MAGAZINE
Lab Manager®
Run Your Lab Like a Business

November/December 2008 Volume 3 • Number 4

Stormy Weather
What Does the Economic Downturn Mean to Your Lab?

Efficiency Matters
Now More Than Ever

GREENUP!
Improving the Science of Science with an Eye Toward Sustainability

Starsys Mobile Workcenters from Intermetro

Versatile, mobile designs let you configure a lab to your requirements.

- Easy to install and reposition as needs change
- Modular door, drawer and cabinet designs
- Corrosion-proof, noncontaminating polymer construction
- Greater storage density in a smaller footprint

Undercounter Refrigerator

– from Marvel Scientific

Space-Saver models are only 15" wide yet provide 3.0 cu. ft. capacity and include three full-depth adjustable shelves. Temp. range: 1° to 6°C. Many other models available.

Starting at $1,255

Auto-Adjust Workstations

Cleanroom-compatible ErgoHeight™ Workstation comes in several standard top designs and sizes; stores up to four height settings for easy pushbutton adjustment.

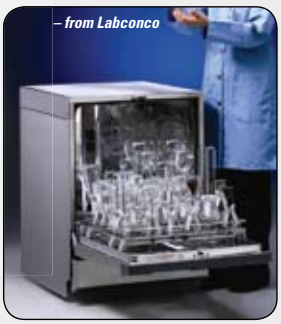
Starting at $2,415

TERRA UNIVERSAL.COM
Critical Environment Solutions

To order, call 714-578-6000 • Fax: 714-578-6020 Fullerton, CA

Your single source for laboratory and cleanroom equipment

Glassware Washers



– from Labconco

FlaskScrubber (shown), ideal for narrow-neck and general purpose lab glassware, comes in freestanding and undercounter models. SteamScruber models are perfect for accessory inserts and smal items

Starting at $6,950

Pass-Throughs

BioSafe™ Pass-Through Chambers feature no-lip, no-seam design for easy sterilization.

Starting at $8,578

Vertical Laminar Flow Station includes PLC control over motorized shield, FFU and lighting to meet Class 100 standards.

Starting at $5,970

Purifier® Logic™ Class II Biosafety Cabinet provides the utmost in efficiency and ergonomics. Unique LCD Information Center monitors operation, including filter life.

Starting at $7,020

Contamination Control Hoods

- Laminar Flow Systems provide particle control to meet cleanliness standards to Class 10/ISO 4
- Ductless exhaust hoods incorporate activated carbon for safe purification of most organic vapors
- Laboratory hoods provide safe ventilation of fumes
- Benchtop models provide space-saving performance and economy
- Full range of optional features includes ionization, UV sterilization, and particle monitoring

Lab & Cleanroom Storage

Cleanroom supplies storage cabinets are available in several shelf and garment rod configurations, with HEPA filter module for optimal cleanliness of stored materials.

Starting at $1,388

Garb & Parts Dispensers

Stainless steel dispenser is ideal for loose gloves, hair nets, shoe covers.

Starting at $1,248

Three-bay acrylic wall-mount glove dispenser accommodates multiple glove sizes or materials.

Starting at $235

Transport Carts — from Intermetro

"Deep Ledge" carts feature corrosion-proof polymer construction; available with antimicrobial Microban®.

Starting at $157

Chrome and stainless steel carts come with solid and wire shelves.

Starting at $306

Lab Apparel

Advanced Vi-Gard® I polyester/cotton lab coat combines durability, comfort and static control. Wide range of sizes and colors.

Starting at $29

Celebrating 40 YEARS
INTEGRITY FOCUS DEDICATION

BioTek®

Hybrid

Microplate Reader Technology

diachemix Rapid Definitive Detection For FP Assays

DLReady

htrf

LanthaScreen™ Certified invitrogen

A perfect fit is a beautiful thing.

Wouldn't work be easier if you had a Multi-Mode Microplate Reader perfectly built just for you? Synergy™ 4 with Hybrid Technology is just that – combining flexible monochromators with sensitive filters. It also has been successfully tested with all major screening technologies including AlphaScreen®. See how perfectly it fits – schedule a demonstration today.

AlphaScreen® Compatible

The choice is yours.	Filter-based	Monochromator-based	Hybrid Technology
AlphaScreen assays	√		√
High performance TRF / TR-FRET	√		√
High performance FP	√		√
High performance fluorescence/FRET	√		√
High performance luminescence	√		√
Flexible assay development tool		√	√
Spectral scanning		√	√

For information visit www.biotek.com/drugdiscovery

BioTek®
Get a Better Reaction.

BioTek Instruments, Inc.
Highland Park, P.O. Box 998, Winooski, Vermont 05404-0998, USA
Tel: 802-655-4040 • Toll-Free: 888-451-5171 • Outside the USA: 802-655-4740 • www.biotek.com

www.labmanager.com **November/December 2008**

Lab Manager MAGAZINE

Run Your Lab Like a Business

CONTENTS

LEADERSHIP & STAFFING

TECHNOLOGY & OPERATIONS

LAB DESIGN & FURNISHINGS

BUSINESS & FINANCE

Based on a recent *Lab Manager Magazine* survey, **35.8%** of our readers expect an increase in their 2009 research budgets for consumables; **34.1%** for staffing; **26.9%** for training; and **26.4%** for chemicals and life science research products. To find out how your budget compares with these, along with complete survey results, visit labmanager.com

You Stand in Front of Our Instruments All Day... We Stand Behind Them...24x7

High Value, Substantially Expanded Services from Applied Biosystems

With over 25 years of experience in the development, manufacture, and service of innovative instruments, and with over 1000 highly trained, dedicated service professionals, AB Global Services is uniquely qualified to deliver a full suite of real-world lab services. From Remote Services to On-Site Application Consulting to Qualification and Professional Services and everything in between, AB Global Services is your value-added partner to help boost your productivity and maximize the return on your technology investment.

- Instrument Repair and Maintenance
- Smart Services
- Qualification Services
- Professional Services
- On-Site Application Consulting
- Training

To learn more go to http://info.appliedbiosystems.com/globalservice or contact your local Applied Biosystems sales representative.

Applied Biosystems

Lab Manager MAGAZINE
Run Your Lab Like a Business

IN EVERY ISSUE

Lab Manager Magazine® (ISSN: 1931-3810) is published bi-monthly by *LabX*. P.O. Box 216, 478 Bay Street, Midland, ON Canada L4R 1K9. USPS 024-188 Periodical Postage Paid at Fulton, MO 65251 and at an additional mailing office. A requester publication, *Lab Manager*, is distributed to qualified subscribers. Non-qualified subscription rates in the U.S. and Canada: $120 per year. All other countries: $180 per year, payable in U.S. funds. Back issues may be purchased at a cost of $15 each in the U.S. and $20 elsewhere. While every attempt is made to ensure the accuracy of the information contained herein, the publisher and its employees cannot accept responsibility for the correctness of information supplied, advertisements or opinions expressed. POSTMASTER: Send address changes to *Lab Manager Magazine®*, P.O. Box 120, Georgetown, CT 06829.

WDS Canadian return: P.O. Box 216, 478 Bay Street, Midland, ON Canada L4R 1K9.

Need stronger lab controls?

TSI provides Safe and Flexible Lab Control Solutions

Design it the way it should be designed:

- Enhanced safety
- Reduced operating expenses
- Occupant comfort
- Design flexibility to fit your needs
- Remote monitoring

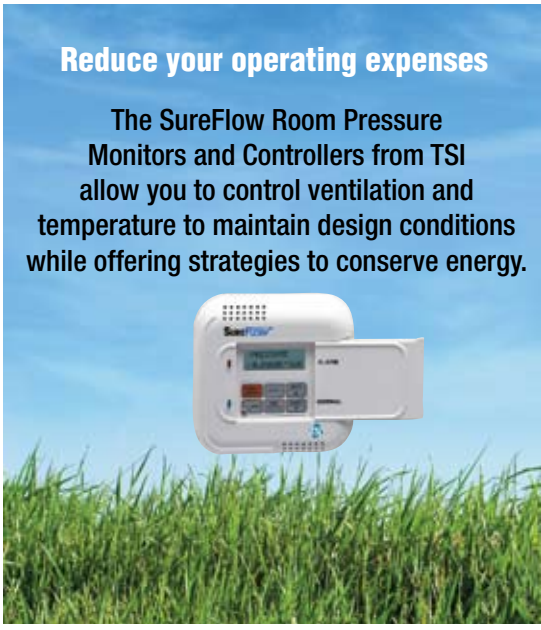
Contact us before it's too late.

Tel: *800 874 2811*
E-mail: *answers@tsi.com*
Web: *www.tsi.com/LAB*

Green Solutions for your lab controls

Reduce your operating expenses

The SureFlow Room Pressure Monitors and Controllers from TSI allow you to control ventilation and temperature to maintain design conditions while offering strategies to conserve energy.



For a free Laboratory Design Handbook, email your contact information to answers@tsi.com

Tel: *800 874 2811* • ***E-mail:*** *answers@tsi.com* • ***Web:*** *www.tsi.com/LAB*

Riding Out the Storm

This month's issue of *Lab Manager Magazine* was initially intended to focus on green laboratory initiatives. However, as the "roller coaster" that is Wall Street continues its heart-stopping, stomach-dropping ride, we felt we needed to shift our attention to where almost everyone else's was – the economy.

Therefore, our November/December issue opens with two feature articles that address the current economic malaise. The first provides some background and perspective on the lab environment today and expectations going forward as markets shrink, budgets tighten and funding is frozen or redirected. Bernard Tulsi looks at what the impact has been and will continue to be on big pharma, government labs, testing labs and possibly the one bright spot—alternative fuel research labs. The second article, by a seasoned manager who has weathered economic turmoil before, provides some practical efficiency tips for staying afloat.

But we did not turn our back on all matters green. This month's Lab Design & Furnishings article offers information on building new or improving current facilities with an eye toward sustainability. One especially good idea is "green purchasing," the practice of buying sustainable products that may include paper, furniture, chemicals and dry lab supplies. Implemented correctly, such a program can preserve natural resources, support the local economy, improve indoor air quality and offer other operational savings. And to demonstrate the practical application of environmentally friendly policies, turn to page 34 to learn how ARUP Laboratories in Salt Lake City is now recycling 30 to 35 percent of its total waste—up from near 0 percent six years ago.

In addition to covering the economy and environmental initiatives, this month's Staffing and Leadership article looks at ways to improve your hiring practices by creating a formal process in which, among other things, you clearly define the job opening, prepare for the interview and check references. That hiring outstanding candidates is one of the most important things lab managers do is echoed by Tony Montana, this year's ALMA Distinguished Service Award winner, in an interview on page 56:

If you haven't yet, I invite you to visit the *Lab Manager Magazine* website (www.labmanager.com), specifically the new Editor's Buzz section. This is where I identify topics of interest and solicit your feedback. By creating a dialogue with you, I hope to better provide the information and answers you need most. Let's chat.

On a final note: I am writing this the morning after Barack Obama's historic White House victory. As he has pledged to reverse the decline in federal funding of science and research and double federal funding for basic research over ten years, Obama's win is promising news for the scientific and research community. Because along with the other serious challenges the United States faces, changing our federal government "from being one of the most anti-science administrations in American history to one that embraces science and technology" would be the right thing, right now.

Pamela Ahlberg
Editor-in-Chief

Lab Manager MAGAZINE
Run Your Lab Like a Business

Publisher Mario Di Ubaldi
mariod@labmanager.com
203.227.1390

Editor-in Chief Pamela Ahlberg
pam@labmanager.com

Contributors John K. Borchardt, PhD
Glenn Ketcham, CIH
Vince McLeod, CIH
Gloria Metrick
Ronald B. Pickett
Tanuja Koppal, PhD

Account Managers June Kafato—International
junek@labmanager.com
705.812.2332

John Buie—Northeast
johnb@labmanager.com
519.915.9932

Ashley Munro—West Coast
ashleym@labmanager.com
888.781.0328 x228

Ed Neeb—Midwest & Southeast
edwardn@labmanager.com
860.350.2761

Design & Production Manager Gregory A. Brewer
gregb@labmanager.com
888.781.0328 x241

Published by LabX

President Bob Kafato
bobk@labmanager.com
888.781.0328 x223

General Manager Ken Piech
kenp@labmanager.com
888.781.0328 x226

888-781-0328
P.O. Box 216, 478 Bay Street
Midland, ON, Canada, L4R 1K9

HAMILTON
THE MEASURE OF EXCELLENCE℠

Discover Automation At Its Best

MICROLAB® STAR
Automated Liquid Handling System

At the Hamilton Company we make it our business to understand what it takes to successfully automate your assay. We supply not only an outstanding liquid handling workstation, but also the ease and support of optimizing your assay and integrating third party devices and labware.

- Easy integration of 3rd party devices
- Expert application support of assay automation scripting
- Handles the widest range of methods and conditions, labware, reagents, and control
- Chain of Custody with pipette monitoring and data management
- Pipetting accuracy and no cross contamination with air displacement pipetting channels, just like the pipettes on your lab bench today

With a Hamilton Microlab STAR, application experience is available in:

- Drug candidate screening
- ADME
- Protein digest
- Protein crystallization
- ELISA
- LC/MS sample preparation
- Cell biology
- DNA/RNA extraction
- Forensics
- And many other liquid handling methods

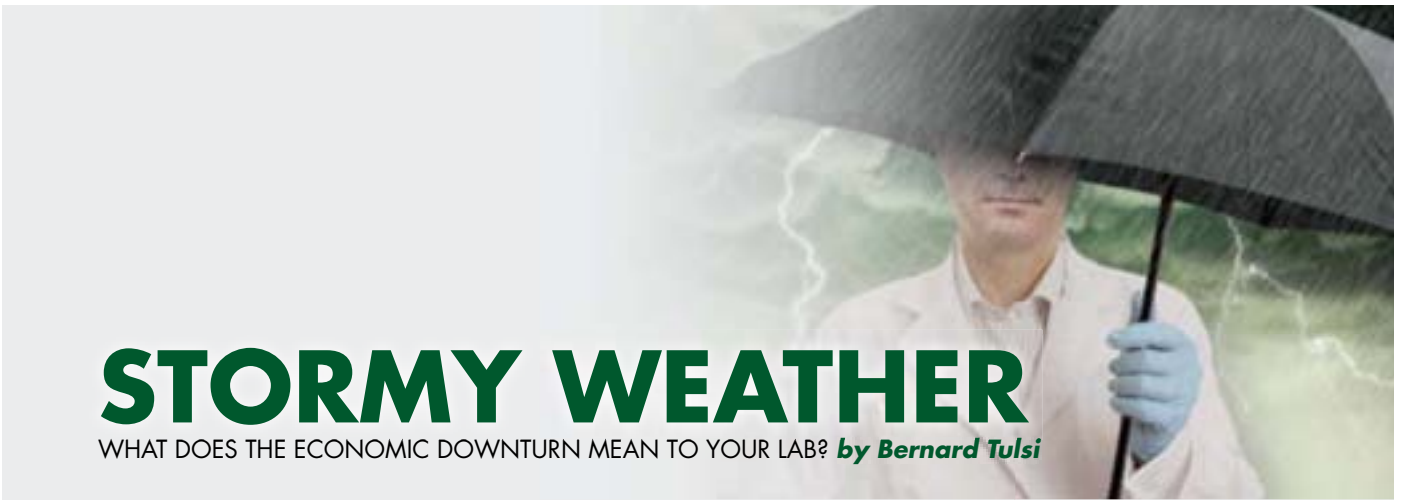
Precisely control 2 to 16 inde-pendent pipetting channels along with 96 and 384 channel heads, CCD cameras and other pipetting aids.

Manipulate labware with grippers and suction devices.

Validate pipetting gravimetrically for assuring accurate results.

4970 Energy Way | Reno, NV 89502 USA | tel 775.858.3000 | fax 775.858.3024 | email sales@hamiltoncompany.com | www.hamiltonrobotics.com

To learn more, contact Hamilton Company at 1-800-648-5950 ISO 9001 CERTIFIED



STORMY WEATHER

WHAT DOES THE ECONOMIC DOWNTURN MEAN TO YOUR LAB? *by Bernard Tulsi*

"There is a need to keep up investments at times like these so that you can emerge from the downturn with new products and services that will be more competitive when times get better and there is more demand."

Even before the precipitous meltdown in global economic markets earlier this month, laboratories affiliated with the U.S. federal government, academic institutions, a range of industries and non-profit entities were battling a constellation of woes inextricably linked to an economy that was losing steam.

Now, in the overall economy, the staggering financial implosion has created a veritable crisis in confidence and has choked off credit, the lifeblood of modern commerce. Largely attributed to an inadequate regulatory regimen, this downturn, and the excesses that led up to it, has roots that can be traced back to the once booming housing market, which fueled a remarkable period of consumer spending as the major economic growth engine.

But the housing boom itself was built on the decaying foundation of subprime lending to eager homeowners, many of whom would eventually prove not to have the wherewithal to repay the loans on their pricey homes. The result has been record increases in home foreclosures and a mounting inventory of toxic debts on the books of banks. This has devastated the credit markets and undermined confidence despite valiant government efforts globally to provide respite with several huge, multi-pronged bailouts.

Even so, the financial markets are far from calmed. Their uncertainties are on display in the erratic daily gyrations on any major stock market index. Former Federal Reserve Chairman Alan Greenspan told the House Oversight and Reform Committee recently, "We are in the midst of a once-in-a-century credit tsunami." He expressed shock that the financial system had broken down to these levels and conceded that he was mistaken in assuming that lenders would more capably safeguard their finances than government-appointed regulators. "I still do not understand exactly how it happened," Greenspan said.

It is still too early to gauge the extent of the impact of the worldwide financial meltdown on the fortunes of the laboratory sector. What has emerged thus far is a mixed picture based on industry and type of laboratory, which may in fact have been created at a time when the economy was already showing signs of slowing—the beginning of this year or even earlier.

Despite fears of slowing growth, or even a recession, which would affect several of the tech sectors, investment in research and development (R&D), a giant share of which ends up in the laboratory sector, was estimated at $367 billion, or 3.7 percent higher than in 2007, according to researchers at Battelle and the editors of *R&D Magazine* February 2008.

As in most areas of the economy, laboratory costs are being driven up by the tough economic climate. Analyst forecasts reported by *R&D Magazine* in June 2008 suggest that construction costs for new laboratory facilities could go up by 3 percent to 10 percent in the U.S. in 2008, depending on local and regional market conditions. These increases stem from increasing costs of fuel, labor and commodities, and a busy construction industry with little spare capacity.

To be sure, the laboratory sector has been the subject of shifting emphases, especially for federal

dollars that seemed destined for security pursuits in the post -9/11 climate. In addition, competitive pressures and outsourcing have been increasing. Still, the year-to-year growth in R&D spending was not unexpected.

"An economic downturn like this can clearly have some impact on laboratories—especially on investments in new laboratory development and expansion," says Renaud Bardon, national sales manager for Millipore's Laboratory Water Systems.

But Bardon notes, "As we have seen in previous crises, it is very important for laboratories to deliver under these trying circumstances."

In some instances, he explains, companies will choose not to invest in their laboratories, or they may elect to delay these investments. "By and large, people are wise on this front and they realize that without the investments now there will be consequences in the future. Even short-term future losses may be greater than the cost of investments they make now in their laboratories," Bardon says.

"There is a need to keep up investments at times like these so that you can emerge from the downturn with new products and services that will be more competitive when times get better and there is more demand," he adds.

"At the moment at Millipore we don't see any slowdown—2008 represents very good growth for us, and we see no slowdown going into 2009 either. Events in the financial markets can change this—but as of now there is not detectable slowdown," says Bardon.

"As in most areas of the economy, laboratory costs are being driven up by the tough economic climate."

Companies like Millipore that make and sell analytical laboratory instrumentation may, in fact, represent one of the few bright spots in this economic crisis. In the second quarter (Q2) of 2008, revenues for the Instrument Business Outlook (IBO) Laboratory Sales Index increased 13.7 percent to reach $4,624 million, versus growth of 13.3 percent in the same quarter last year. In Q2 this year, operating profit grew 20.4 percent to reach $747 million.

Still, this is an uncertain economic environment. "In tough financial times, laboratories will look at their equipment more closely, and some will stop buying until they figure out the exact status of the current instrumentation. They will try to reuse, repurpose and recalibrate as much as possible to maximize their initial investment. Emphasis will be on greater efficiency and productivity," says Laura Hammond, global marketing manager at Agilent.

Alessandra Rasmussen, chromatography business director at PerkinElmer Life and Analytical Sciences, concurs, noting that labs in all industries will try to produce more with instruments they currently have. She says, "Greater productivity or efficiency could mean handling larger volumes of samples, greater throughput, using fewer people—that will definitely be a focus in 2009 for sure."

She believes that the drive for greater efficiency in lean times could result in labs using more handheld portable tools. These tools help cut operating expenses by reducing the need to transport samples from different sites to the laboratory. "This will be facilitated as more effective tools become increasingly

capable and portable without losing performance," she says.

Donna Lococo, product manager of LABWORKS LIMS at PerkinElmer, says that labs engaged in quality testing or monitoring will increasingly market laboratory services by leveraging any excess capacity in their facilities. "So some labs that have focused on general monitoring are now starting to become contract labs on a part-time basis," she says.

Another time-tested approach laboratories use in tough times is to acquire capable and productive tools that rely on fewer workers. Workers do not necessarily need high-level skills. They just need equipment operator skills for instruments that embody highly capable technologies that generate high-level data in a meaningful way that is also easy to retrieve, says Linda Doherty, marketing manager for Agilent's Software and Informatics Division.

She believes there will be a move toward using centralized informatics tools to help create secure, centralized and even paperless environments—such as electronic laboratory notebooks (ELNs) that coordinate data across labs. This helps IT workers manage their labs more productively and cost-effectively.

"Another approach will be to seek smaller-scale solutions that will meet the needs of a work group environment and can be scaled up over time—that is, starting out small at a lower cost and growing as needed," says Doherty.

Other bright spots include an increase in R&D spending in major industries and the solid infusion of venture capital (VC) in the tech sector, which will channel significant funds into research and testing laboratories.

In late July 2008, the Financial Times reported that the biggest oil companies

"Handling larger volumes of samples, greater throughput, using fewer people will definitely be a focus in 2009."

operating in Western nations raised their R&D spending an average of 16 percent in 2007. Royal Dutch Shell, which had already earned the reputation of top R&D spender in 2006, revved up its spending the fastest, with a 36 percent increase to $1.2 billion in 2007. ExxonMobil, the largest oil company in the world, has a market capitalization almost double that of Shell but devotes about 66 percent ($814 million) of what Shell spends on research. Oil services company Schlumberger also raised its R&D budget by 17 percent in 2007 to reach $728 million, an amount surpassed only by Shell, Exxon and Total. In addition to oil and gas research, the major petroleum companies have been known to allocate resources for the investigation of alternative energy.

VC funding is also making a solid comeback. The Money Tree Report—a quarterly study of VC investments in the U.S. collaboratively produced by PricewaterhouseCoopers and the National Venture Capital Association with data from Thomson Financial—notes that in 2007 VC companies provided $29.4 billion in funding to businesses in the U.S. This was the highest level since the crash of the dot-com market in 2001. The VC Association reports strong funding levels in 2008 and no real impact from the economic meltdown because of the long-term nature of the VC business. Research labs engaged in clean energy technologies have attracted unprecedented attention from VCs.

Still, the overall picture is far more bleak than rosy. Layoffs have become just one of the ugly facts of the meltdown. In just two weeks in October, numerous companies, including Merck, Yahoo, General Electric and Xerox, announced

layoffs. Nigel Gault, chief domestic economist at Global, estimates that the unemployment rate will be 8 percent or 8.5 percent by the end of 2009—a forecast that other economists agree with.

On October 23, Merck announced plans to cut 7,200 workers, or 12 percent of its workforce, its second largest layoff in three years. While the cuts are more linked to declining revenues, and earnings the cutbacks are largely viewed as accelerants to the approaching recession. The cuts in this announcement will occur around the end of 2011, with about 40 percent in the United States. Three research sites, in Seattle, Japan and Italy will be closed by the end of 2009.

Meanwhile, other big pharmaceutical companies have also resorted to cuts because of flagging sales and profits. Viren Mehta of Mehta Partners estimates that the big drug makers have slashed about 100,000 jobs in the last five years.

GlaxoSmithKline (GSK) initiated redundancy talks with 850 workers in its R&D divisions worldwide. These researchers are expected to be laid off as the company implements a reorganization plan to refocus its drug group operations, raise productivity and slash expenses.

And on October 1, GSK confirmed that about 6 percent of its R&D workforce, mostly in the UK and the U.S. will likely be laid off. According to the Financial Times, most of the affected workers at GSK are laboratory-based researchers who work in early-stage preclinical drug research.

Workers at national laboratories are also feeling the pinch. In May 2008, in response to budget cuts and higher costs, the Lawrence Livermore National Laboratory cut 440 workers. It is estimated that attrition and layoffs over the past two and a half years accounted for a loss of 1,800 workers from the country's leading nuclear weapons design laboratory.

"Some labs that have focused on general monitoring are now starting to become contract labs on a part-time basis."

At its peak, the weapons laboratory employed some 8,000 top-level scientists and researchers, as well as support staff. In 2008, however, Congress slashed some $100 million from the lab's budget. In addition, the lab was subject to another $180 million in unexpected management-related expenses.

The health care sector, once considered recession-resistant, is also being hammered in the flailing economy. Cutbacks are showing up in all areas of the sector, including clinical service laboratories. Laboratory Corp., the second largest clinical service in the country in terms of sales volume after Quest Diagnostics, reports a drop of 8 percent in blood tests and other lab work for its uninsured customers. Usually, LabCorp reports a 1 percent quarterly growth with this group.

Analysts are still grappling with the complexities of the current economic crisis. It is still almost impossible to gauge the extent of the immediate financial meltdown, let alone its impact on various industries and sectors. What is clear is that all areas are being affected, and in the laboratory sector it is evident that the impact so far has not been good.

Bernard Tulsi *is a freelance writer based in Newark, Delaware. He can be contacted at btulsi@comcast.net or by phone at 302-266-6420.*

EFFICIENCY MATTERS... NOW MORE THAN EVER

TIPS FOR STAYING PRODUCTIVE IN AN ECONOMIC DOWNTURN *by Rich Pennock*

"Lab management puts itself in front of customers' anticipated needs by getting a current view of the direction they are moving in their product/business life cycle."

When Will Goss accepted his current lab management position at Champion Technologies, Inc, in Fresno, Texas, the thought of a national economic slump never entered his mind. Fast-forward to fourth quarter 2008 and Goss, along with the rest of the nation, is facing a challenging workplace. Uncertainty on Wall Street, a crumbling housing market and high unemployment rates make daily headlines across the country as they impact individuals and businesses alike.

Exactly how does a lab remain productive during an economic downturn? According to Goss, if a strategy is already in place, steps need to be taken to enforce it.

"At Champion, we have processes in place on efficiency improvement, so there hasn't been a lot of pressure yet from management to cut back," said Goss, who is section manager, Analytical Services at Champion Technologies. "However, I work in what is considered probably the one bright spot of the nation's economy, the oil and gas industry."

Champion Technologies is a fast-growing specialty chemical company that offers innovative and environmentally acceptable solutions to oil and gas production problems.

When management wants to develop and implement cost-saving processes, many experts say to consider the following.

Efficiency Checklist

Continuous Innovation: Build a culture that responds to market shifts or changes, so that products and services that can leverage existing business operating assets are ready to launch.

Business Assets: Create business asset (facilities, customers, capital equipment/instruments, HR talent, A/R and operating expense) and capacity utilization tools that measure return on investment.

Leadership Environment: Create an environment where your staff is driven to maximize business assets to improve profit performance and customer service.

Flexible Workforce: Structure your workforce so it is more flexible. This allows you to ramp up and down more evenly as work volumes ebb and flow based on the rhythms of the business.

Build a Team: Maintain a core group of employees who are committed and knowledgeable; invest in leadership and professional development and financial acumen for your staff; reward them for demonstrated behaviors in these areas financially and with career/professional advancement.

At Champion Technologies, Goss created a "Skills Matrix" exercise. He is proud of his well-equipped and diversified lab, so he asked his employees to identify their skill levels according to equipment and technique. Employees ranked

themselves on what they know, what they need to know, and what they have a desire to know. Once he charts his employees' skills, Goss reviews the profile of the lab.

At a glance, he knows in what areas he has plenty of expertise. He also knows where gaps exist.

Each lab has to determine its ideal skills balance. Perhaps it is having at least one expert and a few super users and proficient users in each technique. Goss states that while his exercise identifies skills strengths and weaknesses, it also allows the opportunity to create training and cross-training programs for employees.

"This is a very valuable tool to develop," Goss says. "If an employee resigns, bench depth exists so we can easily identify what expertise is lacking.

"Invest in leadership and professional development and financial acumen for your staff."

In addition, the advantage to the employees is that they have the benefit of having back-up support and of knowing what they need to 'get ahead.' This exercise has increased communications and productivity in the lab."

Another option for labs is to use staffing companies such as Kelly Scientific Resources (KSR). Staffing companies recruit, prescreen applicants and handle all the paperwork so employees arrive ready to work on the first day.

"There is great economic value in using a staffing company," says Goss. "I am confident that when I use KSR I am getting a high-quality employee. Also, I don't have to spend my time sorting through thousands of resumes posted on a job board."

Customer Service

In an ideal world, labs have open communication with customers to identify their exact needs in a customers' anticipated fashion. That is, lab management puts itself in front of the customers' anticipated needs by getting a current view of the direction they are moving in their product/business life cycle. The earlier a lab can have these conversations and data, the sooner a resource plan can be modeled that supports the business objectives. The modeling exercise allows lab management and its subject matter experts (SMEs) to determine where potential bottlenecks may occur and build into the plan measures to ensure that bottlenecks are avoided.

The work of lab management is changing to keep pace with the demands of the global workplace. By planning ahead and providing true customer service, labs will continue to efficiently operate well into the future.

***Rich Pennock** is vice president of Kelly Scientific Resources, a leader in scientific staffing solutions. For more information, visit www.kellyscientific.com.*

HIRING RIGHT

TO FIND AND HIRE THE BEST JOB CANDIDATES, LAB MANAGERS NEED TO EMPLOY A FORMAL, DELIBERATIVE PROCESS ***by John K. Borchardt***

"Hiring outstanding candidates who become excellent employees is one of the most important things lab managers do."

"Most hiring managers aren't very good at interviewing, yet they all think they are," according to Lou Adler, author of "Hire With Your Head" (John Wiley & Sons, 2007) and president of The Adler Group (Irvine, California), a training and consulting firm that coaches companies in implementing performance-based hiring. Hiring outstanding candidates who become excellent employees is one of the most important things lab managers do. And there is much managers can do to improve their chances of hiring people who will be productive team members, Adler says.

A major problem in hiring top job candidates is the unsophisticated process most lab managers use to decide whether to make a job offer. Adler says that few companies employ a formal, deliberative process to ensure that the best hiring decision is made.

The first step in this process is to clearly define the job opening. Avoid being overly specific, too narrow or to demanding. All too often, in an attempt to avoid spending too much time coaching new employees, managers require candidates to have too many specific skills which results in a position that's hard to fill. Clearly define the work that needs to be done, but don't narrowly define who can do it. Instead, look for problem solvers who have the skills critical for job success and can readily learn the rest. Then write a job description, advises Robert Wendover, author of "Smart Hiring at the Next Level" (third edition, Sourcebooks, 2002). An outline of important information to include in a job description is given in the sidebar.

Don't turn your hiring problem over to your human resources department and passively wait for results. Let them help find candidates, but pursue other avenues. Turn all your team members into recruiters. Many companies encourage this by paying bonuses to employees who recommend people who later are hired by the company. By doing this, the candidate pool is not limited to individuals who have contacted the employer or leads a headhunter submits.

Be the first person from your firm who talks to the prospective candidate. The sooner candidates are talking to someone who really understands the work that needs to be done, the faster they understand your company's abilities and needs. Candidates can lose interest if they have to work through poorly informed intermediaries before you have a chance to describe your needs and persuade them to interview for the position. By contacting candidates early in the process, you and your technical staff help form a positive image of your company.

> **"Too much emphasis is placed on the interaction between the candidate and the interviewer and too little on the candidate's motivation and ability to do the job."**

Preparing for the interview

The second step is to prepare for the employment interview. Adler comments, "The typical interview, the one most managers use, is a flawed means to hire anyone…. One of the biggest problems is that too much emphasis is placed on the interaction between the candidate and the interviewer and too little on the candidate's motivation and ability to do the job….You need to hire people who are very good at doing the job, not just those very good at getting the job." This means preparing and using behavior-based questions to assess how candidates would behave in challenging situations likely to occur on the job.

To do this, identify the most important knowledge areas, skills and abilities the ideal candidate should possess, advises David G. Javitch, Ph.D, an organizational psychologist and president of Javitch Associates, an organizational consulting firm in Newton, Massachusetts. Plan to ask the person to demonstrate the skill, solve a problem, or write or create something that clearly provides you with the proof you need to make an informed hiring decision.

It also means that hiring managers should help candidates prepare for the employment interview. Don't make the interview process more difficult for you and the candidate by limiting the non-confidential information you provide before the interview and not discussing the opening in advance with the candidate. Instead, follow the advice of professional recruiter Nick Corcodilos, managing director of North Bridge Group in Silico Valley and author of "Ask The Headhunter" (Penguin/Plume, 1997), who suggests, "Treat the interview as an open-book test and give the candidate the book before the test." This helps assure that the candidate's most relevant skills and experience are identified and assessed. In fact, when a candidate is less than diligent in taking advantage of the opportunity you provide, this can be a negative sign.

Provide the candidate non-confidential information about your products and technologies. Describe the challenges and problems and challenges your team, your company and your industry face. Then during the interview discuss the issues that your business and industry face.

During the interview

Employment interviews provide an employer with the opportunity to get beyond the facts listed in a candi-

date's resume and gain some idea of the candidate's compatibility as a co-worker. Important attributes such as interpersonal and teamwork skills, oral communication skills and the ability to think quickly on one's feet can be assessed in an interview. How candidates respond to questions such as how they would behave in certain situations likely to occur in the work environment or how they have responded in such situations can help you assess how they would "fit" in your work group or team. In other words, "use an evidence-based approach to determine whether the candidate is motivated and competent to meet all job needs," advises Adler.

If a candidate presents an employment interview seminar, make sure you have read a couple of his or her published papers or a review of the technology field in question. Candidates often "grade" employers by the quality and number of questions asked during the employment interview seminar. However, the candidate's host or the hiring manager should moderate the question period to ensure that it does not turn into an inquisition.

Avoid the temptation to dominate the conversation and the candidate's interview time. However, do describe the methods you employ in R&D project management and how your group, department or team works together with other groups within your company and with customers. This will help the candidate determine if the workplace culture is compatible with his or her own ways of doing things. Explain how your group works with these other departments so the candidate understands why their representatives are included in his or her interview schedule.

Be sure the interview schedule includes time to talk with future co-workers and a workplace tour. Your staff members will learn things you don't and can come to their own conclusions about whether the job candidate would be a productive, congenial co-worker.

"When you interview candidates, ask them to write the 'minutes' of the interview," suggests Robert Wendover, author of "Smart Hiring" (Sourcebooks, 2002). "What they produce will indicate how much they were paying attention, how well they retain information and how well organized their thought processes are." By asking them to do so very quickly, you can gauge their ability to meet deadlines and their interest in the position.

Reference checks

Many companies, including some very large ones, omit reference checks or conduct only limited ones. However, it is important to obtain references' names and contact information so that the candidate's qualifications and experience can be verified. An increasing number of job applicants are inflating their credentials in their resumes; talking with their references is often the only way to verify claims. Consulting with references can also help you resolve specific concerns about a candidate.

Because many of the issues raised during a reference check are scientific or technical ones, the hiring manager should be the person who contacts the references. However, he/she should do so only after consulting with a human resources representative to be sure no legal concerns are raised. Nick Corcodilos notes that references are more likely to be open and honest when talking to peers than to human resources representatives.

PREPARING JOB DESCRIPTIONS

Preparing a job description will help ensure that only candidates who best meet the requirements of the open position will be invited for an on-site interview. Preparing a job description requires careful thought but is actually a fairly simple process. The five steps are:

1. **Write a two- or three-sentence overview of the position and the function it fulfills in the organization.**
2. **Detail a list of functions a person in the position will perform.**
3. **Describe the reporting structure for the position. Also describe whom the new hire will interact with (fellow team members, etc.).**
4. **List necessary qualifications for the position.**
5. **Identify possible sources of job satisfaction and dissatisfaction. This will help you evaluate candidates during job interviews.**

One question is particularly critical and it's best that the hiring manager rather than a human resources specialist ask it. That question is, "If you were me, would you hire this candidate?" Any hesitation before answering this question, and the enthusiasm and brevity of the answer, are as important as the content of the answer itself.

Making the hiring decision

No candidate likes the uncertainty of not knowing if he or she will receive a job offer. The longer an employer takes to make an employment decision, the less likely the candidate is to be hired. Candidates should ask the hiring manager when a hiring decision will be made. The hiring manager should commit to a specific date. An indefinite answer raises questions about the need to fill the opening and whether filling it is of high enough priority to ensure an expeditious interviewing/hiring process. A favorable answer given substantially in advance of the decision date lets a candidate know the employer is impressed by his/her skills. This can facilitate the candidate's decision to accept the position. So don't delay in informing a candidate if you've made up your mind, even if think you are too busy to work out details associated with salary, family relocation and other concerns.

Avoid the warm-body hire, advises David Javitch, an organizational psychologist and president of the organizational consulting firm Javitch Associates in Newton, Massachusetts. Warm-body hiring is hiring a moderately qualified person to fill an opening as quickly as possible. This person often becomes a low-productivity employee. Terminating this person can be a long and painful process, notes Javitch.

Delaying the hiring decision without a good reason means an excellent candidate may accept a position with another employer in the meantime. If you have doubts about the candidate's abilities, then politely tell him or her that you have decided to hire someone else. If you are confident in the candidate's ability to fulfill the requirements of the position, then make the individual a job offer. Not yet ready with all the details? Then tell the candidate that you will be making him or her an offer although some of the details still have to be worked out.

A well-organized and well-managed hiring process will enable you to make informed staffing decisions well-managed improving the odds of being able to hire the applicants you really want on your team. Adler notes that few managers conduct a later analysis to validate hiring decisions. He suggests that doing so would help define how the best decisions are made and enable lab managers to stop doing things that cause the worst hiring decisions.

John K. Borchardt *is a consultant and technical writer. The author of the book "Career Management for Scientists and Engineers," he writes often on career-related subjects. He can be reached at jkborchardt@hotmail.com.*

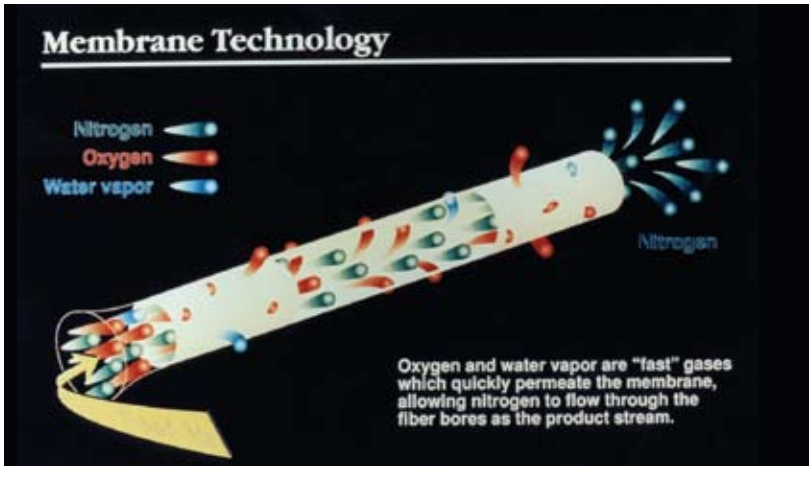
Selecting Makeup Gas for GC with FID

IN-HOUSE GENERATION PROMISES IMPROVED SAFETY, INCREASED CONVENIENCE AND REDUCED GAS COSTS *by Phillip Allison and Peter Froehlich*

"The optimum flow rate for detection of the compounds of interest is typically significantly larger than the flow rate for the carrier gas."

When gas chromatography is employed for the detection of trace compounds, the characteristics of the carrier gas used for the actual separation and the gas used for detection may be significantly different. As an example, the carrier gas flow rate is selected to provide optimum resolution of the compounds of interest and is determined by the van Deempter relationship. The optimum carrier gas flow rate is a function of the compounds to be separated, the nature of the column, the temperature and a number of other considerations. Typically, the on-column carrier gas flow rate is in the order of a few mL/min. In contrast, the optimum flow rate for detection of the compounds of interest is typically significantly larger As an example, when a flame ionization detector (FID) is employed, the detector gas flow has to maintain a sufficiently high concentration of electrons for ionization of the compounds of interest and must be capable of sweeping the solute through the detector so that sharp peaks can be obtained for highly retained peaks. The flow rate for optimizing the detection is frequently as high as 500-2000 mL/min.

▼ *Figure 1: Separation of nitrogen from oxygen and water vapor via a hollow fiber membrane.*



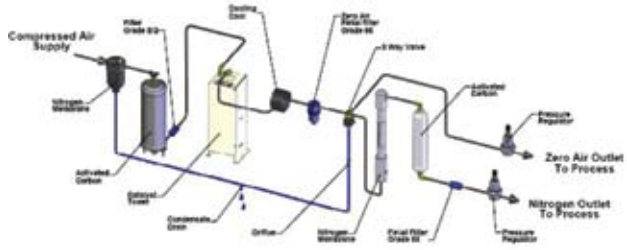
In addition to flow rate differences, the chromatographer may be concerned with the composition of the carrier gas and the detector gas. While low levels of impurities such as hydrocarbons will likely have little effect on the actual separation, they could dramatically increase the background and/or the noise from the detector, thereby reducing the sensitivity of the analysis, and a higher level of purity may be required for the detector gas than for the carrier gas.

To increase the gas flow to what is required for the detection step, a "makeup" gas such as helium or nitrogen is delivered to the chromatographic system between the column and the detector. The makeup gas should be selected so that it does not affect the fuel and oxidant balance, and it must be fairly inert to the detector so that it does not affect the report of the concentration of the compound(s) of interest. In many facilities, the makeup gas is provided from a cylinder or tank. While this approach works, an in-house makeup gas generator can provide a higher level of purity than bottled helium or bottled nitrogen. In addition, an in-house makeup gas generator can provide a considerably safer, more convenient and less expensive approach to supply the required gas.

Generation of zero-grade nitrogen and zero-grade air using an in-house generator

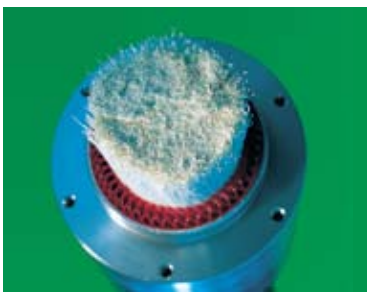
Zero-grade nitrogen for makeup gas can be readily obtained from laboratory compressed air using an in-house generator (model MGG-400NA or MGG-2500NA FID MakeupGas generator, Parker Filtration and Separation Division, Haverhill, Massachusetts) that includes a heated catalytic converter that is similar to an automobile exhaust system. The converter includes a proprietary catalyst blend that is combined with platinum and a hollow fiber membrane separator.

The heated catalyst is used to remove all hydrocarbons by converting them to CO^2 and water vapor, while the hollow fiber membrane allows the separation of nitrogen from oxygen and water vapor. The hollow fiber membrane module (Figure 1), which is the heart of the system, is designed to preferentially allow oxygen and water vapor in the air to quickly permeate the membrane wall while nitrogen travels through the hollow fiber out the end. A schematic diagram of a typical system for the generation of nitrogen is shown in Figure 2.



▲ *Figure 2 : Schematic diagram of FID makeup gas generator.*

The hollow fiber used to separate the nitrogen has a small internal diameter, and thousands of fibers are bundled together to provide a large surface area for the desired flow of nitrogen, as shown in Figure 3. The makeup gas generator can produce makeup nitrogen with purity of better than 99.9999 percent with respect to hydrocarbons (< 1 ppm) at a maximum flow rate of 400 mL/min. In addition, the purity of the nitrogen is greater than 99 percent with respect to oxygen. In addition, the in-house generator can produce zero-grade air with a hydrocarbon concentration that is less than 0.05 ppm at flow rates up to 2500 mL/min. Figure 4 shows a comparison of zero-grade air that was produced by the MakeupGas generator and zero-grade air that was obtained from bottled fuel air from a commercial supplier. It shows that the gas generated by the generator is purer than that from bottled fuel air, as it provides an extremely flat baseline with essentially no signal due to hydrocarbons, while the zero-grade bottled air provided an irregular baseline with a significant level of hydrocarbons, which could impact analysis. Dr. Nithy Govindarajah, a scientist at Symrise Laboratories in Branchburg, New Jersey, reports that he has used the MakeupGas generator with three GCs and analyzed over 1000 samples of essential oils a month, and always obtained a flat baseline.

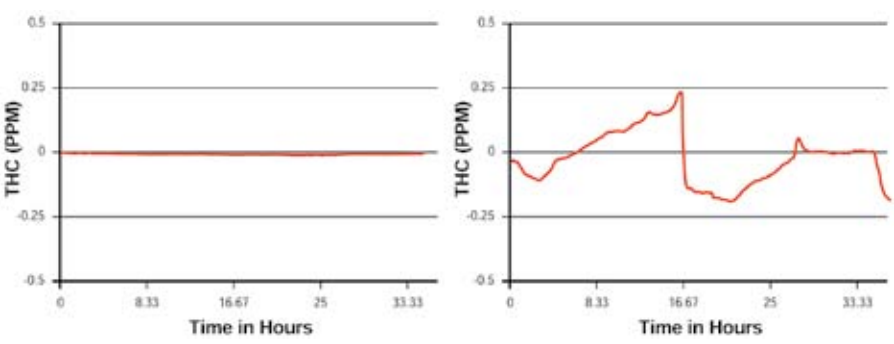


▲ *Figure 3: A bundle of hollow fibers provides a high flow of zero-grade nitrogen.*

Minimizing safety hazards

When a makeup gas generator is employed, only a small amount of the gas is present at a low pressure at a given time and the gas is ported directly to the GC. The system generates a maximum of 2.5 L/min of air or 400 mL of nitrogen at a maximum pressure of 120 psig of nitrogen. If a nitrogen leak were to occur with the generator, there would be a negligible change in the composition of the laboratory air, with only trace nitrogen dissipating harmlessly.

In contrast, a number of serious hazards exist when makeup gas is supplied to the GC via a tank. As an example, if the contents of a full tank of helium or nitrogen were suddenly vented into the laboratory, up to 9000 L of gas would be released. This volume would displace the laboratory air, reducing the breathable oxygen content and potentially creating an asphyxiation hazard for the laboratory occupants. Another potential hazard that is eliminated by use of a makeup gas generator is injury or damage while transporting and installing a gas tank. A standard tank is quite heavy and can become a guided missile if the valve on a full tank is compromised during transport (in many facilities, specially trained technicians are used to replace gas tanks).



◀ *Figure 4: FID baseline from Makeup Gas generator (top) and from bottled fuel air (bottom). Flow rate = 450 mL/min.*

Convenience

When an in-house generator is employed, the gas is supplied on a continuous basis and can be provided on a 24-hour, 7-day-a-week basis without any user interaction other than a minimum of routine annual maintenance. In contrast, when tank gas is employed, the user must pay close attention to the level of gas in the tank and replace the tank on a periodic basis. The in-house system obviates the need to obtain a replacement tank. In many facilities, spare gas tanks are stored outside in a remote area for safety reasons, and it is time-consuming to get a replacement cylinder. When it is necessary to get a replacement makeup gas tank, the chromatographer may require an individual who is qualified to handle the tanks. Many users have indicated that replacing used tanks can be a significant inconvenience, especially in inclement weather if the tanks are stored outside or if not properly secured when the laboratory is located in a seismic zone.

If the need for replacement occurs during a series of analyses, the analyst must interrupt the analytical work to restart the system and wait for a stable baseline, and may have to recalibrate the system. In addition, if a series of automated analyses is desired (e.g., overnight or over a weekend), the analyst must ensure that a sufficient volume of each gas is on hand before starting the sequence.

The frequency of tank replacement depends on the usage of the system. Changing the tank is clearly an inconvenience and leads to a reduction in the useful operating efficiency of the facility. In addition to the actual time required for changing the tank, the laboratory staff must verify that there are sufficient replacement tanks in storage and order replacement tanks as appropriate. The use of a makeup gas generator eliminates the need to keep track of and change gas cylinders. Dr. Govindarajah indicated that he previously had to replace the gas tank approximately three times a month when tank gas was used for makeup gas, and now simply turns on the generator, saving time and eliminating inconvenience. Similarly, Dr. Mike Jordan of Agriculture Canada (Kentville, Nova Scotia, Canada), who analyzes volatile anaerobic compounds in fruits, indicated that the generator allows him to leave the FID detectors on the gas chromatographs powered up on a 24/7 basis. This saves considerable time and increases laboratory efficiency, as it is not necessary to calibrate the detector every time it is turned on. Dr. Jordan simply runs a standard sample on a periodic basis, which takes only a few minutes, to ensure that the system is operating properly. An additional benefit is that it is no longer necessary to train each technician in the calibration process.

"Serious hazards exist when makeup gas is supplied to the GC via a tank."

Cost

In addition to safety and convenience, another benefit of a makeup gas generator is the cost compared to the use of gas tanks. The cost of operation of the generator is extremely low, as the raw materials to prepare the required gas are air and electricity. Running costs and maintenance for the generator add up to a few hundred dollars a year.

In contrast, the cost for using makeup gas from tanks includes the actual cost of obtaining the gas tank as well as the time involved in changing tanks, ordering new tanks, maintaining inventory and related activities. While calculating the precise cost of using makeup gas from tanks for a given user is dependent on a broad range of local parameters and the amount of gas that is used, we present below an overview of the potential savings from the use of an in-house makeup gas generator.

It should be noted that there are many hidden costs, including transportation costs, demurrage costs and the required paperwork (e.g., a purchase order, inventory control and invoice payment) when tank gas is employed. In addition, the time that is required to transport the tank from the storage area, install the tank, replace the used tank in storage and wait for the system to re-equilibrate represents money as well.

A comparison of the cost of supplying gases via tanks versus a makeup gas generator is presented in Table 1. For this analysis, we assumed that a single tank of makeup gas is consumed each week by each chromatograph and that the cost of each tank is $60 (this approximation ignores the incidental costs of handling the gas tank, downtime, ordering tanks, etc.). In comparison, the cost of using the generator is approximately $50 per week. Since the cost of supplying makeup gas is significantly lower with the generator than with tank gas, it is now possible to leave the FID detector on continuously.

Table 1.	In-House Generator	Tanks
Electrical Power	$380	$0
Maintenance (compressor)	$1,500	$0
Maintenance (generator)	$800	$0
Cylinders	$0	$3,120
Demurrage	$0	$840
Labor (changing cylinders)	$0	$1560
Order Processing	$30	$360
Shipping	$100	$3,720
Invoice Processing	$10	$120
Inventory Control	$0	$72
Other	$2,820	$9792

Assumptions:
52 cylinders at $60/cylinder
10 cylinders in use (5 in use, 5 filled) at $7/mo
$30 labor/cylinder
1 order/month @ $30 processing costs
$20/cylinder

Table 1 Annual costs, in-house generation versus high pressure tanks (in U.S. $)

Conclusions

An in-house makeup gas generator can provide high-purity nitrogen and zero-grade air at the flow rates required for the use of flame ionization detectors in gas chromatography. The hydrocarbon content of the makeup gas generated is considerably lower than that in bottled gas from external sources. In addition to the higher purity of the makeup gas, an in-house generator is safer, more convenient and less costly than bottled gas. These benefits allow the chromatographer to maintain power to the detector on a continuous basis, obviating the need for frequent, time-consuming recalibration.

Phillip Allison *global product manager of Parker Hannifin Corporation, Haverhill, Massachusetts.*
Peter Froehlich *is president of Peak Media, Franklin, Massachusetts.*

Automated Colorimetric Method for Nitrate Analysis

A NON-HAZARDOUS ALTERNATIVE TO TRADITIONAL METHODS FOR AQUEOUS SOLUTIONS *by Craig R. Chinchilla*

"The nitrate-to-nitrite reduction is consistently between 95 percent and 105 percent, which is a dramatic improvement over traditional nitrate methods."

Several methods exist for determining nitrate in aqueous solutions. However, the most commonly performed USEPA-approved methods are problematic and can be unreliable. USEPA methods 353.1 nitrate Hydrazine Reduction[1,2] and 353.2 nitrate Cadmium Reduction[3] utilize chemicals that are carcinogenic and highly toxic. Hazardous waste is generated when performing these methods and disposal is costly. Other methods performed by ion chromatography (IC)[4,5] and ion selective electrode (ISE)[6] are slow and can have issues when performing analysis on samples with high ionic strength, such as wastewater, ground water and soil extracts. The new Systea Easy (1 – Reagent) nitrate method was developed to eliminate the problems associated with these traditional methods and improve performance.

Method summary

The method was primarily designed to be performed by automated discrete analysis. The method can also be performed by traditional flow analysis instrumentation. However, discrete analysis is rapidly becoming the preferred technique for environmental ion analysis in laboratories throughout the United States. The advantages include ease of use, minimization of waste and reagent consumption, and true unattended operation.

The procedure for determining nitrate utilizes a reaction in which nitrate is reduced to Nitrite by a proprietary reagent "R1." The reaction is slow and requires greater than 12 minutes for 100 percent reduction of nitrate to Nitrite at 50°C. The reduced nitrate is then treated under acidic conditions to form a highly colored soluble dye, which is measured colorimetrically between 520 and 550 nm. The final product measured represents the Nitrite ion originally present, plus that formed from the reduction of nitrate (nitrate+Nitrite). In order to determine the true nitrate concentration, the sample must also be analyzed separately for Nitrite to determine the amount originally present in the sample. The value obtained for Nitrite is then subtracted from the nitrate + Nitrite value to determine the true value for nitrate.

The method has several advantages over USEPA methods 353.1 nitrate Hydrazine Reduction, and 353.2 nitrate Cadmium Reduction, including elimination of hazardous waste and hydrazine and cadmium exposure. The method utilizes a non-hazardous, non-enzymatic reducing agent, protecting personnel and the environment. Also, potential liability associated with waste handling and disposal is significantly reduced or eliminated. Discrete analysis usually reduces waste generation one-third to one-sixth compared to traditional flow analysis techniques, with total reaction volumes of 300 to 700 µl per test.

Analytical performance is greatly enhanced by the use of the new method. The nitrate to Nitrite reduction is consistently between 95 percent and 105 percent, which is a dramatic improvement over traditional nitrate methods. In the cadmium reduction method, the reduction efficiency changes over time. Depending on the matrix, efficiency of the cadmium reduction can change quickly, causing the analysis to be outside of quality control limits. Examples include samples with high ionic strength, surfactants, and oils and grease, all commonly found in environmental matrices. Charging and recharging of the cadmium coil or column can also be uncertain from procedure to procedure. The introduction of air into a cadmium coil or column also reduces the efficiency of the reduction. When performing the hydrazine method, adjustments to the reagent quantity must be made for proper reduction. High chlorides are known to interfere with the reduction in the hydrazine method. IC and ISE methods experience similar matrix interference problems with samples of high ionic

strength. After extensive testing on various matrices, no matrix interference problems have been observed when using the Easy (1 – Reagent) nitrate method.

Depending on how the method is performed, the associated reagent cost is approximately four cents or less per test. Furthermore, the reagent cost is dramatically less than that of other non-hazardous methods for nitrate, such as enzymatic tests. There are also savings from a labor standpoint, when considering the amount of time that is required to perform the traditional tests. Since the overall performance of the new method is better—and matrix interference problems are not present—analytical runs need not be re-run, saving laboratories time. Finally, since the method has been developed for the discrete analyzer, it can truly run unattended.

"Discrete analysis is rapidly becoming the preferred technique for environmental ion analysis in laboratories throughout the United States."

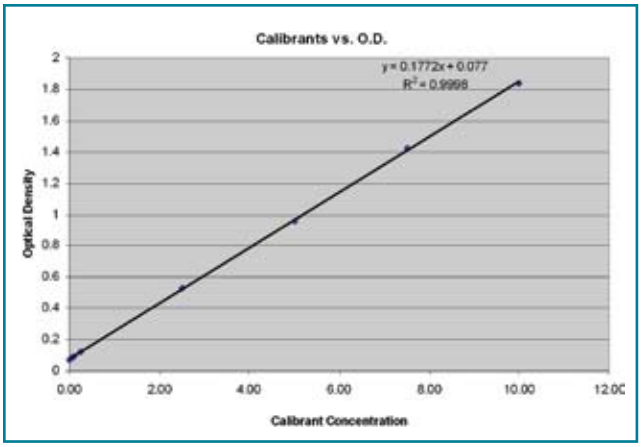
Inter-laboratory study

In order to substantiate the new method's reliability and performance, a comparative inter-laboratory study utilizing various USEPA-approved methods and sample matrices was conducted. The approach taken by the study was different from that of most studies, because the study not only analyzed a variety of sample matrices, but also compared the results of several different EPA-approved methods. Ten laboratories were selected to participate in the study. Each laboratory selected had a unique matrix type, which enabled the Systea method to be compared more rigorously to current USEPA methodology. The laboratories were also selected based on their expertise with particular matrices and the variety of instrumentation used.

The 10 laboratories chosen and various matrices were as follows:

(4) Wastewater treatment plants
(2) Commercial laboratories testing drinking water and wastewater
(1) University testing seawater
(1) Private laboratory testing seawater
(1) Drinking water treatment plant
(1) Laboratory testing soils

Selected samples from laboratories analyzing treated and untreated wastewater included various matrices with the following characteristics: Total Suspended Solids (TSS) greater than 40 mg/L, Total Dissolved Solids (TDS) greater than 100 mg/L, oil and grease greater than 20 mg/L, pre-treatment, and sludge samples. At laboratories analyzing seawater, real seawater samples were analyzed with NaCl concentrations greater than 120 mg/L (near coastal). At the chosen soils laboratory, samples that had been extracted with 2 N KCl were analyzed. Drinking water samples were analyzed from a drinking water plant performing chlorination, and from two commercial testing laboratories. Finally, samples from the commercial test laboratories included steel mill effluent and groundwater.



▲ *Regression Analysis of Calibration Curve 0.050-10.0 mg/L*

Each of the laboratories analyzed its matrix-specific, round robin, initial precision recovery (IPR) and method detection limit (MDL) samples. Standards, quality control (QC) samples and round robin samples were purchased from a third-party manufacturer (Analytical Products Group or APG) and split into 10 duplicate sets labeled 1 through 10 A and B. Each laboratory performed the analytical runs using its current methodology and range. Concurrently, Systea Scientific performed the same analytical tests using the new nitrate method with a range of 0.050–10.0 mg/L. Each of the 10 participating laboratories performed four analytical runs, for a total of 40 runs. Each of the runs was duplicated by Systea Scientific utilizing the new method. To confirm the operation of the method at other calibration ranges, a smaller test group of samples was also run at the following ranges: 0.003 – 0.150 mg/L, 0.020 – 2 mg/L and 0.5 – 50 mg/L.

Sample	Standards	Optical Density	Calc. Conc.
<BLANK>		0.0727	-0.001
<CAL1>	0.00	0.0716	-0.007
<CAL2>	0.05	0.0816	0.050
<CAL3>	0.10	0.0918	0.107
<CAL4>	0.25	0.1219	0.276
<CAL5>	2.50	0.5306	2.576
<CAL6>	5.00	0.9599	4.992
<CAL7>	7.50	1.422	7.592
<CAL8>	10.00	1.835	9.916

▲ *Calibration Data 0.050-10.0 mg/L*

Study results

A statistical analysis of the participating laboratories and the new method data was performed. An assumption was made that the accuracy of the APG samples would ultimately determine the accuracy of the analysis. If the APG round robin samples were found accurate and cross-instrument sample analysis results were erroneous, the APG results would be used as the standard of accuracy. No significant variation between the new method data and the participating laboratories' method data was observed. The results from the Systea method data were equal or superior to the results from the various data from the participating laboratories. Participating laboratories had variable amounts of recoveries and matrix interference issues, depending on the type of instrumentation and methodology employed. In general, labs performing flow analysis methods experienced fewer problems with matrix interferences than labs using IC and ISE techniques.

As part of the study, 10 mg/L nitrate and a Nitrite sample were tested at the end ofeach nitrate run to determine the percentage of recovery of nitrate to Nitrite. The average nitrate-to-nitrite recovery for all the analytical runs performed with the new method was 95.9 percent. This is quite remarkable, considering that perhaps the biggest problem with using the traditional USEPA colorimetric methods for nitrate is poor recovery. The data also demonstrated that the percentage of recovery was very consistent from run to run, with little or no variation.

Method detection limit (MDL) and method limit (ML) data were equally as impressive, or more impressive than, any data obtained during the study. Using a 0.050

Sample	Optical Density	Calc. Conc.		
MDL 0.050 mg/L 1	0.0810	0.046		
MDL 0.050 mg/L 2	0.0814	0.048		
MDL 0.050 mg/L 3	0.0809	0.046		
MDL 0.050 mg/L 4	0.0811	0.047		
MDL 0.050 mg/L 5	0.0809	0.046		
MDL 0.050 mg/L 6	0.0807	0.045		
MDL 0.050 mg/L 7	0.0808	0.045		
MDL 0.050 mg/L 8	0.0807	0.045		
MDL 0.050 mg/L 9	0.0806	0.044	St. Dev.	MDL
MDL 0.050 mg/L 10	0.0804	0.043	0.001433721	0.00404453

▲ *Method Detection Limit Example*

Avg MDL 7 (mg/L)	0.01119
Avg ML 7 (mg/L)	0.03558
MDL Pooled 7 (mg/L)	0.00416
ML (mg/L)	0.01323
Avg MDL 10 (mg/L)	0.011483
Avg ML 10 (mg/L)	0.036515
MDL Pooled 10 (mg/L)	0.004256
ML (mg/L)	0.013535

▲ *Statistical Results of Method Detection Limits*

mg/L sample, detection limits obtained were consistent and ranged between 0.010-0.015 mg/L. Continuous flow analyzers typically report MDL values of about 0.5 to 1 percent of the full-scale concentration of the range. The full-scale concentration of the Systea method study was 10 mg/L. Using the Avg MDL 7 and the MDL Pooled 7, the study obtained a MDL of 0.01119/10 * 100 = 0.11 percent and 0.00416/10 * 100 = 0.04 percent, respectively.

Conclusion

The new Systea Easy (1 – Reagent) nitrate method offers a suitable alternative to traditional nitrate methods for aqueous solutions. Problems associated with performing nitrate analysis, such as poor recovery and matrix interferences, are minimal or nonexistent. Greater method sensitivity and linear range enable both high- and low-range samples to be performed together without compromising performance.

The new method utilizes a non-hazardous reducing agent, eliminating hazardous waste and associated disposal costs. Potential liability associated with disposal of and exposure to carcinogenic chemicals is eliminated. Since the method has been designed for discrete analysis, labor costs associated with performing the analysis are minimized and true unattended operation is possible.

References

1. Methods for Chemical Analysis of Waters and Wastes - Nitrite 353.1, Nitrogen, nitrate-Nitrite (Colorimetric, Automated Hydrazine Reduction, U.S. EPA National Exposure Research Laboratory EPA-600/4-79/020 (NTIS PB 84-128677), Issued 1971; Reissued with Revision 1978.

2. APHA, AWWA,WEF, Standard Methods for the Examination of Water and Wastewater, 20th Edition - 4500-NO3-H Automated Hydrazine, American Public Health Association: Washington, DC, 1998.

3. Methods for Chemical Analysis of Waters and Wastes - nitrate 353.2, Rev 2.0 Determination of nitrate-Nitrite Nitrogen by Automated Colorimetry, U.S. EPA National Exposure Research Laboratory EPA-600/R93/100 (NTIS PB 84-120821), 1993.

4. Methods for Chemical Analysis of Waters and Wastes - nitrate 300.0, Rev 2.1 Determination of Inorganic Anions by Ion Chromatography, U.S. EPA National Exposure Research Laboratory EPA-600/R93/100 (NTIS PB 94-120810), 1993.

5. Methods for the Determination of Organic and Inorganic Compounds in Drinking Water, Volume 1 – 300.1, Rev 1.0 Determination of Inorganic Anions in Drinking Water by Ion Chromatography, U.S. EPA Office of Ground Water and Drinking Water/Technical Support Center (NSCEP PB 815-R-00-014), 1997.

6. APHA, AWWA, WEF, Standard Methods for the Examination of Water and Wastewater 20th Edition - 4500-NO3-D nitrate Electrode Method, American Public Health Association: Washington, DC, 1998.

Craig R. Chinchilla Sr. BS, *is general manager for Systea Scientific, LLC. He has many years of experience developing chemistry methods and working with discrete and flow analysis instrumentation. craig@easychem.com, 630-645-0600.*

GREEN UP!

IMPROVING THE SCIENCE OF SCIENCE WITH AN EYE TOWARD SUSTAINABILITY

by Dan Watch and John Mlade

"The design and operation of your facility should take into account sustainable initiatives to be successful."

Over the last five to 10 years there have been several key developments in the ways we conduct research. From new models for collaboration within and among research teams, to innovative ways to design and construct sustainable laboratory buildings to support and encourage human interactions, to equipment running more samples faster than ever before, research processes continue to evolve. The primary reason for these developments is to accelerate research in order to be more competitive in the marketplace and to address many of the needs facing our world today.

The best researchers are in very high demand globally. To attract and retain such talent, government agencies, private industry and academia are building and operating green laboratories that provide stimulating spaces with ample natural light, thoughtful interior design, inviting work spaces, shared equipment resources, and efficient architectural and engineered systems that adapt to changes in research agendas. Green buildings not only save on operation expenses, but can improve productivity and provide superior research environments. The design and operation of your facility are very important, and should take into account sustainable initiatives in order to be successful.

The laboratory manager plays a key role in creating such a facility. While most lab managers work in existing facilities and rarely if ever have the opportunity to contribute to the design of new laboratories, many opportunities exist for lab managers to improve laboratory management in ways that will facilitate research and keep an eye toward sustainability. The following represent ideas beginning to take hold at some research institutions. They are directly applicable to the work of laboratory managers and, if implemented using the Six Sigma process or other lean thinking strategies, can deliver positive results for any institution.

Sort and Recycle

The research team is asked to take inventory of what is in the lab and determine if everything is still necessary. If the supply is not necessary then it should be recycled. The intent of this effort is to help clean up the laboratory and reduce the amount of research-impeding clutter that tends to accumulate over time.

Label and Store

Label all laboratory supplies and store them in a consistent location. All storage needs to be planned. As the research process is mapped out, appropriate storage locations are identified and labeled to help organize the lab. KanBan is a Japanese lean management approach for supplies that utilizes a signboard listing all supplies necessary in the lab and the lowest amount acceptable before more supplies need to be ordered. The research team orders just-in-time supplies to minimize storage costs, clutter in the lab and the use of expensive laboratory space for storage. On a campus setting or in a large facility, consider centralized ordering and distribution.

Standardize

Standardize the bench size with mobile casework to be as effective as possible. Typically a three-foot module is used because that is the amount of room needed for knee space when someone is seated. The tables are typically six feet long to accommodate one three-foot-wide mobile base cabinet and a knee space, or two mobile base cabinets. By adopting a plan for laboratory flexibility, a strategy for bench size standardization can be phased in.

Green Chemistry

Green chemistry, the practice of designing chemicals that are environmentally benign yet commercially viable, is coming into its own. As

"The green product market has expanded considerably in recent years and offers many products that are cost-competitive compared to their conventional counterparts."

always, advances in science beget advances in business. The principles of green chemistry are being adopted in a growing range of industries, such as biomedical, electronics and consumer goods.

"Green chemistry has already turned maize into biodegradable plastics, developed non-toxic solvents and dramatically reduced the toxic byproducts from the manufacture of popular pharmaceuticals like ibuprofen.

▲ *The interior of this CDC lab is a healthy and inviting space for researchers. Flexible casework will facilitate organization within the laboratory.*

It is vital to the production of Toyota's new electric cars, made in part from kenaf, an annual grass plant," reported Soyatech, a provider to the soybean and oilseed industries.

Green chemistry reduces pollution at its source by designing products and processes that reduce or eliminate the use and generation of hazardous substances. In practicing green chemistry, the designer of a chemical carefully considers an agent's eventual impact on the world. Is this material or its by-products toxic? How will this affect those working with it? Is it renewable? Greening a process also involves reducing the number of steps, energy input and waste. Why use a large molecular compound when only a small part of it is needed?

While both Europe and Asia have long pushed green chemistry, it has only recently gained traction in the United States. The Pollution Prevention Act of 1990, which established a national policy to prevent or reduce pollution at its source, gave a green light to green chemistry. The Environmental Protection Agency, charged with enforcing the act, promoted green chemistry through research grants, public-private partnerships and its prized Presidential Green Chemistry Challenge awards.

Today, the list of successes in the business application of green chemistry is growing. "DuPont's Teflon production pollution problem was solved by rethinking how the molecules making up Teflon are put together. It now uses carbon dioxide as a surfactant rather than the toxic perfluorooctanoic acid," reported Soyatech. "To produce one of its most popular drugs, the pharmaceutical giant Pfizer revised a complex four-step process that produced toxic wastes into a one-step process using ethanol, saving millions of dollars. Other big pharma companies have made similar changes in their manufacturing processes, saved millions of dollars, and now regularly win environmental awards from the U.S. Environmental Protection Agency."

Nearly all chemicals currently come from petrochemical sources, but much of green chemistry involves utilizing living things, such as plants. Thus chemists need to be retrained in their thinking and approaches. Green chemistry proponents also speak of the urgency to teach green practices to scientists in developing countries.

Green chemistry and toxicology are increasingly being taught in science courses, requiring students to forge new methods. Academic institutions are also increasing the number of laboratories suited to green chemistry. And because these labs use 75 to 80 percent fewer energy-hogging fume hoods than traditional labs, the institutions are saving a tremendous amount in energy costs.

Environmentally Preferred Purchasing

Environmentally preferred purchasing, or green purchasing, is the practice of purchasing sustainable products for business operations, including laboratories, and may include paper, office supplies, furniture, chemicals, dry lab supplies and janitorial supplies.

Implementing a green purchasing protocol is largely a policy decision, although stakeholder adherence should be monitored and support offered as needed. Once a green purchasing policy are put into place, it is relatively easy to continue. The green product market has expanded considerably in recent years and offers many products that are cost-competitive compared to their conventional counterparts.

For green purchasing program to be effective, it may be necessary to centralize purchasing activities. Many benefits support the centralization of purchasing, including economies of scale and purchasing power, single-point accountability and reporting on purchasing, evaluation and tracking of improvement, and a reduction in research for suitable products.

The value of purchasing green is several-fold. In addition to preserving natural resources through recycled content, the local economy may be supported through the purchase of regional products. For some products, such as furniture and finishes, green cleaning products, chemical alternatives, and office copy machines, an improvement in indoor air quality may be realized. For other items, such as fuel-efficient vehicles and Energy Star appliances and equipment, operational savings may be achieved.

Green cleaning is a smart practice that contributes to the operation and maintenance of sustainable facilities. The benefits include reduced exposure to potentially hazardous chemical, biological and particulate contaminants that impact human and environmental health. In many cases, green cleaning programs can save money, because many green cleaning practices, such as the use of appropriate entryway systems, reduce the amount of dirt, pollen and other contaminants that enter the building

In addition to using low- and no-VOC cleaning products that limit impact on indoor air quality, green cleaning programs also regularly utilize chemical concentrates with appropriate dilution systems, deck-to-deck partitions and negative pressure in janitorial closets, training of maintenance personnel, and hand soaps that do not contain antimicrobial agents, unless otherwise required. Comprehensive green cleaning programs may also include energy-saving strategies such as using energy-efficient equipment and scheduling cleaning during daylight hours to reduce nighttime lighting and allow building temperature and ventilation setbacks.

For laboratory managers, implementing a green purchasing program should take into account the following concepts:

- Existing guidelines: The U.S. EPA has developed considerable resources to guide the creation of a green purchasing program. http://www.epa.gov/epp/
- Source reduction: Labs can buy less of what will become waste.
- Waste stream diversion: In order to ensure that recycled content products are utilizing former waste streams, products are used longer through reclamation and refinishing, and are also recyclable.
- Use of local materials: This supports local economies and reduces the embodied energy associated with transporting products.
- Decreased toxicity: Buying products whose manufacture, use and disposal avoid hazardous chemicals and materials.

Conclusion

In summary, laboratory managers can play a leading role in identifying and implementing improvements in research processes and facility management. From green chemistry to flexible design and environmentally preferred purchasing, opportunities exist to support green initiatives. When coupled with lean thinking, these objectives can become powerful tools for change with an eye toward sustainability.

Daniel D. Watch, *Principal, LEED AP, dan.watch@perkinswill.com, 404-443-7694*
John C. Mlade, *Science+Technology Sustainability, LEED AP, john.mlade@perkinswill.com, 404-443-7540*

Together, we can generate pure hydrogen and replace costly helium carrier gases.

Gas Generators for Hydrogen, Zero Air, UHP Nitrogen, Ultra Pure Air, TOC Gases, FT-IR Purge Gas, Membrane Air Dryers, FID Gas Stations, and LC/MS Source Gases

Lower cost than delivered carrier gas with payback of less than 2 years

Hydrogen increases sample thru-put without loss in resolution

Easy to install and operate, plug it in and walk away

Consistent purity and pressure supplied 24/7

Lease to own and rental options available

When you partner with the global leader in gas generation technology, expect to move your business and the world forward. Through partnering with key instrument manufacturers, Parker has designed, developed, and commercialized tens of thousands of gas generation systems for the most demanding analytical instrument applications. Parker continues to provide innovative systems designed to improve safety, improve efficiencies, and reduce operating costs.

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding

Parker

BALSTON®

1-800-343-4048

To learn how to replace Helium visit:
www.labgasgenerators.com/nohelium
and register for your **FREE GIFT**!

Pittcon 2009: An extensive technical and educational program.

At Pittcon 2009, you'll also find a rich and diverse technical program. Here are just a few of the topics.

Plenary Speaker

Dr. George M. Whitesides
Dr. Whitesides is a Woodford L. and Ann A. Flowers University Professor at the Harvard University Department of Chemistry and Chemical Biology. He is best known for his work in the areas of NMR spectroscopy, organometallic chemistry, molecular self-assembly, soft lithography, microfabrication, microfluidics, and nanotechnology.

Technical Symposia

ART/ARCHAEOLOGY

Shedding Light on Art: The Use of Lasers and Other Intense Light Sources in Art Analysis and Conservation
Gregory Dale Smith, Buffalo State College, and Richard Palmer, Duke University

ATOMIC SPECTROSCOPY/ ELEMENTAL ANALYSIS

Approaches to Comprehensive Speciation in Pharmaceutical and Nutraceutical Products
R. Kenneth Marcus, Clemson University, and Joseph Caruso, University of Cincinnati

BIOANALYTICAL

Label-Free Bioanalytical Detection—From Benchtop Instruments to Unobtrusive Sensors
Radislav Potyrailo, General Electric Global Research, and Vladimir Mirsky, University Regensburg

High Sensitivity MS-based Approaches in Glycomics and Glycoproteomics
Yehia Mechref and Milos Novotny, University of Indiana

Advances in Metabolite Identification Using Mass Spectrometry
Guodong Chen, Schering-Plough

BIOMEDICAL

Molecular and Nanoparticle Based Imaging, Part I: New Trends
Stephane Petoud, University of Pittsburgh

Molecular and Nanoparticle Based Imaging, Part II: Applications to Cancer
Raoul Kopelman, University of Michigan and Weihong Tan, University of Florida

FOOD/FOOD SAFETY

Multi-residue Pesticide Analysis for Food Testing
ACS Organized Contributed Session

Liquid/Gas Chromatography
High Speed Liquid Chromatography
Peter Carr and Dwight Stoll, University of Minnesota

Best Practice of Chiral Separations in Pharmaceutical Development
Michael Dong, Genentech

New Dimensions in Multidimensional Separations
Matthias Klee, Agilent Technologies (ACS Symposium)

MASS SPECTROMETRY

Ambient Mass Spectrometry
Gary Hiefje, University of Indiana

Accurate Mass Measurement: State of the Art, Uses, and Limitations
Christopher L. Hendrickson and Alan Marshall, Florida State University

NANOTECHNOLOGY

Making Measurements in a Crowd—Chemical Analysis and Molecular Congestion
Paul Bohn, University of Notre Dame

PHARMACEUTICAL

Case Studies in the Stability of Drug Substances and Drug Products
Brian Nunnally, Wyeth

SENSORS/INTEGRATED SENSOR SYSTEMS

Sensors for Assessment of Personal Exposure
Ashok Mulchandani, University of California, Riverside

Short Courses

With more than 100 offerings on nearly 60 topics, short courses are great way to enhance your Pittcon experience.

- Professional Analytical Chemists in Industry: Problem Solving
- LIMS and Laboratory Systems Integration
- Basic HPLC: Fundamentals, Applications and Troubleshooting
- LC/MS Strategies for the ID of Impurities, Degradants and Metabolites
- Analytical Organic Mass Spectrometry
- Application of Inductively Coupled Plasma Atomic Emission Spectrometry
- HPLC Method Development for LC/MS
- Introduction to Mass Spectrometry
- Interpretation of Electrospray Mass Spectra of Small Molecules
- Applying LEAN Principles in the Analytical Laboratory

Visit **www.pittcon.org** for a complete listing of our technical program, including sessions organized by the American Chemical Society Division of Analytical Chemistry.

PITTCON CONFERENCE & EXPO 2009

www.pittcon.org

You'll find the whole laboratory science community here.

SHOWCASING SCIENTIFIC INNOVATION
60 YEARS
PITTCON 2009

Welcome to Pittcon — your once-a-year opportunity to get together with just about everyone in the laboratory science community. There's no better place to network with colleagues from all over the world, or to meet one-on-one with experts in every discipline. Join us in Chicago, and see for yourself!

For more information, or to add your name to our mailing list, visit www.pittcon.org

PITTCON
CONFERENCE & EXPO 2009

PITTCON 2009 · McCORMICK PLACE · CHICAGO · MARCH 8–13, 2009

One Laboratory's Journey Toward Green

SUCCESS RELIES ON A VISION, LEADERSHIP SUPPORT, REALISTIC GOALS, EDUCATION AND A COMMITTED INFRASTRUCTURE *by David P. Jackson, MBA*

When ARUP Laboratories, a national medical reference laboratory in Salt Lake City, began its Corporate Responsibility Program five years ago, it did so in an effort to be more environmentally conscious. The company has been pleasantly surprised that among the rewards reaped for its efforts are tremendous improvements in recycling, reusing and reducing; increased employee involvement and enthusiasm; positive client feedback, and community support and recognition.

ARUP encourages other laboratories to also take steps toward becoming more environmentally friendly. With so many options, deciding where to start "going green" is a daunting task that requires careful planning. However, finding a good beginning is as easy as identifying one or more goals that are feasible for your unique organization.

ARUP initiated its Corporate Responsibility Program with a philosophy based on the three elements of the environmental triangle:

"FINDING A GOOD BEGINNING IS AS EASY AS IDENTIFYING ONE OR MORE GOALS THAT ARE FEASIBLE FOR YOUR UNIQUE ORGANIZATION."

Reduce consumption of unsafe products, energy and natural resources.

Reuse building materials and purchase reusable office and laboratory furniture.

Recycle by implementing a robust recycling program with support and education.

ARUP Laboratories began its journey by focusing on the following five steps and offers these as suggestions to other laboratories looking for ways to go green:

1. Have a vision of what is possible. Set a direction and vision for becoming environmentally friendly. Using the Environmental Protection Agency's "Reduce, Reuse, and Recycle" symbol as a model for organizing efforts can help you define simple, specific goals.

2. Obtain laboratory leadership support. Whether you operate a free-standing laboratory or are located inside a larger facility, leadership support is vital to success. Creativity is key to gaining this support, which may be conditional. For example, achieving greater efficiency in business practices doubles as an environmentally friendly goal. ARUP leadership readily committed to the concept of becoming more environmentally conscious because ARUP's culture is built on doing the right thing.

3. Be realistic about what is possible. The old adage "you can do anything you want, but you can't do everything you want" applies to green activities. Any progress is better than no progress.

ARUP developed a plan based on financial and space considerations. A long-term commitment was necessary for some projects, such as a 10-year xeriscape plan. Other projects were quicker, such as recycling education and recycling container placement. Plans to reduce chemical usage were also implemented quickly. Still other projects were postponed. For example, a grinder/sterilizer for medical waste and a state-of-the-art recycling dock had to wait for space and funding.

4. Actively and continually educate staff. Since many laboratorians are generally environmentally conscious, this step is usually not difficult. Educational seminars, articles in newsletters, posters, reminder buttons, etc., are all things a laboratory can use to keep awareness high.

"ACHIEVING GREATER EFFICIENCY IN BUSINESS PRACTICES DOUBLES AS AN ENVIRONMENTALLY FRIENDLY GOAL."

5. Build an infrastructure. It is crucial to do more than spread the word. There must be an easy and convenient mechanism in order for employees to participate.

ARUP committed to an infrastructure that included:

Office and laboratory areas:

- Blue recycling wastebaskets
- Bins for electronic waste
- Locked bins for shredded documents

Laboratory areas:

- Convenient bins with lids for medical waste
- Bins for cardboard and brown glass

Company-wide areas:

- Locations for other recycling (fluorescent lights, flammable waste)
- Proper storage sites for chemicals and medical waste
- Recycling dock (containers for commingled waste, cardboard, metal and regular waste, and paper for shredding)
- Document storage with expiration dates
- Educational activities about the value of going green
- Policies for record retention and file destruction

The results

Using these five steps, the company developed a robust plan, initiated employee education and began implementing its ambitious vision. In a few short years, ARUP has realized amazing results. Among them:

Recycling:

- 288,000 lbs. per year of commingled waste (paper, plastic)
- 100,000 lbs. per year of cardboard
- 70,000 lbs. per year of metal
- 67,500 lbs. per year of expired documents
- 219,000 lbs. per year of shredded paper
- 24,000 lbs. per year of electronic waste
- 50,000 lbs. per year of flammable waste

Reusing:

- Reused 20,000 square feet of existing carpet
- 33,000 square feet of "renewed/reused" carpet made with 35 percent recycled content
- Almost 100 percent of office, cubicle and laboratory furniture is reusable
- New office furniture is built with 40-60 percent recycled material
- Building materials in construction and renovation are reused as much as possible; the rest are recycled

"THERE MUST BE AN EASY AND CONVENIENT MECHANISM IN ORDER FOR EMPLOYEES TO PARTICIPATE."

Reducing:

- 80 percent of cleaning chemicals are "Green Seal"
- Over 100 gallons per year of wax and stripper chemicals have been saved
- 70 percent reduction of the landscape water when xeriscaping is completed in three years
- 15 percent decrease in the amount of biohazard waste over the past five years
- Over 87 percent of bio hazard waste (376,000 lbs.) processed on-site, avoiding incineration
- Chemical waste disposal costs were five times smaller in 2006 than in 1996 (when ARUP was three times smaller)
- 2,000 lbs. per year reduction of dry chemical extinguishent by using water in fire safety training
- Significant energy savings with motion sensors, automatic temperature setbacks, variable speed motors and two-stage air conditioners
- Significant printing, paper and labor conservation by using electronic payroll deposits and benefits management
- Over 500 employees use some form of mass transit at least once a week

ARUP president and COO Ronald L. Weiss, MD, MBA, believes the work has been worth the effort. "ARUP has taken steps to accept responsibility for the impact our activities have on our customers, employees and communities," he says. "By voluntarily taking these steps, our employees have contributed to improving the quality of life, assisting our local communities and reducing environmental damage."

The company presently recycles 30 to 35 percent of its total waste (up from near 0 percent six years ago), and its overall achievements were recognized by the Recycling Coalition of Utah in May 2008, when ARUP was presented with the Business Recycler of the Year award. ARUP was selected for its outstanding efforts in recycling and sustainability, and its continuing stewardship of the earth, achievements that can be realized by any laboratory that decides to take action.

David P. Jackson, *MBA, Senior Vice President of Strategic Services, ARUP Laboratories, 800-242-2787.*

POST A 24/7 SENTRY OVER YOUR CRITICAL SUBSTANCES

Marvel Scientific refrigerators have always been the most dependable and reliable, maintaining stable temperatures to protect valuable research and costly materials. Now, that reliability is *measurable and recordable*.

With the **MicroSentry™ Scientific** refrigeration monitor, you have the ability to control, confirm and capture temperature performance, giving you the ultimate confidence in your refrigeration.

- ☐ Interior mounted electronic controls with temperature display for convenient monitoring
- ☐ User-programmable temperature set point, high/low alarm values and alarm delay period
- ☐ Integral remote alarm interface
- ☐ High/low temperature history record, periodic maintenance notifications and built-in diagnostics

The **MicroSentry™ Scientific** monitor is available on undercounter general purpose refrigerators in15" and 24" widths. Visit our web site today for complete details.

MicroSentry™ Scientific monitors enhance what are already high-performance products. Each general purpose, FMS and EP Marvel Scientific refrigerator has been designed specifically for the lab with a **Commercial UL Listing** for your peace of mind. To learn why Commercial UL is so important, visit: **www.marvelscientific.com/standards**

MARVEL® SCIENTIFIC

refrigeration for health, science and industry

Marvel Scientific • Toll Free: 800-962-2521• www.marvelscientific.com

SERIOUS ABOUT STANDARDS

Knowledge Is Power

USING SERVICE METRICS TO MAKE INTELLIGENT BUSINESS DECISIONS *by Dawn MacNeill*

"The ability to generate specific key performance metrics is dependent upon having the people, processes and tools to know which data to capture, store, analyze and report for business intelligence."

When it comes to choosing your suppliers for instruments, equipment or services, are you effectively utilizing maintenance and service information to help you make the best purchasing decisions? Do you know how well your suppliers are performing? Do you know how your manufacturers and service providers compare to each other in quality and service delivery? Do you have the tools and information to leverage the volume of your purchasing power and negotiate better deals?

Most organizations have a wealth of data available to assist in the decision-making process. However, in many cases, the data is not organized or reported effectively. By measuring specific key performance metrics (KPMs) on your assets, manufacturers and service providers, it is possible to turn knowledge into purchasing power.

KPMs play a vital role in helping organizations maintain a competitive advantage. They enable an organization to purchase best-in-class assets and utilize the highest-quality service providers, as well as lower the total cost of ownership. With rationalization and standardization, an organization can realize cost savings through volume purchases, operational efficiencies in end-user training, reductions in administrative burden and more.

What are KPMs and how do you generate them?

Key performance metrics KPMs are metrics that are used to help a strategic organization measure the progress of "something" or "someone" to develop a course of action or to identify specific initiatives to improve the progress. KPMs vary and are typically tied to an organization's or a department's goals and objectives. In this case, we are referring to the performance of capital assets, such as laboratory instruments and equipment, their manufacturers, and their respective service providers.

The ability to generate specific key performance metrics is dependent upon having the people, processes and tools to know which data to capture, store, analyze and report for business intelligence. The foundation for developing asset and service provider key performance metrics is an accurate inventory. An accurate inventory is reliant upon individuals who understand the instruments and equipment. This is especially important when capturing instruments and equipment that are part of an overall system, such as a single entity made up of a main component (sometimes referred to as the "parent") and individual components (sometimes referred to as the "children").

Outlined below are the high-level steps that an organization needs to take to produce asset and service provider KPMs:

- Obtain an accurate, up-to-date inventory of your assets, including "parent/child" hierarchies, to enter into your enterprise asset management database.
- Determine other necessary inventory data elements, such as asset owner, manufacturer, model number, serial number, installation date, warranty expiration date, service type, etc.
- Set up processes to maintain an accurate inventory.
- Inventories are dynamic and are in a constant state of flux. Therefore, it is critically important to have processes in place to record changes as they occur in your database. Otherwise, you will need to repeat the process of capturing an up-to-date inventory, which is very time-consuming and costly.
- Establish five or six KPMs to be measured.
- Set up the processes to capture and store the data points required to calculate the KPMs.
- Using an enterprise asset management database, develop a method for reporting the KPMs.

"KPMs can be also be used by an organization to create a scorecard to grade asset, service provider and manufacturer asset performance."

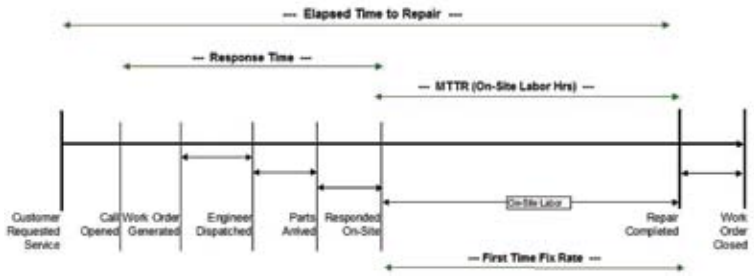


Exhibit A: Overview of the data points, including their respective dates and times, required to be captured for each step involved in an on-site corrective maintenance event. The average number of days between corrective maintenance events is considered the mean time between failure (MTBF).

Prior to establishing specific service levels and/or performance targets for your organization, you should determine a baseline for how well your assets, manufacturers and service providers are performing.

What KPMs are typically measured?

Below we define some key performance metrics, show the data points that need to be collected and provide recommendations on how to use the information to make improvements in your organization.

- **Response Time** measures a service provider's performance by calculating the average time in hours between receipt of a customer's request (Customer Requested Service) and field service engineers' arrival on-site (Responded On-Site) to perform corrective maintenance events.
- **Mean Time to Repair** (**MTTR**) measures a service provider's performance by calculating the average time in on-site labor hours (On-Site Labor) to actually perform corrective maintenance events.
- **Uptime** measures both a manufacturer's performance and a service provider's performance. Uptime can provide measurements for assessing the reliability of a manufacturer's product and the ability of a service provider to return an asset to its proper condition for use quickly. It is calculated by subtracting the total elapsed time required for a corrective maintenance event (elapsed time to repair, or ETTR), assuming the asset is down (downtime), from the total time an asset is expected to be available for use, and then dividing it by the total available hours. For example, an asset's operational hours may be Monday through Friday, 9:00 a.m. to 5:00 p.m., 48 weeks per year. The total annual hours the asset is expected to be available for use is 1920. If the downtime is 16 hours, then the uptime is 1904 hours divided by 1920 hours ,or 99.2%.
- **Mean Time Between Failure** (**MTBF**) measures the reliability of an asset by calculating the number of days between corrective maintenance events within a one-year timeframe. For example, if an asset's MTBF is 547 days, then one might be able to anticipate that the asset will fail once every 18 months.
- **First Time Fix Rate** measures a service provider's performance in the area of on-site preparedness and efficiency by calculating the frequency with which the service provider received a request for service (Customer Requested Service), responded on-site (Responded On-Site) and resolved the issue in the first visit (Repair Completed).
- **PM Completion Rate** measures a service provider's performance of preventative maintenance when needed and on time.

These measurements are often used by Original Equipment Manufacturers (OEMs) to identify opportunities for improvement in their customer support operations, as well as improvements in product reliability. In analyzing the data across the same asset classification, OEMs can determine how well their field service structure is set up to support their customer base, as well as benchmark field service engineer performance to identify best practices and training opportunities.

However, these KPMs can be also be used by an organization to create a scorecard to grade asset, service provider and manufacturer asset performance. This scorecard is an invaluable tool in the decision-making processes. KPM examples for a scorecard are below:

- Asset (instrument and equipment) performance
  - -Which assets have the highest MTBF?
  - -Which assets have the highest uptime?
  - -Which assets have numerous corrective maintenance events?
  - -Which assets should be replaced?
  - -How often are corrective maintenance events occurring due to user error?
  - -What department may need additional training?
- Service provider performance
  - -Who provides the fastest service?
  - -Who provides the best price?
  - -Who provides the best overall value (TCO)?
- Manufacturer performance
  - -Who makes the most reliable products?
  - -Who provides the best service in terms of responsiveness and timeliness of repair?
  - -Who provides the best overall value (TCO)?

Using KPMs to analyze asset performance

The objective of using KPMs to analyze asset performance is to identify those assets within your organization that are the most reliable, as well as those that are unreliable. Reliability can be measured by comparing MTBF and uptime of the same asset classification or technique across various manufacturers. For new purchasing decisions, the objective is to determine which assets to buy for your organization and which assets to replace. Rationalizing your asset base can provide numerous organizational benefits:

-Increases purchasing power
-Reduces end-user training requirements
-Streamlines SOPs
-Provides for redundancy
-Improves operational efficiency

Using KPMs to analyze service provider performance

The objective of using service KPMs to analyze service provider performance is to confidently identify those service providers who deliver the highest quality service. Service quality can be measured by compar-

ing response time, MTTR and first time fix rate. These KPMs should be generated to analyze specific asset classifications and, more specifically, techniques across various manufacturers and service providers. For ongoing maintenance and operations, the objective is to determine which service provider to use for your organization and which service providers to replace. Standardizing your service providers can provide numerous organizational benefits:

-Increases uptime
-Improves staff productivity
-Reduces overall service spend
-Lowers parts inventory carrying costs

Combined together, if your KPMs identify a manufacturer that both has a high-performing asset and is a high-performing service provider, you have identified a supplier with which to develop a more robust business partnership.

Get the power

Today, many organizations are sitting on a gold mine of data that is underutilized. Organizations that have invested in the people, processes and tools to generate KPMs are well positioned to compete in the marketplace by optimizing both their capital equipment and service spend, that is, the cost of instrument and equipment ownership throughout their life cycles.

If you're unable to make the investment, there are asset and service management solution providers who can transform your maintenance data into knowledge and provide the business intelligence you need to make more informed acquisition, operation and disposition decisions. Business reviews are provided on a periodic basis to discuss KPMs to date and identify strategies and tactics for continuous process improvement. And, with online reporting tools and customer analytics, these KPMs can be made available 24/7, enabling you to make business decisions in real time, anytime.

Dawn MacNeill *is Manager of Services Marketing for Thermo Fisher Scientific; dawn.macneill@thermofisher.com; www.tghermo.com/lifecyclenews.*

LABORATORY GLASSWARE WASHERS

LARGE CAPACITY VS. STANDARD, CYCLE TIMES AND ENERGY EFFICIENCY ALL MATTER

Most manufacturers offer standard and large-capacity washers and, as with most things, your first consideration should be your actual requirements. In terms of energy efficiency, "there is a huge difference in operation costs between a washer that takes nine gallons to fill and one that takes 15 gallons to fill. When you consider that a wash program is usually five or six fills, this has a large impact on water consumption, detergent amount needed, electricity needed to heat the water and water treatment/sewage costs," says Ken Austin, Miele Professional Laboratory Division manager.

Another efficiency feature to consider is a delay-start option, which, in places where electricity is less expensive during off-peak hours, facilitates running your washer at night.

"Ideally, a washer should accommodate both spindle racks for narrow-neck glassware and open racks that hold baskets for wide-mouth and specialized glassware, such as beakers and Petri dishes."

Efficient use of time is also important. Cycle times can range from one to three hours, based on water heat-up times, circulation/spray method and other factors. Consider how important a faster wash program is to your lab.

In addition to capacity and efficiency requirements, you need to consider what types of glassware are used in your lab. "Variations in the types of glassware a washer can accommodate now and in the future is an important consideration. Ideally, a washer should accommodate both spindle racks for narrow-neck glassware and open racks that hold baskets for wide-mouth and specialized glassware, such as beakers and Petri dishes," says Jenny Sprung, product manager, Labconco Corporation.

Also, be certain that the glassware washer you're considering is not simply a home dishwasher converted to have a DI water rinse cycle. "This type of washer cannot be compared with a commercial grade washer that is designed for laboratory applications—from the construction materials (chamber and water path capable of handling 18 megohm 95°C pure water), to wash programs designed for organic and inorganic compounds, to pumps with four times the circulation rating of a home dishwasher," says Austin.

"Request that glassware cleaned in your washer has been analyzed for cleanliness, such as with EPA methods for residual metals, volatile and semi-volatile compounds."

Since lab glassware can be soiled with a variety of substances—some requiring high heat for effective removal and others, such as plasticware, requiring lower temperatures—a washer with multiple temperature and cycle time options is important. And "request that glassware cleaned in your washer has been analyzed for cleanliness, such as with EPA methods for residual metals, volatile and semi-volatile compounds," says Sprung. Also, make sure that the washer is advanced enough to monitor temperature, dispensing, water flow and other parameters and be able to "notify the user if something in the wash process is not correct, which is important in achieving consistent, validated cleaning results," says Austin.

Lastly, consider the noise level of various washers. Knowing the product's dBA level, which measures quietness, is important, "particularly with large-capacity washers. Some brands are very loud," adds Austin.

For a complete list of glassware washer manufacturers and suppliers, go to www.LabX.com

Say goodbye to your drying oven!

The new G 7893 from Miele will not only clean your glassware, its HEPA-filtered forced-air system will completely dry most glassware in 15-30 minutes. All of this within a 24 inch wide footprint that will take a minimal amount of lab space and eliminate the need to transfer glassware to a drying oven.

Visit labwasher.com for more details.

✆ 800.991.9380
🖷 609.419.4241
labwasher.com

Miele
PROFESSIONAL

LABCONCO

SteamScrubber, FlaskScrubber and FlaskScrubber Vantage Series laboratory glassware washers offer advanced features and interchangeable spindle and open racks for glassware flexibility. All models include durable Type 304 stainless steel interior and exterior, LCD display, up to six purified water rinses, purified water pump, programmable wash and rinse temperatures to 93°C to sanitize glassware, forced-air drying up to 99 minutes, and up to 10 pre-programmed wash protocols. Additional features include HEPA-filtered forced-air drying through spindles, a water conductivity monitor to confirm rinse water cleanliness, and automatic liquid detergent and rinse aid dispensers.

www.labconco.com

LANCER

The 1400 LXP glassware washer features a larger chamber offering users the flexibility to wash on one to three levels (with four possible rack positions) and HEPA-filtered chamber and spindle drying, which is user programmable in 1°C increments. The washer is microprocessor controlled with up to 40 programs, has an ergonomic top-loading chemical storage compartment, liquid level detectors and two peristaltic pumps for accurate chemical dosing. The washer significantly conserves water, resulting in valuable life cycle cost savings. Many options and accessories are available.

www.lancer.com

MIELE

The G 7893 compact washer combines the superior cleaning capabilities of Miele's undercounter washers with true HEPA-filtered forced-air drying. This is the first 24-inch-wide glassware washer capable of complete drying in 15-30 minutes, offering labs with limited space and high throughput demands an excellent glassware washing option. A cool-down step makes it possible to safely handle the glassware after the drying cycle. While some other brands of glassware washers can take three or four hours to complete a washing and drying cycle, the G 7893 can do the same job in approximately one hour.

www.labwashers.com

SP INDUSTRIES

Hotpack large-capacity glassware washers offer a spray arch water delivery system that ensures a thorough washing and rinsing. This exclusive feature projects a vertical "wall of water" equally across the entire chamber. Separate plumbing systems for wash and rinse cycles minimize detergent carry-over to provide a clear final rinse. A high-efficiency water management system conserves energy and reduces operating cost. A touch-screen control interface, which is located at eye level, enables easy selection from a range of preset or user-defined programmed operating options. The automatic door operation has watchdog safety functions that only allow washer operation when the door is fully closed. Additional features include a 316L stainless steel interior for easy cleaning, easy access to plumbing and detergent reservoirs, plus an ultra-clear glass door to provide unrestricted observation of machine operation.

www.SPindustries.com

For more information on Lab Products, please visit www.labmanager.com and click on Lab Product News. There you will find more lab products and a complete list of suppliers.

MICROPLATE READERS

CONSIDER MULTIPLE DETECTION CHOICES, THROUGHPUT AND FLEXIBILITY

Microplate readers are used widely in research, drug discovery, bioassay validation, and QC and manufacturing processes. Their usefulness lies in their ability to reduce, if not eliminate, the amount of human subjectivity needed to evaluate plate contents.

Common detection modes for microplate assays are absorbance, fluorescence intensity, luminescence, time-resolved fluorescence and fluorescence polarization.

"More than one detection technology in an instrument increases convenience in current and future microplate assay choice."

"When working with fluorescence-based assays, two detection technologies are available: filter-based and monochromator-based. Previously, researchers had to choose only one type, which restricted the assays that could be read on the multi-mode reader," says BioTek product manager Xavier Amouretti. More than one detection technology in an instrument increases convenience in current and future microplate assay choice.

"An important consideration for many researchers is the ability to run various sample types and tests, making the instrument's flexibility a significant criterion," says Alisa Jackson, product manager for Beckman Coulter. In the case of that company's optimized power-detection cartridges, Jackson says they have "nearly doubled the number of available detection choices, and will continue to address new applications."

"Match the resolution of the instrument to the type of cellular assay to be performed—single-cell and sub-cellular assays require the highest possible resolution," says Gabriele Gradl, global product leader for high-content screening at PerkinElmer.

Gradl also reminds end users that if they want to perform fixed-cell assays or live cell assays that require environmental control features, "look for readers with temperature, CO^2 and humidity control suitable for long-term live-cell screening experiments."

Microplate readers come with software for everything from data collection, reduction and analysis to documentation and validation to LIMS. Consider what kind of data you will be generating to determine what kind of software you require.

Additional things to consider:

How many people will be using the instrument, and your desired throughput.

The number of parameters required for read-out. Do you want to perform bulk fluorescence or have imaging-based read-out?

Will your assays have an endpoint or will results be acquired over a time course?

What plate format do you want to use? Plates can range from 96-well up to 1536-well format.

"Match the resolution of the instrument to the type of cellular assay to be performed—single-cell and sub-cellular assays require the highest possible resolution."

Rather than comparing specifications from different manufacturers, Amouretti believes most researchers are looking for a level of familiarity—"what's being used in the lab down the hall, or in published papers?" He says that only after the field is narrowed do budget and technology become important.

For a complete list of microplate reader manufacturers and suppliers, go to www.LabX.com

BECKMAN COULTER

The PARADIGM™ Detection Platform features optimized power-detection cartridges that are interchangeable to meet varying assay needs. The detector reads on the fly, in formats from six to 1,536 wells. The eight initial cartridges provided fluorescence polarization, time-resolved fluorescence, and dual-label and luminescence detection. Four new introductions—two luminescence cartridges optimized for 96- and 384-well plate formats, a cartridge for BRET2 (Bioluminescence Resonance Energy Transfer) live cell assays and a rhodamine fluorescence cartridge for a selection of cyanine dyes—bring the total number of detection cartridges to 14.

www.beckmancoulter.com

BIOTEK INSTRUMENTS

The Synergy™ 4 multi-detection microplate reader combines filter-based and quadruple monochromator-based fluorescence detection technology to perform an unlimited number of microplate-based assays. This hybrid technology provides flexibility in current and future microplate-based assay choice. In addition, it includes fluorescence intensity, luminescence, fluorescence polarization, time-resolved fluorescence and UV-Vis absorbance. The design of the filter systems provides fast wavelength switching and higher read speeds. Quadruple monochromator-based fluorescence technology offers flexible wavelength selection, true spectral scanning and reduced background noise.

www.biotek.com

MOLECULAR DEVICES

The SpectraMax M5e multi-detection microplate reader is designed for flexibility. It provides high-sensitivity fluorescence, time-resolved fluorescence, fluorescence polarization, absorbance and luminescence assays. Users can choose any wavelength between 250 nm and 850 nm. Endpoint, kinetic, spectrum, multi-wavelength and well-area scanning reading methods are used to run cell viability and proliferation, kinase, reporter gene, ELISA, nucleic acid and protein quantification, and enzymatic assays. The instrument meets the growing need to detect biomolecular complex formation and is now certified for use in HTRF, LanthaScreen and IMAP assays. For customers in regulated environments, the reader offers tools to validate instrument and software performance.

www.moleculardevices.com/home.html

PERKINELMER

The Opera™ and Opera™ LX are confocal microplate readers for fully automated, image-based, high-speed and high-resolution cellular screening. They are suited for high-throughput live cell screening, with the addition of precision environmental control and a dispensing unit for kinetic experiments. Potential cell stress is reduced by the use of Nipkow spinning disk imaging technology, which minimizes phototoxicity while enabling high-speed confocal imaging. Four lasers plus a xenon lamp and up to four CCD cameras enable parallel multicolor image acquisition. Analysis modules are available for all key applications.

www.perkinelmer.com

For more information on Lab Products, please visit www.labmanager.com and click on Lab Product News. There you will find more lab products and a complete list of suppliers.

WATER BATHS

IT COMES DOWN TO TEMPERATURE UNIFORMITY, STABILITY AND CONTROL

Water baths are used in industrial clinical laboratories, academic facilities, government research laboratories environmental applications as well as food technology and wastewater plants. Because water retains heat so well, using water baths was one of the very first means of incubation. Applications include sample thawing, bacteriological examinations, warming reagents, coliform determinations and microbiological assays.

"To compare different bath volumes, it is best to compare internal tank dimensions."

The first thing to consider when purchasing a water bath is the electronics. Digital control systems provide greater temperature uniformity, stability and control. Constant temperature digital water baths are suited to a host of applications, including bacteriological examinations, food processing/QC procedures and microbiology assays, just to name a few.

Analog systems offer easy-to-use control and are best suited to fixed set-point applications.

"The exterior needs to remain cool, to prevent accidental burns even after extended use."

Most general laboratory water baths go from ambient temperatures of + 5°C to 99.9°C, with temperature uniformity as tight as ± 0.2°C at 37°C. Many vendors offer temperature preset buttons for quick selection of frequently used temperature set points.

Choosing the right size water bath depends on the volume and size of samples. Water bath sizes can range from 1.5 to 43 liters. To compare different bath volumes, it is best to compare internal tank dimensions.

If there is concern with outside contaminants, it is important to consider a water bath cover. Clear covers allow researchers to see inside. Attached covers eliminate problems with condensation, and gabled covers accommodate glassware of varying heights and permit easy loading and removal of samples. Some manufacturers provide hinged covers that stay open 90 degrees or remove completely. Others offer lid fins that protect hands from hot vapors. Covers are also essential if the lab is operating the water bath above 60°C, in order to maintain temperature.

Rounded, seamless stainless steel reservoir construction resists rust, chemical damage and contamination. An epoxy-powder-coated exterior simplifies cleanup. The exterior also needs to remain cool, to prevent accidental burns even after extended use.

"If there is concern with outside contaminants, it is important to consider a water bath cover."

Safety features may include secondary thermostats that automatically disconnect heater power should the bath temperature get too high or the liquid level drop too low, as well as alarm indicators.

Non-contact recessed heating elements, which specifically curtail element burnout and eliminate tank hot spots, are also available.

For a complete list of water bath manufacturers and suppliers, go to www.LabX.com

Product Focus: WATER BATHS

For more information on Lab Products, please visit www.labmanager.com and click on Lab Product News. There you will find more lab products and a complete list of suppliers.

GRANT INSTRUMENTS

Thermostatically controlled low-temperature baths and circulators are suited to routine applications as well as spectrometry, viscometry, refractometry and electrophoresis. A choice of four thermostatic controllers and five refrigeration units provides a cost-effective system to meet specific application requirements. Each unit is suitable for either open- or closed-loop circulation. Low-temperature baths and circulators offer ease of operationand low maintenance. Robust, durable construction ensures a long-term low cost of ownership.

www.grantsci.com

JULABO

TW Series water baths feature microprocessor technology and a temperature stability of ±0.2°C at a working temperature range of +20 to +99.9°C. The baths are suitable for simple routine and complex applications. There is overall splash-water protection and a keypad for temperature settings with LED temperature indication. Sensitive samples that require a controlled environment can be protected by features such as dry-running, optical and audible warning, and shut-off features. The TW Series includes four models with filling volumes from 2 to 22 liters as well as a wide range of accessories.

www.julabo.com

POLYSCIENCE

These general-purpose water baths are equipped with sensitive microprocessor-based PID controllers that maintain bath temperatures from ambient +5° to 100°C with ±0.1° precision and ±0.2°C uniformity. They are available with 2-, 5-, 10-, 20- or 28-liter single-chamber reservoirs. They also feature digital temperature readout, one-touch set-point recall, and three user-defined temperature preset buttons for quick selection of frequently used temperature set points. Bath temperature can be displayed in either °C or °F. For added operational convenience, all models include a steeply gabled tilting cover that accommodates glassware of varying heights and permits easy loading and removal of samples while allowing condensate to drain neatly back into the bath. A front-panel lockout prevents inadvertent temperature set-point changes and redundant safety thermostats guard against bath overheating.

www.polyscience.com

FISHER SCIENTIFIC

Fisher Scientific Isotemp® programmable, digital, dual-temperature control baths are suited for industrial, clinical, pharmaceutical or biomedical procedures. They provide a temperature range from ambient to 100°C. Microprocessor PID control provides ±0.24°C uniformity, ±0.5°C accuracy and stability at 37°C. Display shows °C or °F and can be read from across the room. Low-profile front-panel controls provide easy access and safer operation, while dual thermostats guard against thermal runaway. Hinged acrylic or stainless-steel gable covers have fins that keep hands away from hot vapors. Covers stay open at 90° or, with quick-release hinge, lift off completely for use with large glassware. Heating elements will not burn out if bath accidentally runs dry. The corrosion-resistant exterior features a tough, easy-to-clean acrylic enamel coating and a temperature-resistant plastic rim that insulates, resists leaks, keeps its shape, and won't dry out or crack like caulked seals.

www.fishersci.com

Protect your work. Eliminate open sources of water in the lab.

WATER COSTS YOU

Lost materials. Distorted data.

Water baths are messy. They can create problems in the lab and introduce contamination. REPLACE water with Dry Aluminum Beads. Try a Sample of Bath Armor.

Watch the Video at www.labarmor.com/video

and we'll ship you a FREE SAMPLE to try!

The water bath may be the weakest link in your lab.

Water can introduce both biological and chemical contaminants to your incubating samples. These unknowns can put your work at risk. A dry bead bath creates a simpler, more stable work environment.

Bead baths lower the cost of owning bath equipment.

A bead bath will save you countless hours of reworking ruined experiments, cut down on wasted reagents, and eliminate cleaning and filling duties. Plus, Bath Armor beads extend the life of your bath by eliminating corrosion.

Beads just make sense. Buy a bead bath today. Peace-of-mind included.

Lab ARMOR™

Must Protect the Lab™ Go to labarmor.com or Call (210)-858-8415

TECHNOLOGYNEWS

The latest equipment, instrument and system introductions to the laboratory market

Malvern www.malvern.com

Zetasizer µV Advanced Light Scattering System

Requires just two microliters of sample
Optimizes sample and storage conditions
Verifies quaternary structure of protein complexes
Assesses protein solubility and sample purity

StellarNet www.stellarnet-inc.com

BLUE-Wave Spectrometers

Measure in UV-VIS-NIR wavelength ranges from 190-1150 nm
15 models for a variety of spectral ranges and resolutions with dispersive optics imaging to a 2048-element CCD detector array
SMA-905 fiber-optic input with a high-speed USB-2 computer interface
Integrated 16-bit digitizer and spectral memory produce a signal-to-noise of 1000:1 with fast conversion times down to 1ms

KNF Neuberger, Inc. www.malvern.com

Wireless SC920 Series Vacuum Pump System

Fast and precise processing
Wireless touchscreen remote operates different modes and functions
Supports vessel evacuation; constant pressure control; detection of sample's vapor pressure; and regulation of process pressure operating modes

Varian www.varianinc.com

XGS-600™ Flexible Vacuum Controller

Monitors and controls multiple roughing, high-vacuum and ultra-high-vacuum gauges
Requires 50 - 75% less rack space than other controllers
Operates, displays and processes readings from hot filament and cold cathode high-vacuum-gauges, as well as convection roughing gauges

JASCO www.jascoinc.com

Software Drivers for Analyst® Software

Drivers for Applied Biosystems/MDS Analytical Technologies' Analyst® software
Allow scientists to control its X-LC® (UHPLC) and supercritical fluid chromatography (SFC) systems

Herzan www.herzan.com

Large-Scale Acoustic Enclosure

Enables AFM/SPM users to expand capabilities
Eight square feet of working area and an internal volume of 25.4 cubic feet
Large doors open over 180 degrees; openable window doors provide easy access; and cable management options prevent parasitic noise

Bio-Rad www.bmglabtech.com

iTaq™ Fast Supermixes for Real-Time PCR

Enable more reliable quantitative PCR (qPCR) results in less than 40 minutes
Can be used on a variety of instruments, including ROX-dependent real-time PCR systems
Designed to deliver maximum qPCR efficiency, sensitivity and specificity
Robust fluorescent signal under fast or standard cycling conditions with any real-time detection chemistry

HELMER www.helmerinc.com

TCR Temperature Chart Recorder

Records ambient conditions from 0° to 35°C
Used for refrigerators ranging from -5° to 20°C
Used for freezers in the operating range of -50° to 0°C
All units can be programmed to operate at any of the three available ranges

FRITSCH www.fritsch.de

Planetary Ball Mill with Sunken Grinding Bowls

The center of gravity of the bowls is on the level of the solar disc
Up to 150% higher application of energy is possible
Grinding time into the nano range is considerably reduced
SelfLOCK tensioning unit makes accidental dismantling of the bowl impossible

BMG LABTECH www.bmglabtech.com

Omega Series Microplate Readers

TR-FRET and AlphaScreen® compatible
Tandem technology utilizes high-speed UV/Vis spectrometer-based absorbance and ultra-sensitive filter-based detection in all measurement modes
Capable of reading absorbance, luminescence, fluorescence intensity, fluorescence polarization and time-resolved fluorescence
Features high-intensity xenon flash lamp, assay-optimized filters and adjustable gain

Beckman Coulter www.beckmancoulter.com

Optima™ eXPert™ Ultracentrifuge Software

Advanced eXPert software for Optima L-XP Series ultracentrifuges
For academic, biopharmaceutical and bioprocessing users in protein, virus and vaccine development
Security and audit trail features support users working with 21 CFR Part 11 guidelines

Olympus www.microscopy.olympus.eu

Documentation and Archiving Software Systems

Well-balanced imaging system for documentation and archiving in basic cell microscopy
The cell^A system is a steppingstone into digital image acquisition in routine research microscopy
The cell^B encompasses all the functions of cell^A along with additional features

Wheaton Science Products www.wheatonsci.com

BioPortfolio™

Complete line of products for life science research
Available in one literature folder
BioSciWare™ comprises laboratory glassware and plastic
BioWise comprises equipment utilized for specific cell culture applications

PerkinElmer www.perkinelmer.com

Photo Diode Array Addition to Series 275 HRes LC Systems

Accelerates productivity and performance for labs performing LC analysis
Provides improved peak identification and peak purity determination
Improved chromatographic resolution and increased throughput operating at higher pressure range (up to 10,000 psi)
Increased confidence in method development and method transfer to Fast-LC

Phenomenex www.phenomenex.com

GC Nut for Shimadzu Systems

Ensures precise and painless column installation
Eliminates finger burning and simplifies GC column installation
Reduces the time required to switch columns

ADMET www.admet.com

MTESTQuattro™ Materials Testing System

Enables greater materials testing capabilities
Combines mechanical test results with microscope images in a single file

Tosoh Bioscience www.tosohbioscience.com

TSK-GEL STAT Series Non-Porous Ion Exchange Columns

Columns allow fast equilibration and analysis of complex biopolymer samples
Packed with non-porous resin particles
Enable high-speed and high-resolution analysis as well as isolation of biomolecules
Available in four different chemistries

Sartorius www.sartorius.com

ProBatch+ Application Software

Used in conjunction with the Sartorius X-Family, Combics Pro and other PLC controllers
Offers efficient management of original raw material and recipe data
Allows for visual presentation of the running process
Enables all batch procedures to be visually monitored and easily controlled

The Baker Company www.bakerco.com

SterilGARD® e3 Biological Safety Cabinet

Airflow management system requires less energy and improves user comfort
Self-adjusts to maintain safe operation
Offers a sleep mode that is instantly safe upon exiting
Available in 4-foot, 5-foot and 6-foot models

Synbiosis www.synbiosis.com

ProtoCOL UV

Rapid, accurate counting of colonies or imaging zones illuminated by UV or white light
Versatile enough to image fluorescing and visible colonies, as well as inhibition zones

Wasting Away in Laboritaville

SMART CHEMICAL WASTE MANAGEMENT RELIES ON A WRITTEN PROGRAM, ACCURATE CHARACTERIZATION OF WASTE AND AN UNDERSTANDING OF ACCUMULATION GUIDELINES

by Glenn Ketcham and Vince McLeod

Recently, after a late night and hours of work in an organic chemistry lab, a graduate student finished up his experiments, dutifully collected his waste and added it to the waste container in the hood. He sealed the container and left for the evening. Unfortunately, a few hours later the one-gallon amber glass bottle decided to increase its entropy and scattered itself and its contents all over the hood and the laboratory. Fortunately, no one was in the lab when the minor explosion took place, so only the hood and the lab were damaged. What happened? We all know that this was a case of mixing incompatible wastes. But why did it happen? And how do we prevent occurrences like this.

This month the Safety Guys provide an introduction to and overview of waste handling in a typical research laboratory. Our focus is on hazardous chemical wastes, as these are the main culprits when it comes to accidents like the one described above. However, proper management of chemical waste is important not only for safety but for economic health, since serious fines and penalties are possible if waste is not handled according to regulations. We touch on the federal regulations, present a model program for chemical waste management and discuss satellite accumulation areas. Our hope is that this will start a discussion leading to in-depth follow-up articles on topics you, our readers, are interested in.

"Proper management of chemical waste is important not only for safety but for economic health as well."

A look back to the beginning

The federal Resource Conservation and Recovery Act (RCRA of 1976) initiated our having to deal with hazardous chemical wastes. With this act Congress mandated that the Environmental Protection Agency (EPA) develop regulations for treatment, storage and disposal of all hazardous wastes. The goal was to keep harmful wastes out of the environment and curtail illegal disposal. This law put in place a record-keeping and tracking system to follow hazardous wastes "from cradle to grave."

RCRA defines those wastes that are hazardous, that is, those that must be tracked, and specifies the manifest system by which to do this. The details are contained in the Code of Federal Regulations, Title 40, Protection of the Environment, parts 260 to 265[1]. Essentially, a waste record or manifest is developed by the generator of the waste and passed to the shipper or transporter and finally to the disposal facility.

Radiation Protection Made Simple…

For Your People, For Your Lab, For Your Campus

In today's climate, you can never have too much protection. The safety of a lab's most valued assets – its personnel and vital infrastructure – is of paramount concern. Whether in routine or extraordinary circumstances, you must ensure that your facility has deployed the optimal technology to keep your assets from harm's way. The Thermo Scientific brand includes a comprehensive line of protection for all of your Radiation Safety needs.

Thermo SCIENTIFIC

Your Partners in the Lab

Fisher Safety is your partner when it comes to keeping your laboratory safe.

Fisher Safety works side-by-side with Thermo Scientific to deliver the radiation protection you need, when you need it.

As one of America's leading providers of occupational health and safety products, Fisher Safety offers a portfolio of more than 75,000 products from trusted manufacturers. Our distribution network touches every corner of the country and builds on an infrastructure that has been in existence for more than a century.

Rely on Fisher Safety to provide the products and customized solutions you need to meet your biggest safety challenges.

800-772-6733 • www.fishersci.com/safety

Protecting What Matters Most

Fisher Safety
Part of Thermo Fisher Scientific

The manifest is checked and signed by each entity, and, after final disposal, the completed manifest is returned to the generator, documenting the proper "cradle-to-grave" management.

Getting started: Developing your model program

Most lab managers who have been at this for a while can skip this section, because we know that you have already done your homework and have a program in place. For new labs and those getting started, we strongly encourage you to develop a written plan and policy statements. The plan should designate a lab waste manager, assign responsibilities for the manager as well as laboratory workers, list required training and the method used to document training, and provide the standard operating procedures you will use to run your waste management program.

A written program also allows you to clearly state any specific policies that must be followed, such as "no hazardous wastes shall be disposed in the sinks or trash." Finally, your written plan should include segments on periodic review of policy and operating procedures to address any changes or additions to your lab's activities and methods to evaluate the program's overall effectiveness.

We must emphasize that, although the federal regulation establishes a baseline, some states and local jurisdictions have waste or chemical management requirements that go beyond EPA compliance. Therefore, it is critical to check with state and local entities regarding additional regulations.

Second step: Identification and accumulation

If your lab generates a waste stream, the first step is to determine whether the waste is hazardous or not. The burden is on you, the generator, to characterize the waste. Very simply for laboratories, it is considered hazardous waste if any components are on one of two lists of chemicals (P-list for acutely hazardous or U-list for general toxic chemicals) or it has one of the characteristics for ignitability, corrosivity, reactivity or toxicity as defined in 40CFR 261.20. If you are unsure, we urge you to contact an experienced professional to assist in making the determination through either documented generator knowledge or proper testing. If the waste is not hazardous, it can be disposed of locally via the sewer system or the general refuse collection. However, you must perform due diligence and confirm with local providers and authorities to ensure that all local codes and ordinances are followed.

"Some states and local jurisdictions have waste or chemical management requirements that go beyond EPA compliance."

After completing your waste characterization for the various wastes generated, you will need to design and implement a collection and storage strategy. For most research laboratory facilities, wastes are collected at the point of generation. Usually this is done using small-volume and appropriately compatible containers. As these containers are filled they are moved to a larger segregated storage area.

Collection near the point of generation is known as a satellite accumulation area. EPA has developed strict guidelines for these satellite accumulation areas to ensure safety and avoid abuse of a storage area. The first requirement is to have signage posted in the area or have it labeled as a satellite accumulation area. The second most important requirement is to stay below the accumulation limits. For a satellite area, this is 55 gallons total of hazardous wastes and no more than one kilogram (about one quart) of any acutely toxic (P-listed) wastes. Satellite accumulation limits should be confirmed with state and local jurisdictions. For example, the state fire marshal may have stricter requirements if your waste is flammable.

There are a few more requirements that pertain to accumulating wastes, for both satellite areas and storage areas. These represent the most common errors (read citations with fines) found during compliance inspections. Number one is proper labeling of containers. Labels must contain the words "Hazardous Waste" and list all constituents (spelled out, no abbreviations or chemical formulas) with their percentage of the total. Make sure the list totals 100%. Next, containers must remain closed except when adding waste. Do not leave funnels in drums or open containers in hoods. Containers must be in good condition and compatible with the types of waste stored. For example, do not put corrosive wastes in metal containers. One last thing to check is proper segregation. It is very important to keep incompatible chemicals separated, for instance flammable liquids and oxidizers or acids and bases.

Summary

Proper management of hazardous chemical waste is important for maintaining safety and avoiding potential expensive regulatory fines. If you are new to handling laboratory waste, this article should get you on the right path. If you are an old hat, then hopefully there is some useful information here to help you review your current operations. In future articles on topics pertaining to waste management, we hope to discuss nuances of defining a hazardous waste with a focus on the four characteristic categories, waste compatibility and waste minimization. We look forward to these and lots of reader feedback.

References:

1 – Environmental Protection Agency, 40 CFR, Subpart I Solid Wastes, Parts 260-265. http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?sid=34398760c105d0c852fa1fd2cddea656&c=ecfr&tpl=/ecfrbrowse/Title40/40cfrv25_02.tpl

2 - Prudent Practices in the Laboratory: Handling and Disposal of Chemicals. National Research Council. National Academy Press, Washington, D.C., latest edition.

Glenn Ketcham *is a certified industrial hygienist with 25 years of experience in the health and safety field. He is currently the risk manager for the University of Florida with responsibility for the general liability and insurance programs, loss prevention, ergonomics, emergency management, and the occupational medicine surveillance program. He has managed the laboratory safety programs for the University of California, San Diego, and the University of Florida. In addition, he served as an industrial hygienist with federal OSHA compliance and has a Master of Science degree in environmental engineering sciences with a health physics concentration.*

Vince McLeod *is a certified industrial hygienist and the senior IH with the University of Florida's Environmental Health and Safety Division. He has over 20 years of occupational health and safety experience in academic research, with a focus in the research laboratory. His specialties are in hazard evaluation and exposure assessment.*

2008 ALMA Distinguished Service Award Winner

An Interview with Tony Montana, PhD

By Sara Goudarzi

"If you run the lab like a separate island outside the company, you will not be able to demonstrate where the laboratory is adding value to the overall business."

The Association of Lab Managers (ALMA), an organization that provides assistance with the management aspect of running a laboratory, has been in existence for 30 years.

Each year, ALMA hosts a conference where lab managers get together and discuss common problems and potential solutions. The board also grants a Distinguished Service Award for Laboratory Management to a manager whose skills in running a lab are considered outstanding.

This year, the honor goes to Tony Montana, the vice president of scientific operations at Garden State Nutritionals, a custom manufacturer of nutritional supplements in Fairfield, New Jersey.

"I've been a member of ALMA for over 20 years," Montana says. "I'm a past president. I've been involved with running the conference and have taught short courses."

"I've been very active because I find [ALMA] very valuable to me."

Montana was brought into management after working as a chemist for only six months. When his manager was moved into another position, Montana's bosses thought that he had the right organizational and communication skills to run the lab.

But Montana had little management training and background.

"I had to learn very fast and be very effective at it, so I did a lot of studying, got an MBA degree and read all the management books," Montana explains. "But it wasn't until I got involved with ALMA that I started to get more information about the practical side of lab management."

Teamwork

Montana oversees 19 full-time chemists and is responsible for all the testing required to formulate, develop and manufacture custom dietary supplements. His team tests about 800 batches of product each month.

"The other responsibility I have is [being] the technical voice for the business," Montana says. "So, throughout the day I get many phone calls from our customers—the people using the products that have a certain concern—and my job is to supply them with technical information."

Garden State Nutritionals has more than 700 employees. Montana works hard to incorporate his lab—a small yet valuable part of the business—into the day-to-day company operations. He believes it's important to communicate the contributions of his division to those outside.

"If you run the lab like a separate island outside the company, you will not be able to demonstrate where the laboratory is adding value to the overall business," he says.

Teamwork, according to Montana, is essentially the most important trick of the trade, not just within the company but also within the lab.

It's great to have skilled people in the lab, people who are good workers, but they still need to work as a group, he explains. "There's a lot of synergy when people work together rather than working independently."

Another key to good management is establishing a one-on-one dialogue with each employee.

"The laboratory today is very multicultural, so you've got to take a personal interest in each individual," Montana says.

"If they're comfortable in dealing with you and working with you, they'll feel more comfortable in the lab [and] work more effectively."

Budget

Montana manages both the operating and the capital budgets for his division. The operating budget is primarily a daily expense budget that includes the cost of running the lab, purchasing consumables and lab supplies, and payroll.

The capital budget is for longer-term needs such as laboratory equipment and expansion. How Montana and his colleagues adjust their budget needs is connected to the overall economy.

"Certainly in this current environment, we need to keep our cost down and to ensure that if we're making a capital purchase, we justify that need," Montana explains.

"We need to make sure that we buy the right instrument at the right price and use it very efficiently and effectively."

Fortunately for Garden State Nutritionals, customers take nutritional products on a regular basis, so Montana hasn't yet noticed a sudden downturn in sales.

But as with other goods, people who buy these products are going to seriously reconsider their needs, he says. "So in the longer run, an economy like this affects us as well."

Hiring

Montana's lab experiences a 10 percent turnover in employees each year. Whether it's a replacement position or a new position, the management staff must justify the need for additional people.

Often, replacement positions are filled quickly, but it's more difficult to rationalize adding another person to the group. Once a new position is approved, management searches for the right person through word of mouth, a recruiter or an ad in the local newspaper.

"The most important thing is that we try to find the best person we can for the position," Montana says.

"Once we get a good person on board, we get them the resources—any training or support—they need to do the job and then leave them on their own and not over-manage or micro-manage that person."

Government Regulations

The Food and Drug Administration has recently issued Good Manufacturing Practices (GMP) for nutritional supplement products, tightening the regulations for this industry.

This industry is now being looked at more like an over-the-counter drug product industry than strictly a food supplement industry, Montana explains.

"So we make these products like we're making an actual drug product to sell to the customer."

The additional testing of the raw materials and the finished product, along with requirements for documentation, have slowed down Montana's lab. But the extra effort ensures better results slightly.

"It does lengthen the time to make a product, but the assurance is that now you're making more of a quality product by following these regulatory requirements," he says.

Technical Diversity

Montana admits that while the work is demanding, his days are filled with diversity and technical excitement.

"Every day is different, [because] we make different products every day," he explains.

"Sometimes it puts more pressure on you, but it makes the day a lot more fun from a technical perspective."

The other aspect of work that Montana enjoys is watching the growth of his employees.

"You see their daily contribution and accomplishments and as they move up the ladder. It's very gratifying that as a manager you had a part in their success."

***Sara Goudarzi** is a freelance writer based in New York City. Her website is www.saragoudarzi.com.*

HOW IT WORKS

Spectrophotometer Standards

Problem: The need to verify that an instrument is performing properly and is in calibration is becoming increasingly common for regulatory committees and internal QC procedures. This is particularly true when using UV/Vis spectrophotometers. These instruments can slowly drift out of spec as the lamp ages. In order to know that the data you are collecting is accurate, it is vital to verify the instrument's performance.

Solution: By using a NIST-traceable standard, you can verify that an instrument is in fact performing as it should. This provides validity to the data that is collected using the instrument.

Many of the solutions that are available are either costly, toxic or not flexible and can't meet your exact specifications. GFS Chemicals has the ability, with its In-Spec® Standards, to find a solution that will better fit your requirements

.

GFS Chemical's In-Spec product line has a broad range of solutions. For photometric accuracy, there are the In-Spec standards, which can be used from 200-900 nm. These standards are very easy to use since they are non-toxic, come completely premade with no dilutions or mixing

required, and do not require special disposal procedures when you are finished using them. GFS Chemicals offers a broad range of absorbance values to match your tests, or custom values are available.

To use the In-Spec standards you would first baseline the instrument with the supplied Background Solution, then run the standard. You would compare the values obtained on your instrument to the values listed on the Certificate of Analysis. If the values are within the greater of 5%, or +/- 0.004 added to your instrument's stated accuracy, then your instrument is performing well.

GFS Chemicals also offers other standards that can be utilized to validate other aspects of an instrument's performance. Wavelength, stray light and resolution filters are available. Together with the In-Spec photometric standards, these can be used to check the overall health of your spectrophotometer.

The In-Spec product line also has a solution designed specifically for the increasingly popular short pathlength (1 mm) instruments. The In-Spec Nano-Kit consists of two standards to check the absorbance values at 260, 280 and 320 nm. These wavelengths are the most common for DNA/RNA quantification tests. The kit comes with data for those wavelengths at a 1 mm pathlength.

When properly used and documented, a secondary, NIST-traceable standard can provide you with security and peace of mind in knowing that the data you collect with your instrument is in fact accurate.
For more information, go to www.in-spec.com.

one Spec-tacular offer

Eight 1 µl samples. Twenty-second measurement. One great offer.

Designed for full-spectrum UV/Vis analysis of up to eight 1µl samples at one time, the Thermo Scientific NanoDrop™ 8000 Spectrophotometer is ideal for workflows dealing with higher throughput or multiple users. The full-featured software allows for pre-configured as well as user-configurable methods all within an easy-to-use system—perfect for busy labs requiring flexibility and speed.

The patented sample retention system captures and measures up to eight samples in 20 seconds without the need for cuvettes or dilutions. The system can measure nucleic acids, proteins, dyes, microbial cell cultures and much more. The ability to change path length in real time (1.0 mm and 0.2 mm) provides an extensive dynamic range (2 to 3700 ng/µl for dsDNA). Also, the unique Sample Position Illuminator helps keep track of samples to be measured by lighting up the appropriate wells.

Get a FREE system laptop or FREE one-year extended warranty.*

www.nanodrop.com/8000offer | 302.479.7707

* Offer valid until 11/30/08 on new purchases only. Available only in U.S. and Canada.

Moving science forward

Thermo SCIENTIFIC

Part of Thermo Fisher Scientific

HOW IT WORKS

The Microvolume Quantitation Solution

Problem: Quantifying common biomolecules such as nucleic acids and proteins efficiently without significant loss of sample is a frequent problem encountered in laboratories that regularly perform molecular biology techniques. Conventional methods such as traditional cuvette-based spectrophotometers and fluorescence-based plate reading require either too much material or too much time to quantify samples. Due to these limitations, investigators often forgo quality control steps to conserve sample, save time, or both. The overall demand from the scientific community is for reduction of the time and material needed for measurement without sacrificing data quality. As molecular techniques that use less material continue to be developed, take accurate measurements with minimal consumption of sample is of paramount importance.

Solution: By using fiber-optic technology and taking advantage of the inherent surface tension properties of liquid samples, NanoDrop microvolume instruments (Thermo Fisher Scientific) can accurately quantify a wide range of biomolecules using volumes as small as 1 microliter. The patented sample retention system enables absorbance measurements to be performed without traditional containment devices such as cuvettes or capillaries. The Thermo Scientific NanoDrop™ 8000 Spectrophotometer captures and holds up to eight 1 µl samples during the measurement cycle. Using a multi-channel pipettor, 1 µl samples are pipetted directly onto the lower array of optical pedestals. An upper-array optical pedestal automatically engages the sample, using surface tension to form a liquid column that determines the mechanically controlled path length.

NanoDrop Microsample Quantitation System

Once the measurement is complete, the user prepares for the next set of samples by simply cleaning the optical surfaces with a standard laboratory wipe.

By removing the need for traditional containment devices, the NanoDrop 8000 can automatically change its path length from 1 mm to 0.2 mm during the same measurement cycle. This allows for a broad dynamic range of sample concentrations to be measured (2 ng/µl to 3700 ng/µl for dsDNA), essentially eliminating the need to perform dilutions. The multi-sample capability of the NanoDrop 8000 addresses the needs of higher-throughput environments such as biorepositories, sequencing laboratories and genotyping facilities. To improve the ergonomics of the system and reduce human error, the Sample Position Illuminator keeps track of which samples are to be drawn by lighting up the appropriate wells on a 96-well plate.

Overall, scientists who work with limited sample quantities or restricted time frames need simple, elegant solutions that give sound, quality-controlled data with minimum consumption of sample. NanoDrop instrumentation offers a fast, simple alternative to conventional quantitation methods.

For more information, go to www.nanodrop.com.

THROUGH A GLASS, BRIGHTLY

NIKON'S SMALL WORLD RECOGNIZES EXCELLENCE IN PHOTOGRAPHY THROUGH THE LIGHT MICROSCOPE *by Sara Goudarzi*

Pleurosigma (marine diatoms) (200X)

It's a small world and most people don't have the tools to see it. But once a year for the past 34 years, Nikon's Small World Photomicrography competition has given the public a peek into the minute by recognizing outstanding images of hidden details as seen through a light microscope.

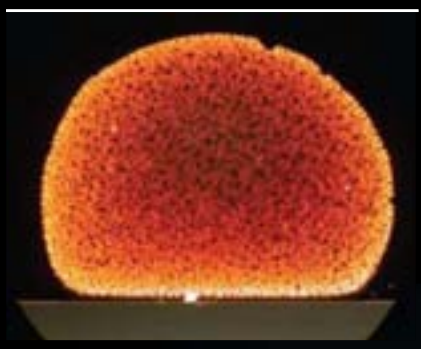
8th Place. John Hart, Department of Atmospheric and Oceanic Sciences, University of Colorado. Crystallized mixture of resorcinol, methylene blue and sulphur (13X)

After sifting through 2000 images, the judges—top industry experts—chose a photo of marine diatoms, a common type of phytoplankton, as this year's winner. Michael Stringer of Westcliff-on-Sea, Essex, United Kingdom, captured leaping beams of colorful light by magnifying diatoms 200 times, using super contrast and carefully applying color.

Stringer, a retired nurse practitioner, collected diatoms from tributaries with the intention of displaying the single-celled algae with a contemporary flair.

"My objective was to display diatoms in today's modern style, through the careful application of colors," Stringer said in a press statement. "I couldn't be more pleased that the Small World judges recognized the artistic vision in this image."

The judges chose Paul Marshall's glowing image of carbon nanotubes as the second place winner. Marshall, of the National Research Council in Canada, who used this image as the cover of his Christmas card, intended to convey the hidden microscopic beauty of science and technology. Carbon nanotubes are strong nanostructures with unique electrical properties that could have useful applications in the fields of optics, electronics and material science.



Carbon nanotubes, post growth (30X)

Nikon honored Stringer, Marshall and the rest of the winners last month in New York City, where the winning photomicrographs were displayed. The unusual colors and images of ordinary objects inspected so closely give spectators an unusual viewpoint.

"To see the world's tiniest objects captured in such a majestic way puts our very existence into perspective," said Lee Shuett, executive vice president of Nikon Instruments.

The collection of photographs is now touring science and art museums across the country.

***Sara Goudarzi** is a freelance writer based in New York City. Her website is www.saragoudarzi.com.*

web box **For touring information and to see all the winning images,** go to *www.nikonsmallworld.com*

11th Place. Wim Van Egmond, Micropolitan Museum, Rotterdam, The Netherlands. Diatoms on red alga (100X)

DATA SHARING FOR PROTEOMICS CORE FACILITIES

VIEWING SOFTWARE ALLOWS RESEARCHERS TO VISUALIZE CONCEPTS RAPIDLY AND WORK THEIR WAY THROUGH LARGE AMOUNTS OF DATA EFFICIENTLY ***by Mark Turner***

Proteomics core laboratories have come a long way from the days when spreadsheets were the only way to struggle through evaluations of massive search engine files. A new generation of analysis software can now graphically analyze protein identification probabilities and look at a wide range of other data-mining results.

The ability to present protein identification and statistical analysis visually opens up new perspectives for core lab scientists. Graphic displays allow users to visualize concepts rapidly, grasp large amounts of data efficiently, identify trends and indicators that would otherwise be obscured by too much data, drill down to find experimental data supporting results, and provide quick access to online protein identification resources and databases.

"Researchers who look to core labs for mass spectrometry results are often less familiar with statistical analysis software and less likely to have on-site IT help."

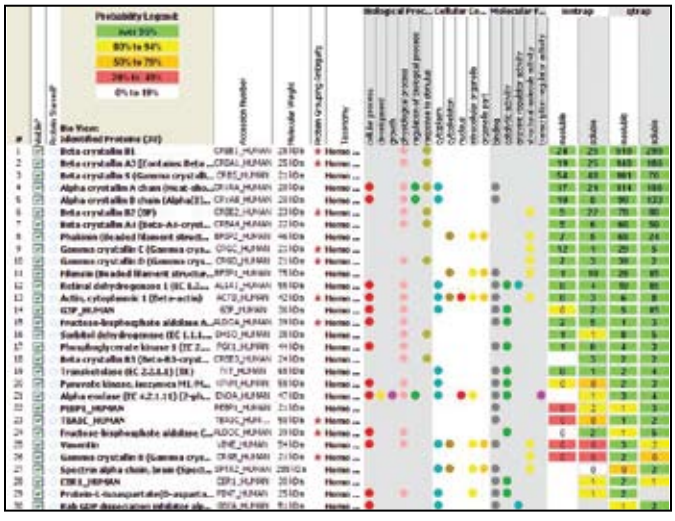
Researchers who look to core labs for mass spectrometry results are often less familiar with statistical analysis software and less likely to have on-site IT help. Their requirements for analysis can vary from simple yes-or-no protein identification to in-depth study of spectra. A visual front end with interlinked data views and graphs gives them all those options in navigable form.

When proteomics core laboratories send MS/MS results to research colleagues, their challenge is to simplify the exchange of information and reduce the need for customer support. Using a graphic viewer means data is available in a useful and biologically relevant format that clearly presents protein identification probabilities.

This level of control over the data display allows researchers to conduct analyses at their own pace and answer their own questions independently. By visually organizing the biologically relevant information, Proteome Software's Scaffold Viewer allows researchers to work independently and reduces support time.

When preparing a data package for shipment to client researchers, core facilities staff can maintain some control over the level of detail and the number of display options. Access can be adapted by controlling available views and tools. By limiting access to levels of detail that may not interest some researchers, they can make it simpler for researchers to focus on data of interest.

Mark Turner, *President, Proteome Software*
www.proteomesoftware.com, 800-944-6027



Proteins are graphically sorted by biological process and by the total number of spectra used to identify each protein within a sample. Rows show proteins, columns show samples and, at the intersections, color codes indicate identification confidence: green for highly confident, yellow for questionable and red for dubious identifications. The visual display allows researchers to observe the entire experiment at a high level or to drill down to peptide and spectral evidence that will improve the likelihood of correct protein identification.

Short Courses: January 24–25, 2009 **Conference:** January 25–28, 2009 **Exhibition:** January 25–27, 2009

Premier Sponsor:

VELOCITY11
An Agilent Technologies Company

Palm Springs Convention Center
Palm Springs, CA
January 24–28, 2009
labautomation.org/LA09

LabAutomation 2009

Where Science, Technology and Industry Come Together

Make the Right Move

Making the right strategic move can make all the difference — in discovery, market share, and your career. Given the current unprecedented challenges impacting all industry sectors, sustaining high performance and results is paramount. So make the smart strategic choice. Attend LabAutomation2009. Align knowledge, strategy and technology. Maximize opportunities. Minimize risk. And create achievement in your laboratory that transcends incremental success to pioneering success.

Register Today! Visit labautomation.org/LA09 or call +1.630.208.6830

LabAutomation2009 Plenary Series Speakers

Klavs F. Jensen, Ph.D.
Warren K. Lewis Professor of Chemical Engineering; Professor of Materials Science and Engineering; Massachusetts Institute of Technology

John Abele
Co-Founder, Boston Scientific

Jeffrey Wigand, Ph.D.
Real-life scientist behind Russell Crowe's character in the Academy Award nominated movie, "The Insider."

A Diversity of Industries Including:

- Drug Discovery and Development
- Clinical Diagnostics
- Agriculture and Food
- Forensics and Security
- Energy Generation and Petrochemicals

LabAutomation2009 Key Education Tracks:

- Detection and Separation
- Micro- and Nanotechnologies
- High-Throughput Technologies
- Informatics
- New Frontiers for LabAutomation: Agriculture and Food

TAKE with ALA OFF
It Saves You $200

Learn how to save $200 on your LabAutomation2009 airfare; Visit labautomation.org

Become Eligible to Win an Apple MacBook Air!

Visit labautomation.org for details.

ALA
Association for Laboratory Automation

ALA is a non-profit association committed to driving progress in laboratory technologies through high-quality education that benefits the global scientific community, including its membership of scientists, engineers, academicians, and thought leaders.

ADVERTISER INDEX

Marketplace

PARTING POINTS

Takeaways from this month's issue:

Hiring Right, p. 16

A major problem in hiring top job candidates is the unsophisticated process most lab managers use to decide whether to make a candidate a job offer. To improve that process:

- Clearly define the work that needs to be done
- Look for problem solvers with key skills needed for job success
- Turn your team members into recruiters
- Prepare for the employment interview
- Use behavioral-based questions to assess candidates
- Contact references

Green Up!, p. 28

The design and operations of your facility should take into account sustainable initiatives to be successful. The following represent ideas beginning to take hold at some research institutions:

- Sort and recycle
- Label and store
- Standardize
- Practice green chemistry
- Implement a green purchasing protocol

One Laboratory's Journey Toward Green, p. 34

Deciding where to start "going green" is a task that requires careful planning, but could be as easy as identifying one or more goals that are feasible for your unique organization. Those might include:

- Reduce consumption of unsafe products, energy, and natural resources
- Reuse building materials and purchase reusable office and laboratory furniture
- Implement a robust recycling program through support and education
- Have a vision of what is possible
- Obtain laboratory leadership support
- Be realistic about what is possible
- Actively and continually educate staff
- Build an infrastructure

Knowledge is Power, p.38

Through the measurement of specific key performance metrics (KPMs) on your assets, manufacturers and service providers, it is possible to turn knowledge into purchasing power. KPMs enable an organization to:

- Purchase best-in-class assets
- Utilize the highest quality service providers
- Lower the total cost of ownership
- Realize cost savings through:
  - Volume purchases
  - Operational efficiencies
  - Reductions in administrative burden

Wasting Away in Laboritaville, p.52

Smart chemical waste management relies on a written program, accurate characterization of waste and understanding accumulation guidelines. To develop a model program:

- Designate a lab waste manager
- Assign responsibilities for the manager as well as laboratory workers
- List required training and the method used to document training
- Provide the SOPs you will use to run your waste management program

ALT American Laboratory Trading Inc.

www.americanlaboratorytrading.com

We have it all.

From **Agilent** to **Zymark (Caliper)** and every letter in between.

Need a GC, HPLC or Scintillation Counter? All in stock.

Need a Vortexer, stirrer or shaker? We have hundreds in stock.

Great People. Great Service. Great Equipment.

Fully Refurbished and Guaranteed

Used Lab Equipment

American Laboratory Trading has been one of the industry leaders in High Quality Refurbished Lab Equipment for over a decade. We pride ourselves on the fact that we have the benefit of years of experience in the used lab equipment market, coupled with a full staff of highly qualified industry service technicians. Along with a professional sales staff, this combination makes for a solid foundation of good customer service, great used lab equipment and guaranteed satisfaction.

www.americanlaboratorytrading.com

Phone: (860) 449-0730
Toll-free: (866) 449-0720
Fax: (860) 449-0734

Coming Soon!

ALT BioPharma AUCTIONS

Another way to SAVE you money!

Buying used just got better!

TrustedPartner

Count on Fisherbrand for the products you need, when you need them. Quality, reliability and value.

800-766-7000 • www.fishersci.com

Fisherbrand®

Part of Thermo Fisher Scientific

Quality. Reliability. Value.