

## Order in: New tool, new world

### Aberration-Corrected Electron Microscope will offer HTML users atom-scale images

Researchers at the High Temperature Materials Laboratory have put in an order for a new ultra-high-resolution electron microscope. It's going to be one of the world's first of a new generation of electron microscopes. The Aberration-Corrected Electron Microscope will provide images at a resolution of better than a single atomic diameter.

ACEM is so named because it features a set of electron lenses that can correct the distortions that inevitably occur in electromagnetic lenses. The advent of modern computer control techniques and new algorithms for image analysis make such aberration correction possible.

The microscope will take advantage of the remote operation technology pioneered by the HTML's Materials Analysis User Center. This "collaboratory" concept allows users to analyze samples from the desktop, even if that desktop computer is in another city or even in another country.

"Everything will be digitally controlled by computer," says the user center's Larry Allard. "There will be no knobs, dials, film or viewing chamber and no operator in the room. It will allow us to create ideal environmental conditions for operating the microscope at its ultimate resolution."

That kind of isolation and technology will enable the ACEM to achieve direct image resolution approaching 0.7 angstroms. This is a significant improvement over the current

operational resolution of 1.3 angstroms—also achieved by ORNL with the Solid State Division's Z-contrast scanning transmission electron microscope, or STEM, located a few blocks away from the HTML.

The Metals and Ceramics Division team will partner with the microscope's builder, Japan Electron Optic Laboratory, or JEOL, and the corrector's builder, CEOS Company in Germany, to incorporate the aberration correction technology into the new microscope. It's a complex system that uses a system of secondary lenses to correct the distortions in the image created by the microscope's objective lens.

"The aberration corrector is an almost perfect analogy to the lens that corrects the distorted mirror on the Hubble space telescope," says Edgar Voelkl, who works with Larry, Ted Nolan and postdoc Doug Blom in the Materials Analysis User Center, part of the M&C Division.

Edgar explains that Harald Rose of the University of Technology, Darmstadt, Germany, proposed the present

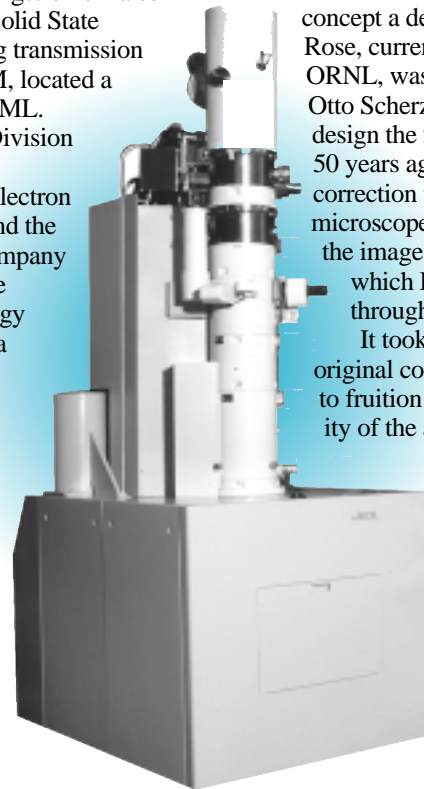
successful aberration correction concept a decade ago. Professor Rose, currently on sabbatical at ORNL, was a student in Germany of Otto Scherzer, who attempted to design the first aberration corrector 50 years ago. Applying the lens correction technology to the electron microscope imaging process refines the image from the primary lens, which Edgar likens to looking through the bottom of a bottle.

It took Professor Scherzer's original concepts 50 years to come to fruition because of the complexity of the aberration-correction

process. There are currently 24 "free parameters" in the process, which means, Edgar says, that if one of those parameters is altered, the other 23 must be re-compensated.

It's a process much too complicated to be done by hand. However, modern, high-speed desktop computers can handle the job quite nicely; an advantage Professor

(See ACEM, page 4)



The Aberration-Corrected Electron Microscope, shown in this composite illustration, will be capable of microscopy at unprecedented resolutions thanks to computer-aided technology. Delivery is slated for 2003.

## 'Rate reality' reflects real numbers, real costs, real savings

Nearly a quarter of the way into Fiscal Year 2001, ORNL finds its cost load lightened by some \$20 million. These savings are the initial part of a two-year campaign to reduce ORNL's indirect costs by \$30 million, and thus bring the Lab's cost of doing business down to a more competitive level among national laboratories.

Those \$20 million in savings come through a staff-reduction program that reduced the ORNL head count by 310 positions (212 employees took voluntary packages) and other reductions in overhead costs.

ORNL Director Bill Madia told a Friends of ORNL-sponsored gathering on November 29 that the measures will drop the Lab's composite multiplier rate, which was initially estimated at 1.95, to 1.80. "And that definitely

moves our cost of doing business in the right direction," the director said. Eventually, the cost-reduction campaign will drop the rate to a very competitive 1.70.

But the Lab director has acknowledged that some in the Lab may have to be convinced

*"Raising the space rates is key to our strategy of upgrading our facilities."*

that the savings aren't the product of smoke and mirrors. "We've encountered a degree of skepticism on whether or not we can actually reduce cost," Bill said earlier at the October 2 senior managers meeting.

Indeed, although the goal of the cost reduction campaign is to maximize the

research dollar, some researchers and managers say rate increases, particularly for office and lab space, are cutting into their own funding.

In another national lab's employee news, an ORNL staffer remarked on the cost reduction campaign: "Our space charges went up in August (retroactive to last October) from \$X per square foot to almost \$2X per square foot! Next year, they'll be at \$2.5X! How about that for a reduction!"

Most people are, in fact, focusing on space charges. Facilities and Operations Director Herb Debban responds that the changes in space charges reflect ORNL's determination to deal in real numbers: real costs and real savings.

"Actually, of all the labs we benchmarked,

(See RATES, page 2)

# Rates

Continued from page 1

ORNL was charging the lowest space rates,” Herb says. ““But our rates were not reflective of the true cost of maintaining the space.

“Raising the space rates is key to our strategy of upgrading our facilities, which is a critical need for ORNL. These new rates reflect the true cost of managing the facilities. They provide an incentive to exit excess space, which will eventually lower overall space costs, and they give us the resources to manage a new research campus.

“Currently, we have to make an investment,” Herb says. “We’ll reap the savings in later years with a better managed, more efficient work place. But if we want new, modern facilities that we’re proud of, that reflect the quality of work done here, the space charges need to go up.”

## Major overhead items reduced in FY 2001

Management fee: –\$1.7 million  
Y-12 site usage fee: –\$1.1 million  
Y-12 overhead transfers: –\$1.1 million  
Environment protection: –\$0.8 million  
Office of Safety and Health: –\$1.4 million  
SAP operations: –\$1.2 million

Compounding the cost drivers is the fact that the Lab is currently not growing. ORNL lost \$25 million in revenue this fiscal year, much of it in funding related to environmental cleanup. That necessitated reducing staff if the Lab was to meet its \$20 million overhead reduction goal.

However, Chief Finance Officer Greg Turner points out that three major overhead rates—general and administration, materials handling and organizational burden—are all down thanks to savings in areas such as the

management fee, Y-12 site use and SAP operations. And those rates make up the composite multiplier rate, which Lab management has pledged to reduce from its current lofty position to the lower third of national labs.

“We’ve realized very real savings in some major overhead costs—almost \$8 million,” Greg says (see the list). “The average organization burden rate has dropped nearly three dollars, from \$31.61 to \$28.73. Also, the composite overhead rate has been reduced from 43 to 41 percent, and that could have been more if we hadn’t lost \$25 million in revenue.

“These numbers reflect good, real savings,” he says. “It isn’t cost shifting. If you simply move costs around, they will always show up somewhere else.”

Those “good, real savings” are possible, Greg says, only by reducing the Lab’s actual costs of doing business. In the meantime, ORNL’s current plan is laying the foundation for growth.

“The Laboratory Agenda is focused on achieving a competitive cost structure and developing a strategic approach to ORNL resource deployment,” Greg says. “Space rates for the new buildings will be consistent with what you would pay for high-quality space in the commercial world. In the long run, and on the bottom line, although rates will be higher than what researchers see today, the actual net payout for space—all things considered—will likely be less.”

Rate stability is a Leadership Team promise to researchers, and so far the Lab is sticking to its guns. Call it “rate reality” as well.

“We are not going to set ourselves up with rates that are too low,” Greg says. “We really need to understand what it costs to do business. There is no purpose or incentive in

tricking ourselves, or our customers, with artificially low rates. Nobody gains by that. Our goal is to be a high-value provider and part of that is lowering our costs. And, you do that with hard-dollar reductions and accurate rates. The total indirect costs are down, the organization burden rate is down, and all other

*There is no purpose or incentive in tricking ourselves, or our customers, with artificially low rates. Nobody gains by that.*

overhead rates are down except the space rate.”

Greg says he will visit divisions and groups and explain the numbers in person. Call his office at 241-0648 and he’ll arrange to meet with your group.

“Don’t judge us now, but hold our feet to the fire,” Greg says. “If we make our goals—and we are accomplishing things—this Laboratory will be much better placed, strategically and financially, to realize its growth potential.”—B.C. [ornl](#)

## Funding limits rule out matching gifts, for now

**B**WXT Y-12, the new contractor for the Y-12 Plant, recently rolled out its matching gifts program for employee contributions to educational institutions, similar to the previous Lockheed Martin program. A *Reporter* reader asks, “BWXT Y-12 has continued Lockheed Martin’s matching gifts program for education. Why didn’t UT-Battelle?”

UT-Battelle did not continue the matching gifts program for its employees when it assumed the ORNL contract last April. The company does, however, contribute about \$300,000 a year in legacy investments for education in the region.

“UT-Battelle looked closely at Lockheed Martin Corporation’s program during last winter’s transition. Our task was to balance the program’s \$250,000 cost against our commitments and other education initiatives,” explains Communications and Community Outreach Director Billy Stair. “Funding the American Museum of Science and Energy, for example, is a new cost that will require about \$1.6 million. A large portion of this cost will have to be funded from UT-Battelle’s corporate fee.

“UT-Battelle’s fee is less than what its predecessor earned and significantly less than what BWXT Y-12 will likely earn for operating Y-12. The previous matching program at ORNL was funded by Lockheed Martin’s corporate office, not through LMER’s corporate fee.

“When we get the museum in stronger financial shape, we want to revisit the matching gifts program. One option may be to consider the education match as part of a ‘cafeteria’ benefits plan,” Billy says.—B.C. [ornl](#)



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Curtis Boles

Jimmy Hair, helpful husband of Business Management’s Kristee Hair, and Communications and Community Outreach’s Brenda Hackworth load up Values Committee Angel Tree toys. See more about holiday spirit on page 4.

DOE Inspector General Hotline: 1-800-541-1625



# Lab Notes

## ORR: Community resource

Is the Oak Ridge Reservation valued by the local environmental community? A new on-line newsletter put together by ORNL's Pat Parr, who manages the ORR program for DOE, seems to indicate that it is. The first issue of *Research Park Notes* included the following items about outside interest in the reservation.

Meredith Clebsch, of Native Gardens in Greenback, collected native grass seed on the ORR in October. Interest has increased in using native grasses in restoration and landscaping efforts on the reservation, as well as in re-establishing native grass species in the Smokies.

University of Tennessee professor *emeritus* Hal DeSelm met with a group in October at the ORR's Raccoon Creek Barren, where they discussed the species they found and management options for the "excellent example" of a cedar barren.

UT student Sara Drake is finalizing a report that will rank exotic, invasive plant species on the ORR. Pest plants are a growing problem (no pun intended) that are attracting interest across the state.

Dev Joslin, an avid birdwatcher and member of the Tennessee Ornithological Society, discovered a new colony of brown-headed nuthatches on the ORR. The nuthatch is uncommon in these parts, and its range (south of Tennessee) is decreasing. "Bird species that are decreasing may become threatened or endangered in the future; we'd like to prevent that," says ORNL Wildlife Coordinator Warren Webb. "We see the ORR as an important asset in doing so, *if* it is maintained in a sound ecological and unfragmented condition."

Apparently, so would a lot of other folks. *Research Park Notes* is open to new subscribers. Drop Pat an e-mail at [parrpd@ornl.gov](mailto:parrpd@ornl.gov).

## Possible Pu-238 role for ORNL

Last month DOE decided not to restart the Fast Flux Test Facility at Hanford to produce plutonium-238 for NASA's deep-space missions. That means two ORNL facilities, the High Flux Isotope Reactor and the companion Radiochemical Development and Engineering Center, will likely be called on to help meet the

Oak Ridge National Laboratory

need for Pu-238, which is not a weapons material but is the fuel of choice for powering spacecraft.

Although HFIR will likely serve in a backup production role to Idaho National Engineering and Environmental Laboratory's Advanced Test Reactor, REDC figures highly in the Department's "preferred alternative." Its hot-cell facilities would be

used to process the irradiated target material.

As part of the Pu-238 project, REDC's Building 7930 is planned to receive about \$34 million of refurbishment including customized processing equipment for the hot cells and the construction of a new glove-box line, says Nuclear Technology Programs Manager Gordon Michaels. The processing facilities are planned for a 30-year operating mission.

DOE's decisions on Pu-238 production should be finalized soon. Meanwhile, HFIR continues its scheduled outage for replacement of its beryllium reflector and other upgrades. The outage may be extended: Operators discovered a small amount of tritium in soil surrounding an old drain line. The line will have to be replaced before operations resume.

When all is complete and the Spallation Neutron Source is up and running later this decade, Oak Ridge will be the top destination for the world's neutron scientists.

## Friendly encounter

Although Bill Madia has declined few invitations to talk since UT-Battelle came on the scene, the first actual formal public get-together was hosted on November 29 by Friends of ORNL, the local Lab advocacy group. The event at the American Museum of Science and Energy drew a lively mix of Lab veterans, employees, stakeholders and the simply curious.

Bill updated the group on progress with various facets of the Laboratory Agenda, the Spallation Neutron Source and reducing the Lab's cost of

doing business. He remarked on the latter, saying that staff reductions were "very difficult, very painful and very necessary."

The director painted a bright future, however. He told the group that with the SNS progressing (1.3 million cubic yards of terra firma have been moved) and ORNL positioning itself better competitively, the Lab has a solid outlook.

Friends of ORNL is open to new members; the only prerequisite is an interest in the Lab. Watch their Web site at [www.kornnet.org/~fornl/mtg-info.html](http://www.kornnet.org/~fornl/mtg-info.html) and attend a meeting.

*Reported by Bill Cabage*



## Christmas wish list, 1948

As he prepared for retirement earlier this year, Tom Row discovered an old clipping among his mountains of paper. It's a letter to Santa outlining some of the wants and needs of the Lab in 1948. Interestingly, some things Santa actually brought.

Dear Santa,

The divisions of Oak Ridge National Laboratory unite in asking you to bring fulfillment of the needs listed herewith:

Biology: A super-deluxe X-ray machine, a perfect experimental organism for radiation; landscaping of Building 9207 area

Chemistry: Five new analytical laboratories, permanent research buildings

Engineering and maintenance: The program

General offices: An unlimited budget, a formula for stick-proof tar; a settled Oak Ridge; world peace

Health: An electronic diagnosometer; a treatometer employing the best pinball and slot machine principles, noninjuring athletics for amateurs

Health Physics: A bigger and better research program; a bumper hay crop on the new landscaping; a canteen.

Metallurgy: More personnel, an X-ray diffraction unit; more laboratory equipment and office furniture

Operations: A new pile (reactor), a new isotope area, less rain and mud, more warm days; more isotope customers

Personnel and Services: More B, C, D and F houses, more supervisors to attend supervisory conferences, better road conditions from Oak Ridge to the Laboratory (particularly at the quarry), more basketball players, fewer exceptions to established policies (it's a joke, son!)

Physics: One high-flux reactor, 6 MEV milliamp Van de Graaff, one 200 kilogauss magnetic field to orient nuclear spins, one liquid He generator with cryostats, a generous budget

Security: Improved security, new cyclone fences

Technical: A budget forecasting machine, a reliable figure program predictor, *a home!*

# ACEM

Continued from page 1

Scherzer didn't have.

Researchers will use the ACEM to study crystalline interfaces at the atomic level. Larry Allard explains that defects that occur in crystalline materials have much to do with determining properties of materials. The HTML's abilities to study the atomic structure and micro-chemical attributes of materials are very important to the industrial user community, particularly in the electronics, nanostructured materials, thin-film and catalytic science arenas, Larry says.

The ACEM will also have an "energy filter" that can discern what elements are present in a sample by recording the distribution of electron energies in the beam after it passes through the sample. The elements in the sample produce characteristic "energy loss" features that enable them to be identified and even allow researchers to determine the particulars of their chemical binding.

"The filter will enable us to locate and identify elements present in the sample to the level of single atomic columns," says Larry.

*The ACEM will have many fans in the user community, who will be able to use the microscope while at another lab, city or even country.*

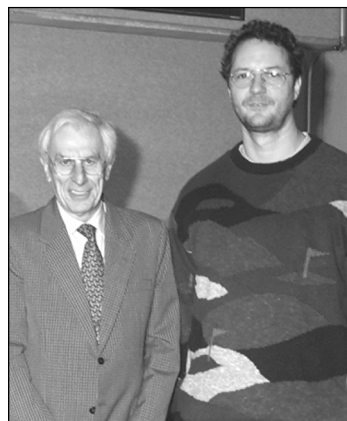
The instrument is being funded by DOE's Office of Heavy Vehicle Technologies, primarily to study catalytic materials of importance in reducing emissions and particulates from diesel and automotive engines.

ORNL has been a leader in microscopic imaging. Steve Pennycook's Z-contrast STEM is a friendly competitor, but he is very supportive of the ACEM project. Steve is currently working with an American company to develop an aberration corrector for his 300kV STEM, aiming for even higher ultimate resolution.

"We're upgrading our Z-contrast machines with aberration correction, predicting, optimistically, 0.5-angstrom resolution," says Steve. "The

ACEM will cement ORNL's lead in sub-angstrom probe microscopy."

The ACEM will also have many fans



Curtis Boles


**Edgar Voelkl (right), a member of the Materials Analysis User Center, with Prof. Harald Rose of Germany's University of Technology, Darmstadt, who proposed the aberration-correction method used in the ACEM's design.**

in the user community, who will be able to use the microscope while at another lab, city or even country. After one on-site visit to learn how the microscope works, users can send their samples to HTML and then do the analyses from their home bases.

The ACEM dream goes beyond the microscope itself. The M&C Division hopes to build an addition to the HTML that will be specially constructed to house the ACEM and other ultra-precision instruments, which require bedrock-solid foundations to thwart vibrations and a nearly total absence of magnetic fields that may interfere with the electron microscopes' ability

to produce a clear image.

Architecturally, the proposed annex will blend with the HTML's whimsical design. Functionally, it will be a Nirvana for microscopy.

With the order just in to the manufacturer, the ACEM will take a few years to build. Delivery is expected in 2003.—B.C. 

## Holiday spirit shines as Lab folk help less fortunate

ORNL people do things to help other folks throughout the year, but especially during the holidays. Here's a roundup of some of the charitable efforts that have taken place this season.

ORNL's Protective Force raised \$1500 for the Knox Area Rescue Ministries' Thanksgiving Food Drive, including a \$200 donation from Wackenhut's Community Partnership Fund, according to the force's Ray Hubbs.

ORNL's Values Committee also sponsored a Thanksgiving food drive in November. Twenty-five families in the Anderson, Campbell, Knox, Morgan and Roane county areas each received three cases of food, a turkey, 10 pounds of potatoes, three pounds of onions and five pounds of oranges. The local Anderson County Food Bank received 41 cases of food, and \$395 in cash was collected, part of which bought the 25 turkeys; the remaining \$160 was donated to a local safe house in Anderson County, which used it to purchase gifts for abused teenagers.

The Values Committee sponsored an angel


tree, in which employees could select and provide an item wished for by a disadvantaged child. Demand for "wishes" initially outran supply and more had to be added to the Web-based tree. Ultimately, more than 180 disadvantaged kids got toys and clothes for Christmas through the Values tree.

ORNL employees warmed up to the first Coats for the Cold drive, says Lab organizer April McMillan. Nearly 200 coats were donated. All got a free cleaning from Prestige Cleaners. Overall, more than 5,000 coats were collected in the WBIR-TV-sponsored drive.



**(From left) Sheri Coffey, Teresa Ferguson and Jenny McGill distribute items from the Values Committee's Angel Tree.**

Holiday spirit was also evident over at the Spallation Neutron Source office, where another angel tree was set up. That program was still going on at press time. Gifts from the SNS tree will be accompanied by food

baskets—word is that some SNS staff members were trying to outdo each other in decorating them.—Reported by Deborah Barnes 

## ORNL sends \$600,000 to area UW campaigns

ORNL is responsible for more than \$600,000 in donations to this year's United Way campaigns in 16 East Tennessee counties. Most of the total comes from contributions by ORNL employees to this year's United Way campaign at the Lab. UT-Battelle's contribution of \$55,000 is the largest in the history of ORNL's corporate contributions to United Way.

"UT-Battelle is proud to be able to make this significant contribution to the valuable programs of United Way in this area," said ORNL Director Bill Madia. "United Way makes so many lives better, and we take pride in making this contribution to this valuable effort."

Contributions went to area United Way campaigns in the following counties:

Anderson, \$213,859; Blount, \$10,269; Campbell, \$8,901; Cumberland, \$1,219; Hamblen, \$150; Hamilton, \$1,514; Jefferson, \$456; Knox, \$227,558; Loudon, \$21,595; McMinn, \$1,985; Mesa, Colo., \$4,230; Monroe, \$2,342; Morgan, \$23,237; Rhea, \$562; Roane, \$84,999; Sevier, \$2,422; and Union, \$3,030.

# Car talk

## M&C's Alex Gabbard channels his passion for cars to the page, with rewarding results

One of ORNL's best published authors writes not about science but about cars—hot rods and other fun vehicles, to be exact.

The Metals and Ceramics Division's Alex Gabbard recently nailed a top award from the International Automotive Media Conference, the foremost international automotive media organization, for a magazine article in which he road tested a sport utility vehicle in Europe. Nice work, if you can get it. And, as Alex insists, writing about cars is not totally divorced from writing about science and technology.

"Cars present a composite of the human experience," he attests. "The fuels, materials, technologies and manufacturing techniques found in a certain model offer a window into the design and fabrication capabilities of that time."

As a "hot-rod kid who never grew up," Alex has observed over time the technical progress that is reflected in the vintage and historic sports cars and racers that he has catalogued.

"Look at an old car. They are simple and squarish because machine tools couldn't do complex, compound curves. Styles often reflect manufacturing capabilities."

Alex has also noted that the avant-garde often becomes the norm when the innovations suit the market. For instance, a 1930s BMW racer's exotic aerodynamic lines, which look way ahead of their time, had become ordinary by the 1970s, when fuel economy demands led to more aerodynamic designs. And technological

advancements spurred by events such as war—light-weight, high-performance aircraft engines and fuel injection, for instance—have become common on today's floor models.

Alex's earlier writings centered on the performance packages—racers and the rides of whiskey runners. Bootlegging was the subject of his acclaimed book, *Return to Thunder*

*Road*, which focuses in some detail on the hot rods driven by bootleggers in the '40s, '50s and '60s—many of them the forebears of today's stock car racing culture. He's since updated and expanded the book, one of a dozen he has written.

The piece that Alex picked up a prize for most recently recounted a rather sedate 2,400-mile sojourn through Germany, Italy, Austria, Switzerland and the Czech Republic in a Ford Maverick—not the clunker you had for driving lessons back in the '70s, but a spiffy turbo-diesel-powered SUV marketed overseas.

Alex liked the German-built car and also praised the European backroad scenery, except for areas of the Czech Republic still recovering from dreary decades of communism. Europeans allow no off-roading, so the Maverick road test's rough riding was limited to a narrow, winding and precipitous passage across the Swiss Klausenpass.

The article that came out of the

trip, which ran in *Today's SUV* magazine, published by McMullen-Argus, won Alex a silver medallion at the IAMC's 10th annual awards in October. He's particularly proud of the second-place award because the competition included 470 entries, many by professional writers and photographers.

It was Alex's fourth international award for automotive journalism. His previous awards are two Moto awards for book-of-the-year in their field during the 1980s and a Moto honorable mention for a series of magazine features published in the early 1990s.

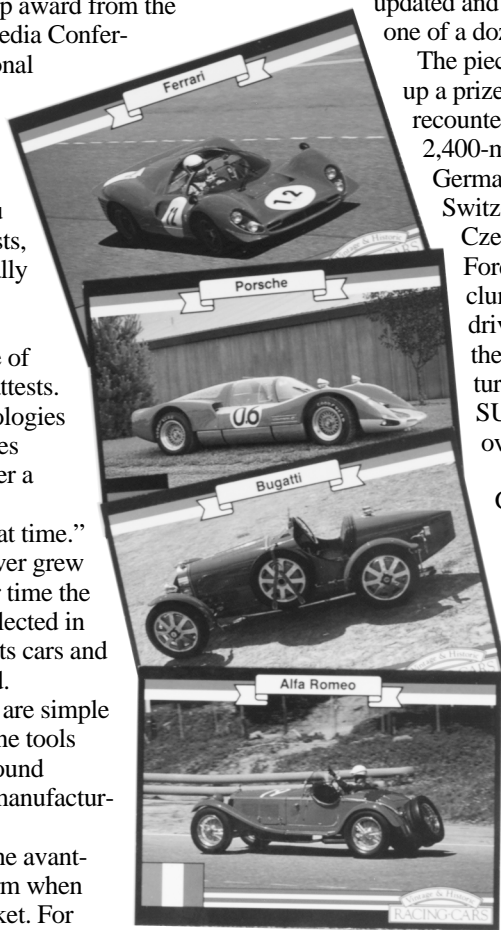
Alex's clout with the automotive press is such that he can think up a premise for an article, make some phone calls and have a brand new top-of-the-line vehicle practically handed to him. Sure, he paid his way to and through Europe, but he also managed to present a scientific paper in Prague while he was there.

This accomplished writer also has an industry-recognized archive of car photos

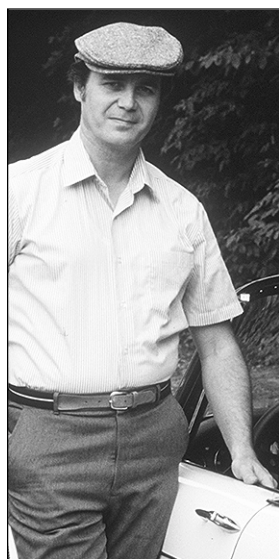
numbering around 20,000 shots—mainly of sport and racing vehicles.

In his other life—at ORNL—he is most currently investigating another automotive-related pursuit—storing natural gas in carbon for use as transportation fuel. How does he manage to carve out enough time to maintain his two successful careers?

"I don't play golf," he replies. "I come to work and work, then go home and work."—B.C. [ORNL](#)



Alex's work has been adapted to sports car trading cards. He took the photos.



Unreformed "hot-rod kid" Alex Gabbard

## Students summarize environmental report

Students from Karns High School have completed a summary of the latest *Oak Ridge Reservation Annual Site Environmental Report*. Twenty students participated in the project, which was initiated at Karns four years ago.

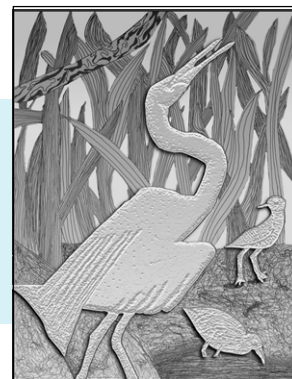
"The site environmental report (at more than 300 pages) is extensive, technical and complex," ASER Project Manager Tim Joseph says. The 24-page summary that the students produce is "easily read, understood and meaningful."

During the project students met with Oak Ridge Operations Manager Leah Dever, toured the reservation and learned about the operation of environmental monitoring equipment such as air monitors and about cleanup technology.

Contributors were Karns High art and creative-writing students, Karns High art teachers Andrea Haury and Ron Hickman and Karns High instructor and English Department chairperson Jennifer Webster.

In addition to environmental highlights of 1999, the summary contains an explanation of radiation, a dose map for the five miles surrounding the Oak Ridge plants, environmental monitoring, reservation highlights, an interview with Leah Dever, a guide to Web sites for more information and a student survey.

The report is available at the DOE Reading Room or on the Web at [www.ornl.gov/aser](http://www.ornl.gov/aser).—Marty Goolsby [ORNL](#)



Karns students also contributed the artwork that graces the cover of the 1999 environmental report summary.

# Benefit Plans' Summary Annual Report

## Plan Participants and Beneficiaries:

[The 1999 benefit plans report has been prepared in accordance with instructions from the U.S. Department of Labor and is required by the Employee Retirement Income Security Act of 1974.]

This special section summarizes annual reports of various Lockheed Martin Energy Systems Inc. benefit plans for 1999 and is written in language specified under regulations prepared by the U.S. Department of Labor. Complete annual reports for the

- insurance plans,
- savings plans, and
- retirement program plan

have been filed with the Internal Revenue Service, as required under the Employee Retirement Income Security Act (ERISA) of 1974. The employer identification number for the insurance plans, retirement program plan and savings program is 52-1318516.

## 1999 Insurance Plans

This is a summary of the annual reports for the insurance plans listed below. The plans have contracts with the insurance carriers shown to pay all claims incurred under the terms of the plans. The group life plan is a so-called "experience-rated" contract, so the premium costs are affected by, among other things, the number and size of claims.

Plan Name	Insurance carrier	Total premiums paid in 1999	Total benefits paid in 1999
Group life insurance	Metropolitan Life Ins. Co.	\$15,185,225	\$14,003,750
Business travel accident insurance	Life Insurance Co. of North America	\$ 21,000	0
Special accident insurance	Life Insurance Co. of North America	\$ 860,002	\$ 115,500

## Medical plan

The employee medical plan operates under a contract between Lockheed Martin Energy Systems Inc., and Connecticut General Life Insurance Company, which provides that Energy Systems will supply funds for the payment of all claims due under the terms of the plan, up to a specified maximum determined each plan year. For the plan year 1999, the maximum was \$62,304,403. In addition, the plan has an insurance contract with Connecticut General that guarantees the payment by Connecticut General of all claims incurred under the plan that may exceed the maximum and also provides for all claims administration.

The total insurance premiums paid for the group medical plan for the year ended December 31, 1999, were \$948,369. In addition, Energy Systems supplied funds of \$61,708,354, including costs for the self insured drug program, to Connecticut General for payment of claims resulting in total plan costs of \$62,656,723.

As an alternative to the Health Benefits Program, you may elect membership in a Health Maintenance Organization and during 1999, certain other insurance coverage was available to Lockheed Martin Utility Services employees. Energy Systems has entered into agreements with HMO's and other carriers to provide a variety of health care services to its members for a fixed, prepaid fee. For the plan year 1999, the total fees paid by Energy Systems were \$22,733,965.

The Major Medical Medicare Supplement Plan is designed to provide protection against hospital and medical expenses during a participant's retirement years. The total premiums paid for the MMSMP for the year ended December 31, 1999 were \$2,037,795. In addition, Energy Systems supplied funds of \$6,438,789 to United HealthCare for payment of claims resulting in total plan costs of \$8,476,584.

## Pre-tax medical/dental premium contribution and flexible spending account plan

The pre-tax medical/dental premium contribution and flexible spending account plan provides for employee contributions toward the cost of medical, dental, health and dependent care coverage with before-tax dollars. Before-tax contributions are deducted from pay before federal income taxes and Social Security taxes are withheld, resulting in a lower actual cost to the employee. For the plan year 1999, there were 8,245 participants who contributed \$7,121,944 to the various plans with before-tax dollars.

## Dental expense assistance plan

The dental expense assistance plan operates under a contract between Lockheed Martin Energy Systems Inc. and the Metropolitan Life Insurance Company, which provides that

Energy Systems will supply funds for the payment of all claims due under the terms of the plan, up to a specified maximum determined each plan year.

For the plan year ended December 31, 1999, the maximum was \$6,713,645. In addition, the plan has an insurance contract with Metropolitan that guarantees the payment by Metropolitan of all claims incurred under the plan that may exceed the maximum and also provides for all claims administration.

The total insurance premiums paid for the plan year ended December 31, 1999, were \$775,257. In addition, Energy Systems supplied funds of \$6,984,798 to Metropolitan for payment of claims resulting in total plan costs of \$7,760,055.

## Employee assistance program

The Employee Assistance Program (EAP) operates under a contract between Energy Systems and Personal Performance Consultants Inc., which provides that Energy Systems will supply all funds for the services available to employees. The EAP provides confidential assessment, referral and, if appropriate, counseling services for problems that affect personal life, job or health. For the plan year ended December 31, 1999, the fees paid totaled \$202,926.

## Your right to additional information:

Participants in an insurance plan have the right to receive a copy of the full annual report, or any part of it, on request. Included in that report is insurance information.

## Savings program

This is a summary of the annual reports of the savings plans for 1999, including basic financial statements.

### Savings plan for salaried and hourly employees

Benefits under the savings plan for salaried and hourly employees are provided by a trust fund. Plan expenses were \$141,670 in benefits paid to participants and beneficiaries. The plan was completely merged in the new Savings Program during the year.

The value of plan assets, after subtracting plan liabilities, was \$0 as of December 31, 1999, compared to \$5,014,894 as of January 1, 1999. During the plan year, the plan experienced a decrease in net assets of \$5,014,894. This increase includes unrealized appreciation or depreciation in the value of the plan assets; that is, the difference between the value of the plan assets at the end of the year and the value of the assets at the beginning of the year or the cost of assets acquired during the year. Assets transferred to the new Savings Program were \$5,025,343.

The plan had total income of \$133,240, including employer contributions of \$29,003; employee contributions of \$149,759; realized and unrealized gains (losses) of (\$45,522).

### 401(k) savings plan for hourly employees

Benefits under the 401(k) savings plan for hourly employees are provided by a trust fund. Plan expenses were \$70,185 in benefits paid to participants and beneficiaries. The plan was completely merged in the new Savings Program during the year.

The value of plan assets, after subtracting liabilities of the plan, was \$0 as of December 31, 1999, compared to \$13,528,443 as of January 1, 1999. During the plan year, the plan experienced a decrease in net assets of \$13,528,443. This increase includes unrealized appreciation or depreciation in the value of the plan assets; that is, the difference between the value of the plan assets at the end of the year and the value of the assets at the beginning of the year or the cost of assets acquired during the year. Assets transferred to the new Savings Program were \$5,025,343. The plan had total income of \$177,618, including employer contributions of \$64,646; employee contributions of \$302,270; realized and unrealized gains (losses) of (\$189,298). Assets transferred to the new Savings Program were \$13,635,876.

### Savings program

Benefits under the savings program are provided by a trust fund. Plan expenses were \$86,788,820; including benefits paid to participants and beneficiaries of \$83,467,784 and administrative expenses of \$3,321,036. A total of 11,79 persons were participants in or beneficiaries of the plan at the end of the plan year, although not all of these persons had yet earned the right to receive benefits.

The value of plan assets as of December 31, 1999, after subtracting liabilities of the plan, was \$1,024,206,373 compared to \$1,124,951,970 as of January 1, 1999. During the plan year, the plan experienced a decrease in net assets of (\$81,512,351). This decrease includes unrealized appreciation or depreciation in the value of the plan assets; that is, the difference between the value of the plan assets at the end of the year and the value of the assets at the beginning of the year or the cost of assets acquired during the year. The plan had total income of \$166,142,642, including employer contributions of \$17,758,518; employee contributions of \$45,294,997; realized and unrealized gains of \$67,548,185; and earnings from investments of \$35,288,275. Transfers to other programs totaled (\$160,666,623) during the year.

## Your right to additional information

Each participant has the right to receive a copy of the full annual report, or any part of it, on request. The items listed below are included in that report:

- an accountant's report,
- assets held for investment, and
- transactions in excess of five percent of plan assets.

Note: Transactions for financial reporting purposes for the Form 5500 and the summary annual report differ slightly from the requirements for audited financial statements as they relate to distributions payable and expense reporting at year end. This may result in timing differences between amounts reported on the Form 5500 and those published in the audited financial statements.

## Retirement program

This is a summary of the annual report for the retirement program plan for 1999.

### Basic financial statement

Benefits under the plan are provided by group annuity contracts and separate account trust investments. Plan expenses were \$ 156,610,606. These expenses include \$140,198,251 in benefits paid to participants and beneficiaries and to purchase benefits, and \$16,412,355 in administrative expenses. A total of 24,030 persons were participants in or beneficiaries of the plan at the end of the plan year, although not all of these persons had yet earned the right to receive benefits.

The value of plan assets, after subtracting liabilities of the plan, was \$2,845,771,334 as of December 31, 1999, compared to \$3,057,344,519 as of January 1, 1999. During the plan year, the plan experienced a decrease in its net assets of \$211,573,185. The plan had total income of \$517,649,938, including earnings from investments. During the plan year, the plan transferred some \$572,612,796 to other pension plans.

The plan has contracts with the Metropolitan Life Insurance Company and the Prudential Insurance Company of America that guarantee the liabilities of all participants retiring before July, 1999. The assets of the plan are invested in either the General Account or Separate Accounts of the insurer or in separate trust accounts in accordance with the contract terms.

### Minimum funding standards

An actuary's statement shows that enough money was contributed to the plan to keep it funded in accordance with the minimum funding standards of ERISA.

### Your right to additional information

Participants have the right to receive a copy of the full annual report, or any part of it, on request. The items listed below are included in that report:

- an accountant's report,
- assets held for investment,
- insurance information,
- actuarial information regarding the funding of the plan, and
- transactions in excess of five percent of plan assets.

Note: Transactions for financial reporting purposes for the Form 5500 and the summary annual report differ slightly from the requirements for audited financial statements as they relate to distributions payable and expense reporting at year end. This may result in timing differences between amounts reported on the Form 5500 and those published in the audited financial statements.

### For more detailed information

To obtain a copy of the full or partial annual reports for the insurance plans, retirement program plan or savings program, write to Plans Administrator: Lockheed Martin Energy Systems Inc., P.O. Box 2003, Oak Ridge, TN 37831-6497. Copying costs are 25 cents per individual page; \$4 for the complete insurance plans; \$5 for each savings plan annual report; and \$10 for the entire retirement program plan annual report.

With regard specifically to the retirement program plan and savings plans, participants have the right to receive from the plan administrator, on request and at no charge, a statement of the assets and liabilities of the plan and accompanying notes, a statement of income and expenses of the plan and accompanying notes, or both.

For each participant requesting a copy of the full annual report, these two statements and accompanying notes will be included as part of that report. The copying cost previously mentioned does not include a charge for duplicating these portions of the report because they are furnished without charge.

Participants also have the legally protected right to examine the insurance, savings or retirement program plan annual reports at the main office, located at 104 Union Valley Drive, Rm. 126, Oak Ridge, Tenn., and at the U.S. Department of Labor in Washington, D.C.

Participants also may obtain copies from the U.S. Department of Labor upon payment of copying costs. Requests to the Department of Labor should be addressed to: Public Disclosure Room, N4677, Pension and Welfare Benefit Programs, Frances Perkins Department of Labor Building, 200 Constitution Avenue, N.W., Washington, DC 20216.

# Retirements

To arrange for a portrait, call Deborah Barnes, 576-0470

**Robert L. Atchley**, Protective Services, has retired with 38 years of service. He lives in Knoxville.

**Dave Braski**, who worked in the Metals and Ceramics Divisions Metallography and Materials Analysis groups, has retired with 33 years of service. He lives in Kingston

**Thelma Garrett** of Contracts and Procurement has retired with 25 years of service. She lives in Knoxville.

**Polly Henry**, a secretary for the Environmental Sciences Division's Bioenergy Feedstock Development Program, has retired with 27 years of service. She lives in Knoxville.

**R.J. Luxmoore** of the Environmental Sciences Division has retired with 27 years of service. He lives in Harriman.

**Della Marshall** of the Environmental Sciences Division has retired with 27 years of service. She lives in Kingston.

**Gilbert V. McKinney** of the Plant and Equipment Division's glass shop has retired with 42 years of service. He lives in Oak Ridge.

**Wilma McNabb** of the Environmental Sciences Division's Bioenergy Feedstock Development Program has retired with 21 years of service. She lives in Lenoir City.

**Carole Michaels** has retired from the Environmental Sciences Division with 25 years of service. She lives in Kingston.

**Jay Nave**, who did photography and metallography for the Metals and Ceramics Division (and took photos for the Lab) has retired with 31 years of service. He lives in Knoxville.

ORNL Fire Chief **Harold D. Rose** has retired with 33 years of service. He lives in Clinton.

**Bill Sides**, who did program development for Mars mission and HEU blendown programs in the Instrumentation and Controls Division, has retired with 33 years of service. He lives in Ten Mile.

**Mary Uziel** has retired from the Life Sciences Division with 27 years of service. She lives in Oak Ridge.

The ORNL Fire Department's **W.L. Whaley** has retired with 38 years of service.

He lives in Kingston.

**Jack P. Young**, who did research in the Chemical and Analytical Sciences Division (one of his pet projects was searching for DNA material in dinosaur bones) has retired with 45 years of service. He lives in Oak Ridge.

We also received calls from **Jim Hannah**, deputy director of the National Security Programs Office, who is retiring with 32 years. He lives in Greenback and also worked in Robotics. **Paul Selby** is retiring from Life Sciences, where he worked in the Mouse House and in toxicology. He has 29 years of service and lives in Oak Ridge.

## Service Anniversaries

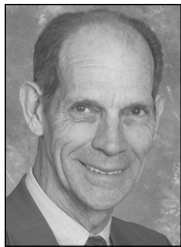
December 2000

**41 years:** Dot W. Gaddis, Business & Information Services

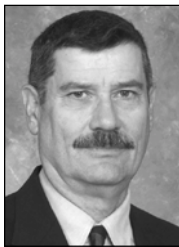
**30 years:** Claudette G. McKamey, Metals & Ceramics

**25 years:** James A. Ayers, Larry J. Bivens, Lynn R. Lawhorn, Glenn T. Miller and Thomas G. Chadwick, Plant and Equipment; Johnnie B. Cannon, Office of Strategic Planning; Clifton R. Hyman III, Research Reactors; Roger A. Jenkins, Chemical & Analytical Sciences; Rodney A. McKee, Metals & Ceramics; C. B. Oland, Engineering Technology; Robert (Bob) W. Shaw, Chemical & Analytical Sciences; David W. Swain, Fusion Energy

**20 years:** Teresa F. Ault, Staffing Mgmt. & Diversity Programs; James L. Baxter, Plant and Equipment; Gary J. Capps and Pedro J. Otaduy, Engineering Technology; George E. Courville, Energy; W. R. Gorman and Donald C. Gregory, Operational Safety Services; Robert A. Hawsey, Superconductivity Program; Marilyn K. Kerley, Life Sciences; Jeanette McBride, Physics; John F. McCarthy, Environmental Sciences; James A. Moore, Instrumentation & Controls; Roswitha (Rose) S. Ramsey, Chemical & Analytical Sciences; Terrence P. Sjoreen, Office of the Laboratory Director; Andrea L. Sjoreen, Computational Physics and Engineering



Atchley



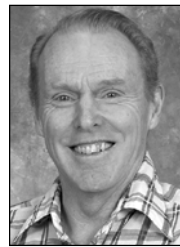
Braski



Garrett



Henry



Luxmoore



Marshall



McKinney



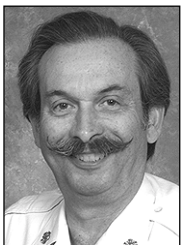
McNabb



Michaels



Nave



Rose



Sides



Uziel



Whaley



Young

## Deaths



Smith

Charles A. Smith died on November 7. He worked in the Instrumentation and Controls Division, where he led the broadband and cable TV services group. Charlie was a key figure in televising and broadcasting significant Lab events and talks over the years. He resided in Knoxville.

# Sheldon Datz' Fermi Award caps a career of discovery

Sheldon Datz, ORNL physicist and pioneer of molecular physics, has capped his career with one of the highest honors in science—the Enrico Fermi Award. The Energy Secretary notified him with a phone call to his office.

He shares the award with Sidney Drell of the Stanford Linear Accelerator Center and Herbert York of the University of California.

Sheldon began his career in 1951 at ORNL. He and Ellison Taylor

were the first to explore molecular-beam techniques for studying chemical reactions. That research laid important groundwork in the field of chemical dynamics. In fact, two researchers who followed after the ORNL work won Nobel prizes.

He received the Davison-Germer Prize from the American Physical Society in 1998 for research into atomic interactions with ions, electrons and photons and an honorary doctorate from Stockholm University.

"I'm kind of peculiar in that I have moved from one area to another," he told *ORNL Reporter* last year. "I started out in chemistry, but as I've seen holes in science, I've tried to fill them, and maybe in not the same way as I filled the last one."

It was such a gap in the knowledge of how radiation damaged nuclear reactor materials that led to the discovery of ion channeling.

Sheldon has also explored—and filled—knowledge gaps in fusion reactor design and accelerator science. Early ORNL work in particle-solid interactions have led to analytic methods and surface modifications techniques that underpin a multi-billion-dollar ion implantation industry.

He and his colleagues in the Physics Division's Atomic and Molecular Physics section have been frequent users of the CERN Super Proton Synchrotron in Switzerland. More recently, his interests have turned to the effects on DNA of high-energy heavy-ion bombardment using ORNL's Holifield Radioactive Ion Beam Facility and a Japanese synchrotron.

His peers hailed the award as being well deserved.

"Dr. Datz is a powerhouse of originality and venturesome science," Nobel Laureate J.C. Polanyi of the University of Toronto writes. "I would only like to say that the dynamism and daring that made Datz a pioneer of crossed-beam chemistry quite clearly characterizes the man and all his work."

Reinhold Schuch, head of the Atomic Physics Department at Stockholm University, writes: "Sheldon Datz is a dominant figure and internationally accepted spokesperson for the atomic and molecular physics community. His permanent efforts promoted atomic collision physics to the status of one of the leading fields of natural sciences."

The Enrico Fermi Award is the government's oldest science and technology award, dating back to 1956. Fermi led the team of scientists who achieved the first self-sustained controlled nuclear reaction at the

University of Chicago in 1942. Fermi subsequently led, for the Manhattan Project, the construction of the world's first operating nuclear reactor, at ORNL.

Other ORNL Fermi winners include Liane Russell (1994), Richard Setlow (1988), Alexander Hollaender (1983), Alvin Weinberg (1980), William Russell (1976) and Eugene Wigner (1958).

Sheldon will receive his award, which includes a gold medal and a \$66,000 honorarium, this month in Washington.—*Bill Cabbage and Ron Walli* [ornl](#)



Sheldon Datz

## ORNL people

**Stephen E. Nagler** of the Solid State Division has been elected to fellowship in the American Physical Society by its Division of Condensed Matter Physics. He was cited for his neutron scattering studies of excitations in low-dimensional quantum magnets.

The Life Sciences Division's **Stephen J. Kennel** has been named a fellow of the American Association for the Advancement of Science for "his important and sustained research in immunochemistry, particularly for fundamental advances in the understanding of monoclonal antibodies and their use for radioimmunotherapy."

The Instrumentation and Controls Division's **Ken Tobin** received the Industrial Scientist of the Year Award from the Tennessee Academy of Scientists last month at Belmont University in Nashville.

**ornl** reporter

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