B. Alt  
University of Maryland  
College of Business  
College Park, MD 20742  
(301) 454-6315

### Region 6:

Marilyn Hwan  
RAYCHEM Corporation  
300 Constitution Drive  
Menlo Park, CA 94025  
(415) 361-2190

### Region 7:

Charles A. Miller  
SYSCON Corporation  
1127 Reeves  
Ridgecrest, CA 93555  
(619) 446-2589

### Region 8:

*position vacant*

### Region 9:

Carlos W. Moreno  
Moreno-Blocker Inc.  
230 Northland Blvd.  
Suite 234  
Cincinnati, OH 45246  
(513) 772-7249

### Region 10:

Gregory F. Gruska  
The 3rd Generation, Inc.  
1157 Shallowdale  
Troy, MI 48098  
(313) 585-0431

### Region 11:

George W. Marrah  
Dept. of Mathematics &  
Computer Science  
James Madison University  
Harrisonburg, VA 22807  
(703)433-6534

### Region 12:

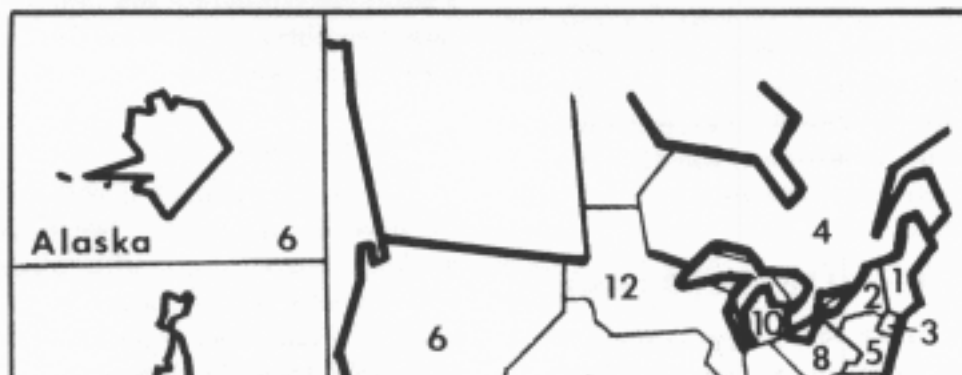
Galen C. Britz  
Consumer Products Plant  
Household Products Division/3M  
Hutchinson, MN 55350  
(612) 587-3626 Ext. 1462

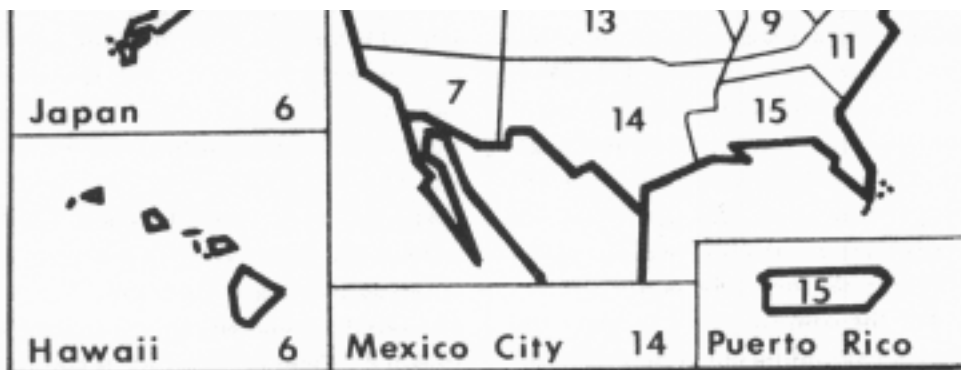
### Region 13:

*position vacant*

### Region 14:

Kenneth E. Case  
School of Industrial Eng.  
Building 322, Engineering North  
Oklahoma State University





Stillwater, OK 74078  
(405) 624-6055

**Region 15:**  
Harrison M. Wadsworth  
Georgia Institute of Technology  
School of Industrial & Systems  
Engineering  
Atlanta, GA 30332  
(404) 894-2332

# Editor's Corner

## Tony Salvia Named As New Editor of Newsletter

**By Ed Mykytka**

I am happy to announce that Dr. Tony Salvia has been named as the new editor of this newsletter and will be taking command starting with the next issue.

Tony Salvia is the director of the Quality Control institute at the Behrend College of Penn State University in Erie, Pennsylvania and is an associate professor of Industrial Engineering as well. His undergraduate training is in Mathematics (he received his B.A. in 1960 from Gannon College) and has a Master's in Mathematics and a Ph.D. in Statistics from Case Western Reserve.

I sincerely believe that Tony is well qualified for this task and I hope he can succeed where I have failed, particularly in regard to publishing this newsletter on a more regular basis. Please give him your enthusiastic support and keep him posted of any activities that would be of interest to Statistics Division members.

Selecting Tony for this position was a difficult task as we had two other eminently well-qualified and enthusiastic applicants for the editor's position. I would like to thank both these gentlemen, Dr. Barry Griffin and Dr. John Orban, for their desire to serve the Division. It is this willingness to serve that keeps the Division strong.

### **More Thanks**

Since this is my last issue as editor, I would like to thank a number of people for making my job easier. First, I would like to thank the officers of the division, and particularly John Ramberg, Bill Mead, and Pete Jacobs, for their continual support. Without their direct inputs and encouragement, these tasks would have been impossible.

Lynn Bulfin has provided invaluable support as an editorial assistant and also enthusiastically assumed the odious job of affixing mailing labels to our finished product. Thanks, Lynn.

One perquisite of this Job has been that, as editor, I have often received praise for the professional appearance of this publication in spite of the fact that I really cannot take credit for it (although I often do). That credit belongs to the staff University Printing Service here at Auburn University. These people are truly professionals. I'd like to particularly thank Billy J. Jones and his fine staff of artists and typesetters for their help and patience and Elba Locklar and his production staff for consistently

producing a high quality publication.

Finally, I'd like to thank all the members of the Division who have taken the time to write or offer words of encouragement. It is the support that I have received that transformed this job into a joy.