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Galileo completes daring lo flyby

By Jane Plat



A plume of gas and particles is ejected some 100 kilometers (about 60 miles) above the surface of Jupiter's volcanic moon Io in image recently taken by Galileo. or the men and women of the Galileo project, Sunday, Oct. 10 began as a real nail-biter, but ended with immense pride and relief as the spacecraft successfully completed its daring flyby of Jupiter's moon Io.

An unexpected 3:09 a.m. wakeup call on Sunday sent Galileo team members scrambling into action. Three hours after entering the intense radiation zone near Jupiter and Io, Galileo went into safing when an error popped up in the memory of the onboard computer. The team was faced with a daunting task—to get the spacecraft out of safing and back to normal operations in time for the flyby at 10:06 p.m. (Earth receipt time).

"It was a heroic effort to pull this off," said Galileo Project Manager Jim Erickson. "The team diagnosed

and corrected a problem we'd never come across before, and they put things back on track."

"We waited four years for this encounter and we would do everything in our power to make it happen," said Eilene Theilig, spacecraft and sequence team chief. "Each person in this talented, dedicated and professional group knew what he or she had to do."

"Before every encounter, we go through various contingency scenarios, including a possible safing." said Nagin Cox, spacecraft and sequence team deputy team chief. "That preparation paid off and the anomaly resolution team swung into action quickly."

"It was poetry in motion," said Olen Adams, lead

for Galileo's command and data subsystem. "People were traveling around these aisles like it was a relay race. Every single person had to perform perfectly. We could not afford one single 'gotcha.' If one person got sick, or one PC crashed, or one command didn't make it to the spacecraft, it wouldn't have worked."

"I knew that if the radiation had triggered one memory fault, there was a good chance it could trigger another," said Tal Brady, who designed the command and data subsystem flight software. "I was very relieved when we got the spacecraft out of safing and later when the flyby data was recorded successfully."

The team saved the day by first pinpointing the location of the computer memory error. They did this by analyzing telemetry and memory readouts and looking at the timeline of spacecraft activities. They changed the encounter sequence to avoid activities that use the faulty portion of the memory. By late Sunday afternoon, Galileo engineers uplinked a new command sequence to the spacecraft. That posed another risk, since the transmission took place while Galileo was in the deepest portion of the radiation zone near Io. Against all odds, Galileo resumed full operations at 8 p.m., just two hours before the Io flyby.

The spacecraft and sequence team did much of the hands-on work, in conjunction with the science and mission control teams. Erickson pointed out, "We were able to meet this enormous challenge because the other teams did their work and assured us that we were free to focus on the crisis at hand."

During the flyby, Galileo's science instruments studied the surface chemistry, heat, gravity and magnetic properties of Io, the most volcanic body in our solar system, from an altitude of only 611 kilometers (380 miles). This was the closest look at Io by any space-craft. The data, including close-up images, will be transmitted to Earth in coming weeks.

"We want to learn more about the differences and similarities between volcanoes on Io and volcanoes on Earth," said Dr. Duane Bindschadler, Galileo manager of science operations and planning.

A second, closer flyby of Io by Galileo is planned for Nov. 25 at an altitude of 300 kilometers (186 miles).

Good news for NASA, JPL budgets

By Mark Whalen

Last week's House/Senate conference committee recommendation for a NASA fiscal year 2000 space science budget of \$2.198 billion, representing President Clinton's full request for the agency's funding next year, comes as "excellent news for JPL," according to Dr. Richard O'Toole, manager of the Lab's Legislative and International Affairs Office.

However, he said, the allocation may be reduced somewhat depending on how NASA allocates a general funding reduction of \$30 million for science, aeronautics and technology.

In addition to the modest cut in space science funding. Earth science programs are due to be cut by only about \$4 million next year as part of NASA's overall budget increase of \$75 million above the president's request.

NASAs budget bill is expected to be approved by both houses of Congress this week and Clinton is expected to sign the bill before the current continuing resolution to operate the agency expires on Oct. 21, O'Toole said.

Local congressional representatives David Dreier (R Glendora) and James Rogan (R-Glendale) "really went to bat for us, helping restore space science funding above what it was in both the House and Senate bills,' O'Toole noted. "We faced cuts of \$240 million in the House and \$120 million in the Senate, and it came out at the president's requested level, pending the allocation of the general funding reduction. That's very positive.'

California senators Dianne
Feinstein and Barbara Boxer
also helped NASA's cause, he
said, with a joint letter of
support to conference committee chair Christopher
Bond (R-Mo.) and Barbara
Mikulski (D-Md.), the ranking
minority senator on the
conference committee.

The exact effect on JPL programs will not be known until Dr. Ed Weiler, NASA's associate administrator of space science, decides where to make specific funding adjustments for next year. That could be decided in the next few weeks.

Still, O'Toole said, "I wouldn't expect significant dislocations to our programs."

Battery acid chemical found on Europa

By Jane Platt



Frozen sulfuric acid on Jupiter's moon Europa is depicted in this image produced from Galileo data. Sulfuric acid—a corrosive chemical found on Earth in car batteries—exists on the frozen surface of Jupiter's icy moon Europa.

"This demonstrates once again that Europa is a really bizarre place," said Dr. Robert Carlson of JPL. "Sulfuric acid occurs in nature, but it isn't plentiful. You're not likely to find sulfuric acid on Earth's beaches, but on Europa, it covers large portions of the surface."

The new Galileo findings were reported in the Oct. 1 issue of the journal Science. Carlson, principal investigator for the near-infrared mapping spectrometer aboard Galileo, is the lead author of the paper. The instrument works like a prism to break up infrared light. Scientists can study the resulting

light patterns to determine what chemicals are present, since different chemicals absorb infrared light differently.

Pictures and other information gathered by Galileo indicate Europa may have a liquid ocean. Water is one key ingredient essential for life.

At first, Carlson thought the findings of sulfuric acid on Europa would quash any talk that life might exist there. Those thoughts were negated by a colleague, Dr. Kenneth Nealson, head of JPL's astrobiology unit.

"The presence of sulfuric acid on Europa in no way rules out the possibility of life," Nealson said. ""In fact, to make energy, which is essential to life, you need fuel and something with which to burn it. Sulfur and sulfuric acid are known oxidants, or energy sources, for living things on Earth. These new findings encourage us to hunt for possible links between the sulfur

oxidants on Europa's surface, and natural fuels produced from Europa's hot interior." Carlson proposes the theory that

the sulfur atoms originate with the volcanoes on Io. with the material being ejected into the magnetic environment around Jupiter and eventually whirled toward Europa. Another idea is that sulfuric acid comes from Europa's interior, beneath the icy crust, ejected by sulfuric acid geysers or oozing up through cracks in the ice. Yet another theory is that sodium and magnesium sulfates may have leached onto Europa's surface from underground oceans and then were altered by the intense radiation field, producing frozen sulfuric acid and other sulfur compounds.

Carlson and one of his co-authors, Mark Anderson, a chemist in JPLs Analytical Chemistry Laboratory, hope to determine whether Jupiter's largest moon, Ganymede, also contains sulfuric acid.

A visitor center exhibiting spacecraft models, artifacts and JPL space exploration is part of the new Educator Resource Center and Applied Technology Classroom.

New JPL facility will help space educators By John G. Watson

Southern California educators seeking innovative ways to integrate space exploration into their classrooms now have an exciting, new resource with last month's opening of JPL's Educator Resource Center and Applied Technology Classroom in Pomona

Developed as a result of a new partnership between JPL and the Pomona Unified School District, the state-of-the-art facilities will provide

materials and strategies for teachers at all levels who wish to include the space program in their curricula.

"We are excited about the capabilities of these beautiful facilities and about the new relationship with the district," said site administrator Gene Vosicky of JPL's Communications and Education Office.

The center is a focal point for educators to become acquainted with NASA/JPL educational materials and resources. The classroom is designed to in-

crease students' knowledge of technology and science through scientific investigations, and also serves as a model for educators on how to utilize computers and other technologies in the instructional process.

The facility is located in the district-owned Village at Indian Hill educational mall, 1460 E. Holt Ave., Suite 20. For information, call (909) 397-4420.

ABOUT 3,500 PEOPLE attended the Lab's annual Family Day Oct. 2. Family members of JPL employees and contractors enjoyed music, chil-dren's activities, tours of various Lab

facilities and a complimentary lunch. "A big thank you to all those at JPL who volunteered to make the day a success," said NANCY KAPELL of the Reward and Recognition and Employee Services Group.

INFLUENZA VACCINES will be offered to employees and affiliates twice weekly from Oct. 26 to Nov. 18.

The vaccine will be available in a series of clinics on Tuesdays and Thursdays at Occupational Health Services, Building 310-202, on the corner of Surveyor and Explorer roads. On each of those days, 125 vaccinations will be administered. Occupation al Health Services will open at 1:30 p.m. and give out tickets for that day. Appointments will not be given, and shots will be administered on a firstcome, first-served basis.

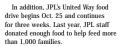
Influenza vaccine is strongly recommended for people over 65, residents of nursing homes and other chronic care facilities, adults and children with disorders of the pulmonary or cardiovascular systems, and those with chronic metabolic diseases. This year, the target population includes women in the second and third trimester of pregnancy and women in any trimester of pregnancy with a high-risk condition. The vaccine does not affect the safety of breastfeeding.

Immunization is also recommended for household members of high-risk

Weekly schedules, including exceptions and changes, will be advertised on JPL monitors and posted to JPL $\,$ forum. For more information, see Occupational Health Services' home page at http://eis/medical.

A KICKOFF CELEBRATION for this year's United Way campaign, "Make A Smile Last A While," will be held Oct. 29 at noon in the mall, in conjunction with the ERC's Halloween Fashion show. Displays by various community service agencies supported by United Way will be featured

A \$5 lunch special will be offered, of which 50 cents per meal will be donated to United Way by Eurest Dining Services, JPL's cafeteria



Through Nov. 12, food donations can be placed into barrels at the following locations: Building 114 (ERC); Building 167 cafeteria; Building 180 lobby; Building 190 cafeteria; Building 230 lobby; Building 264 (repro); Building 301, second floor; Building 302, sec ond floor; Building 303 cafeteria; and Building 601 (Woodbury), Suggested items for food donations include canned stew, pork and beans, sour chili and dried foods such as cereal, coffee, flour and sugar.

Last year, United Way of Greater Los Angeles raised \$62 million, including \$433,000 from JPL's campaign.

Campaign representatives in each JPL organization will begin contacting employees Oct. 29 for participation. Awards will be given to the top cam-paigners in each organization.

For more information, go online to http://hr/unitedway or contact NANCY KAPELL at ext. 4-9432.

WITH ANNUAL BENEFITS ENROLL-MENT under way through Nov. 1, the Benefits Office urges employees to consider several factors before en-

How well did your choices work for you last year? Do you need to add or delete dependents from coverage? Do you need to increase or decrease life insurance for yourself or dependents? Did you defer too much or too little from health care or depending care spending accounts?

To assist employees with coverage options and other questions, representatives from the Benefits Office and each of JPL's medical and dental insurance carriers will be on Lab from 9 a.m. to 3 p.m. on Oct. 21 (167 cafeteria) and Oct. 26 (303 cafeteria). In addition, training sessions have

been scheduled to show employees how to use the Oracle Web Applications system-the same web site used for timekeeping—to make benefit changes. Remaining dates and times are Oct. 20, 3 to 4 p.m., Building 167 conference room, and Oct. 28, 1 to 2 p.m., Building 180-101.

Updates on benefits enrollment will appear in "This Week." For more information, call the Benefits Office at ext. 4-3760. For questions about web application training, call ext. 4-1268.

Special Events Calendar

Alcoholics Anonymous-Meeting at 11:30 a.m. Mondays, Tuesday Thursdays (women only) and Fridays Call Occupational Health Services at ext. 4-3319.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Support Group—Meets the first and third Fridays of the month at noon in Building 111-117. Call employee assistance counselor Cynthia Cooper at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parent Support Group—Meets the fourth Tuesday of the month at noon. For location, call Javne Dutra at

Senior Caregivers Support Group days of the month at 6:30 p.m. at the Senior Care Network, 837 S. Fair Oaks Ave., Pasadena, conference room #1. Call (626) 397-3110.

Friday, October 15

JPL Dance Club—Meeting at noon in Building 300-217.

JPL Perl Users Group—Meeting at noon in Building 301-127.

Saturday, October 16

SURF Seminar—Registration for the Summer Undergraduate Research Fellowship begins at 9 a.m. at Caltech's San Pasqual Mall. Student presentations will be held from 10 to 11:40 a.m. and 1 to 4 p.m., followed by a poster session and reception. Admission is free; a \$10 lunch will be available between noon and 1 p.m. Call 395-2885 or e-mail to sfp@cco. caltech.edu.

Monday, October 18

Caltech Ballroom Dance Club-Beginning east coast swing will be held from 7:30 to 9 p.m. in Caltech's Winnett Lounge. \$1 per lesson. See www.caltech.edu/~ballroom or call 626/791-3103

Galileo's 10th Anniversary—A new video celebrating the mission and its science contributions will be shown at 12:30 p.m. in von Kármán Auditorium

Tuesday, October 19

Virtual Private Network—Bill Vlahos of Section 366 will describe this new remote access service, which supports secure dial-up Internet service providers and other connections. At noon in von Kármán Auditorium.

Wednesday, October 20

AFS Quick Start Session-Jeff Sachs of Section 366 will provide an overview of the benefits of this distributed file system to manage computer files, change passwords and protect data. At noon in von Kármán Auditorium.

Caltech Ballroom Dance Club-Beginning salsa will be held from 7:30 to 9 p.m. in Caltech's Winnett Lounge. Cost: \$30. See www.caltech.edu/~ballroom or call 626/791-3103.

JPL Hiking Club—Meeting at noon in Building 238-543.

JPL Drama Club-Meeting at noon in Building 301-127.

JPL Astronomy Club—Meeting at noon in Building 198-102.

Von Kármán Lecture Series-Mars '98 Project Scientist Dr. Richard Zurek and Deep Space 2 lead scientist Dr. Susan Smrekar will present "Return to Mars" at 7 p.m. in von Kármán Auditorium. Open to the

Friday, October 22

JPL Dance Club—Meeting at noon in Building 300-217.

Von Kármán Lecture Series-Mars '98 Project Scientist Dr. Richard Zurek and Deep Space 2 lead scientist Dr. Susan Smrekar will present Return to Mars" at 7 p.m. in The Forum at Pasadena City College. 1570 E. Colorado Blvd. Open to the public.

Saturday, October 23

Beakman—The zany scientist from CBS' Beakman's World will present an interactive show on scientific principles at 2 p.m. in Caltech's Beckman Auditorium. Tickets are \$10 for adults, \$5 for children. Prior to the show, Family Day activities featuring scientific demonstrations, face painting and food will be presented beginning at 11:30 a.m. next to the auditorium. Call (626) 395-4652

Sunday, October 24

Chamber Music—The Emerson String Quartet will appear at 3:30 p.m. in Caltech's Beckman Auditorium Tickets: \$25, \$21, \$17 and \$13. Call (626) 395-4652.

Monday, October 25

Caltech Ballroom Dance Club-Beginning east coast swing will be held from 7:30 to 9 p.m. in Caltech's Winnett Lounge. \$1 per lesson. See www.caltech.edu/~ballroom or call (626) 791-3103.

Wednesday, October 27

Caltech Ballroom Dance Club-Beginning salsa will be held from 7:30 to 9 p.m. in Caltech's Winnett Lounge. Cost: \$30. See www. caltech.edu/~ballroom or call (626) 791-3103.

JPL Drama Club—Meeting at noon in Building 301-127.

JPL Toastmasters Club-Meeting at 5:30 p.m. in the Building 167 conference room.Call Mary Sue O'Brien at ext. 4-5090.

Thursday, October 28

Caltech Architectural Tour-The Caltech Women's Club presents this free service, which is open to the public. The tour begins at 11 a.m. and lasts about 1 1/2 hours. Meet at the Athenaeum front hall, 551 S. Hill, Pasadena, Call Susan Lee at (626)

JPL Golf Club—Meeting at noon in Building 306-302.

Y2K Readiness—Kimberly Simpson will moderate a panel comprising members of JPL's Y2K Project and JPL Security and which will discuss the Lab's Y2K compliance efforts and what employees should know about the year 2000 transition. At noon in in von Kármán Auditorium

Friday, October 29

JPL Perl Users Group—Meeting at noon in Building 301-127.



N_{ews}





Top photo: astronaut candidates and former JPLers Drs. John Olivas (left) and Stan Love sign autographs at Family Day. Bottom: Roger Gibbs shows visitors the Mars Yard.

embers of the Mars '98 operations team who worked on Mars Climate Orbiter are now gearing up for the upcoming landing of Mars Polar Lander on Dec. 3.

JPL Director Dr. Edward Stone and Mars Surveyor Operations Project Manager Richard Cook discussed with Universe the preparations under way for the mission.

Q: Dr. Stone, following the loss of Mars Climate Orbiter, what do you believe is the most important thing for employees to keep in mind?

Stone: The primary objective for the Laboratory now is not to look back, but to focus on Dec. 3. That's the key. All of our energies need to be focused on whatever needs to be done to assure a successful landing for Mars Polar Lander.

Q: As landing day approaches, how is the morale of the Mars team?

Cook: Obviously, the team was extremely disappointed by the loss of the orbiter. Yet, in a sense, having Mars Polar Lander coming up in less than two months is really the best thing for them. Everybody is moving on as rapidly as they can and focusing on what needs to be done.

Q: Can the loss of the orbiter in some way help the team ensure success on the lander mission?

Cook: Yes. We're using this opportunity to take a bottoms-up look at the risks we're taking and make sure we're doing all the right things. It allows us to see that evervthing really does work. Personally, I'm optimistic because I know the caliber of the people working on the flight team. To a person, they are committed to ensuring the success of Mars Polar Lander. I'm also extremely proud of the way they are handling adversity while staying focused on MPL.

Q: Review teams within JPL and from NASA are probing the causes of the loss of Climate Orbiter. How can their findings be used to help Polar Lander?

Cook: These reviews should help us identify process improvements that we can immediately apply to help the lander mission. We had already identified some improvements, but additional recommendations from the boards should be very helpful. One change that we are making is to improve our quality assurance, to make it as sound and as all-encompassing as possible. We are also increasing the fidelity of our operations testing to exercise more contingency paths. We are going back and taking a look at what we call an end-to-end risk tree or failure tree, and see where we might have holes. So we're updating our assessment of risk. We've also brought in other external organizations to help us with our processes and to provide us with another double-check

Q: How are these external organizations helping you with Polar Lander?

Cook: A particularly good example is a team from Langley Research Center, which is helping us go over all the simulations we've done to validate the lander's entry, descent and landing system. They are uniquely qualified to do this work and will help us to verify all of the atmospheric entry and terminal guidance simulations that are performed.

Q: So the checks that are going on are not iust in reaction to Climate Orbiter's loss?

Stone: Most of these activities are, in fact, not in reaction to the orbiter. We'll know very shortly what the orbiter's problems were, but we are not limiting what's being done to just addressing those issues.

Cook: I can say right now that the specific problem that led to the loss of Climate Orbiter—one team providing thruster activity information in imperial units with another using the metric system-will not occur with the lander. We're already done assessing that.

Stone: That isn't the main issue, however; the main issue is the process that should have recognized that situation. But rather than just focus on that process, we're taking a second look at all the processes, all of the critical elements and the hard parts of landing on Mars.

Q: Can you address recent concerns about the state of the lander mission, particularly a potential problem with the spacecraft's flight aeroshell?

Cook: This is a good opportunity to put some of those rumors to bed. During final inspections at Kennedy Space Center before launch, a very small pinhole was detected in the substrate, the structural backing behind the aeroshell. At the time, there was no real concern about it. But since the launch in January, some on the project suggested we make sure it's not a

So just last week, we completed a set of tests using what's called an arc jet-like a giant blowtorch—at Ames Research Center, which effectively tests the heating environment we expect for the spacecraft's entry to Mars. The tests were completed with that small pinhole, and everything looked fine-the aeroshell worked exactly as planned.

Q: What is the plan for direct-to-Earth communication with the lander and the use of Mars Global Surveyor as a relay?

Cook: The Deep Space 2 mission, which will last for about about a week, will rely solely on Mars Global Surveyor for Earth communication. So for the first week or so of the lander mission, we will primarily depend on the lander for direct-to-Earth communication. After that, we'll be able to use Mars Global Surveyor for the relay of the lander data.

We will soon do end-to-end validation testing of our engineering unit copy of the Mars relay hardware at Lockheed Martin. We did that before launch, but we think it's useful to repeat those tests.

We've sharpened our pencils about how we might use direct-to-Earth: it would only extend the amount of time it will take to do things at the beginning of the mission. We're probably not going to get color panoramas within the first couple of days, like Pathfinder did; it will probably take three or four days this time. But we will get enough data to do a really successful science mission.

Q: Dr. Stone, do you feel that the reviews and extra attention to detail on Polar Lander will help lead to a successful mission?

Stone: I'm confident that we will have a successful landing, and the processes and additional checks we're going through will help us make sure we've got it exactly right. Our internal activities already in place are looking at all the critical areas, and the JPL review team led by John Casani, as well as the external NASA review team, will make independent assessments of what can be done to assure a safe landing on Mars.

Q: On another subject, Galileo's flyby of Jupiter's moon Io this week has given JPL another shot in the arm, hasn't it?

Stone: Yes. The successful Io flyby is a very important milestone. The team did a tremendous job in recovering the spacecraft from "safe mode." identifying the problem with the computer's memory and restoring the sequence, all during the day of encounter. It's a testimony to the skill the Laboratory has in dealing with complicated missions in difficult environments.

Learning from the occasional setback is critical to honing those skills in the new era of going often, landing and bringing samples back.



"Personally, I'm optimistic because I know the caliber of the people working on the flight team. To a person, they are committed to ensuring the success of Mars Polar Lander. I'm also extremely proud of the way they are handling adversity while staving focused on MPL."

Richard Cook MARS SURVEYOR OPERATIONS PROJECT MANAGER



In December, JPL's next Mars adventure will begin

PPROACHES

READERS NOTE Two ads per person limit

Due to the large volume of classified ads submitted to Universe and space limitations, restrictions have been put in place to limit the number and size of ads.

Effective with the Oct. 29 issue, no more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submis-

The ad deadline for the Oct. 29 Universe is Monday, Oct. 18 at 2 p.m.

For questions, call ext 4-6089

http://universe.jpl.nasa.gov

Editor Mark Whalen

Chief Photographer Bob Brown/Photo Lab

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Audrev Riethle/ Design Services

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For change of address, contact your section office (on-Lab personnel) or Xerox Rusiness Services at (626) 844-4102 (for JPL retirees and others).

Notice to Advertisers

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Ads must be submitted on ad cards, available at the ERC and the Universe office, Bldg. 186-118, or via e-mail to universe@ jpl.nasa.gov. E-mail ads are limited to six lines.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

etters

Thanks to the ERC for the plant received on notification of my father's death. And thanks to the many coworkers expressing support at this difficult time for our family. Thanks. Albert Whittlesey

Your kindness, thoughts and prayers helped tremendously, and I want to thank my friends and co-workers for all the caring words, hugs and cards that received on the passing of my mom on July 12. Also, a special thank you to the ERC for the beautiful plant.

Pat Rollins

My family and I would like to thank all my friends at JPL who have expressed condolences after the recent death of my mother. Also, we would like to thank the ERC for the beautiful plant we received.

Kamesh Mantha

Passings

NORMAN MORGAN, 68, retired supervisor of the Mechanical Engineer ing Group, Mechanical Systems Development Section 352, died of liver failure Aug. 30.

Morgan worked at JPL for 29 years retiring in 1991. He is survived by his wife, Margaret, daughter Lisa, sons Kurt and Brad, and six grandchildren.

Memorial services were held Sept. 11 in Hahamongna Park. Donations are requested to Tree-People, 12601 Mulholland Dr., Beverly Hills, CA 90210.

KATHRYN MIKA, 50, a customer service representative in Engineering Documentation Services, Section 644, died of heart failure Sept. 3 at her home in Rosamond.

Mika had worked at JPL since 1992 She is survived by her parents, Frank and Mary Kofahl sister Lorraine Schwarz and brothers Steve and Kurt Kofahl.

Services were private.

C lassifieds

For Sale

ARLINE TICKET, R.T., anywhere Southwest flies, travel must be completed by Nov. 17, \$150/dob. 626/355-3886. BABY ITEMS, cradle, includes sheet & mattress, \$40; exersaucer \$35; infant car seat, infant snugli, assorted infant clothes, blankets, shoes, all in gd. coud. and reasonably priced. 026/796-6248. BAR STOOLS, unfinished heavy duty wooden set w/arms and swivel seats \$200/obo. 957-3022, eves. SZUU/OBO. 957-3UZZ, eves. BASEBALL CARDS, '99 Bowman series, 2 unopened boxes, 24 packs, major stars, rookies, \$50; 200 assorted rookies, \$50; 200 assorted baseball/football cards, inserts, favorite teams/players included, \$20; Randy Moss autographed 8 x 10 w/certif. of auth., \$50 626/914-6083. BICYCLES, 26," \$80. 805/582-9494.

BOA, red-tail, almost 1 year old, likes to be held, nice coloring, \$100. 952-8455. BOMB HOIST, WWII vintage, portable, 1/2 ton capacity, gd. size for mounting in a truck bed, \$60. 626/303-1927. truck bed, \$60. 626/303-1927.

BOOK, "Mars and Its Canals" by Percival
Lowell, 1906; plus related clippings 1907,
vg cond., \$300. 624/445-6320.

BOOKCASE, 0a& /4 w x 6 h, 10 adjust.
shelves, \$100; TREADMILL, Sears
ProForm Crosswalk Plus, like new, incline,
folds for storage, calorie counter,
pulse/distance sensor, arm exercisor, paid
\$500, sell \$375/obo. 626/358-1228.

BRICKS, Ig., 4 1/2 W x 9 L x 3 1/2 D, installed as walk, remove and haul away, \$100. 790-5593. CHINA CABINET, walnut 4 panel contemp. style wlights, 42"H x 58"W x 13"D, call for pictures, \$275/obo. 323/550-8139 eves. CHINA SET, 60 pieces, \$70/obo. 909/592-

0780, Ana.
COMPUTER, Mac Power PC 7100 AV,
104mb ram, 500MB HD, AV model, does
video capture, w13" Trinitron mon., 5500;
Mac Quadra 650, 68040 processor, 32
MB RAM, 105mb HD, 5200; Mac Syquest,
200MB removable media storage, SCSI,
w'cartridge, \$100, more cartridges avail.
353-2103, Bill.

353-2103, Bill.
COMPUTER, Gateway laptop, Solo 9100
SE, 14.1" active matrix screen, 233MHz
Pentium II, 20B hard drive, 64MB SDRM,
4MB SGRAM, 2 USB, 33.6k modem, 20x
CDROM, Windows98, Office 97, plus much
nore. 629/839-6747, Karsten Browning. COMPUTER, power computing PowerTower Pro 250 (PowerMac Clone): 250MHz 604e CPU, 192MB memory, two 2GB HDs, 16xCD-ROM, 4GB tape backup unit, Zipi 00, Apple Multi-Syne 17" monitor, 8MB video card, Voodoo 1 card, 56k V.90 modem, keyboard, mouse and SideWinder Pro joystick; SOFTWARE: MacOS 8.1 and 7.6.1, FWB RAD Toolkit, Norton Utilities 3.5 and Retrospect tape backup software; has 9 drive bays and 6 PCI slots; S3,000. 626/795-6530, evenings.

Jaca LUS, 512, 500-6134. CRUTCHES, new aluminum Health Aids, \$30; bedside alum. commode w/arms in frame, \$60; alum. adjustable walker, \$65; 8-ft. beige tufted sofa, \$100; coffee table, \$4' x 24' black onyx in brass frame, \$60. 790-6060.

790-6060. DICTATION/transcribing mach., Sony prof BM75 w/foot pedal, \$75. 323/221-8620, Richard.

DRYER, Whirlpool 1998 gas, like new \$250, 957-7905. EXERCISE EQUIPMENT, Nordic Track Pro, new, w/pulse monitor, \$250. 626/798-8970.

8970.
FURNITURE, all from Ikea, about 2 yrs. old, gd. cond.; white desk, no shelves or drawers, \$30; TV stand, black, 3 shelves VHS storage, \$25; end tables, cherry we finish, set of 3, \$35. 352-2337.

minsi, set of 3, 535, 532-2537.
FURNITURE, dining room, Ethan Allen cherry wood server, Georgian Court Collection, 40" x 21" x 34", exc. cond., \$800; matching wall-mounted shelf, \$40. 626/577-8107.

526/77-8107. FIREWOOD, eucalyptus with some pine, \$250/cord, pick up in La Canada. 790-6851, Roger or Margaret. GOLF SET, left-handed, jr., like new, \$95. 626/797-1673.

GUITARS: '66 Fender Super Reverb, black face, no mods, grill cloth & speakers not orig., gone thru, new tubes, filter caps, great tone, \$975; '55 Fender P-bass, org., gone thru, new tubes, litter caps, great tone, \$975; \$55 Fender P-bass, blond, bakelite pickguard, contour body, \$57,50; 61 Gibson Les Paul/SG, cherry red, great cond, great tone, \$5,300; Fender Telecaster, neck refinished, body paint & pickups original, \$3,500/cobe, 50,000 paint & pickups & p

7339.

HAMSTER PENS, 2 pet pens, colorful plastic, major brands, incl. tower, wheel, connecting tubes, attached feeding dishes, water dishes, gd. cond., orig. \$250+ for all parts, willing to sacrifice to a good home, JPL discount. 309/881-7492, Jim.

JPL discount. 909/981-7492, Jim. HOCKEY TICKETS, Kings at Staples Center (2), various games. 562/947-0557, Shiela. INFLATABLE BEDS, new and used in original boxes, great for camping or temporary extra bed, various sizes, \$10-20. 805/582-9494.

LAZER DISK PLAYER, new, Sony, with remote, \$58. 805/582-9494.

remote, \$58. 805/582-9494.
MISC, bed, twin w3u underdrawers, perfect
cond., natural wood color, \$75; coffee
table, walnut wood, \$45; 7-pice dining
set, new, \$500; women's goff club set in
original bag, \$50. 957-8614, Mina.
MISC, desk, \$401; g. folding table \$10; set
of speakers \$75; encyclopedias in small
bookcase, \$30; 4 wooden crates for IPs.
\$5 each; HP 20S calculator still in box,
\$250; National Concernibic; from '606-'006. \$20; National Geographics from '60s-'90s, 5/\$1. 626/791-8848 eves.

5/S1. 626/791.8848 eves.
MISC, baby crib; portable playpen;
stroller; redwood picnic table; SUV dog
gate; Somma CA king bed; garden power
tools; 16* boy's bike; ponton pool
loungers; pool cover and reel; basketball
hoop; moped, needs work; Weber BBQ;
snow chains, 185 60 R14; 6 ft couch; 80#
punching bag; beer making kit; ping pong
table. 626/643-9769.

table. 626/643-9/69.
MISC, queen sofa sleeper, love seat recliner, matching set, accommodating colors, pd \$1.499, sell \$750/bo, dhy, avail; washer/ dryer, GE, manuals, exc. cond., \$250, dhy, avail; Beta tapes, new, used once, \$1: Beta camcorder, used less than 30 hrs., like new, incl. accessories & batt. \$250. 805/582-9494.

SZ50. 805/582-9494. MISC, sled, S5; 286 PC, S5, Pentium PC, S50, apprx. 100 balls for ball bath, \$10; battery-operated baby fams, \$10; baseball and soccer clearlysast. children's sizes, \$5/pair, vertical blinds, asst. sizes, \$5/ea; outdoor light fixtures, \$5/each, 909/598-0065.

0065.

MOVING SALE, calculator, Texas
Instruments TI-83, new, used for 1 mo.,
\$60; washer & dryer, Whirlpool, exec.
cond., 2-yrs. old, \$300 ea.; car seat for
toddler, top quality, exec. cond., \$35. 2318208, Irene, eves.

8208, Irene, eves.

PHOTOGRAPHS, 40" x 30", color, framed;
2 tall-ship pics by prof. photog., vg cond.,
1 of Span. ship in SF bay, one of German
ship nr Puerto Rico, \$70/each, \$120/both
obo. 626/568-8298.

PICTURE FRAMES, 3, brass, 22" x 28" \$6/ea., \$15 for all 3/obo. 626/568-829 Ana. POOL, Doughboy, 16-ft. diameter by 4 ft. deep, exc. cond., incl. ladder, pump, DE filter, accessories, \$2,000. 249-9534.

PRINTER, Xerox Diablo 630 daisywheel with print wheels/ribbons, exc. cond., works great, \$10/obo. 626/568-8298. RANGE, GE XL44 gas, sealed burners \$100/obo. 957-2173. RANGE, Whirlpool gas, almond, 30" self-clean oven, like new, \$350. 626/337-6130. REFRIGERATOR, Kenmore 22 cu. ft., iso/water disnenser. 1 yr. old, \$675; ice/water dispenser, 1 yr. old, \$675 WASHER/GAS DRYER, stacked, x-la yacity, 1 yr. old, \$750; crib, \$25; CAR SEAT, infant seat/carrier, \$15; BABY GYM, \$4. 626/445-7125.

REFRIGERATOR, 18 cu. ft., 1970s, retro brown, frost-free freezer, compressor rebuilt 2 yrs. ago, works great, clean, \$35; can be delivered locally. 352-2337. RELAY RACK, 19" half height w/wheels \$30/obo. 957-2173.

SEWING MACHINE TABLE, three drawer solid wood, cherry, \$58. 805/582-9494 WATER FALICET FILTERS Pur replacements in sealed pouches, \$15 for 2. 626/395-8516, Mary.

WEDDING DRESS, exc. cond, used once, kept in garment bag, white, straight, long sleeves, bow in back, \$40/obo. 626/568-

Vehicles/Accesories

'90 ACURA Integra LS, auto, AC, mroof, new radiator, exc. cond. full records, 150K miles. \$3,500/obo. 714/838-7175, James. '98 BMW F650 motorcycle, Funduro, red, BMW topbox, no scratches, never on ground, just serviced, exc. cond., 6,000 mi., \$6,500. 626/797-6573.

'85 BMW K100 RT M/C, custom paint, corbin seat, lots of extras, see in red lot, \$3,500. 248-1997. CADILLAC wire hubcaps (3), chrome, \$25/ea. 626/798-7339.

'91 CHEVY S10 pickup, good condition, 5 speed, AM/FM radio w/CD changer, like new tires, 323/259-8604 Traci.

'92 DODGE Caravan, 7 passengers, auto, 70k mi., \$4,950. 626/792-3083. 708 mi., 34,330. 020/792-3003. 93 FORD Escort LX hatchback, 3D, 4 cyl., 5 spd., am/fm/ster. cass., rear spoiler, alloy wheels, exc. cond. 626/857-3753.

89 FORD F350 transvan motorhome, 21 ft., fully self-contained, sleeps 2, roof and dash a/c, ps, pb, cruise control, 58,000 mi., \$15,000. 909/591-4142. '85 GRUMMAN 14' Alum Boat w/trailer &

25 Hp Merc otbd motor, \$1,500/obo 909/599-2598.

'95 HONDA Acura Legend IS Coupe 2D, black, auto., 104,000 mi., mint cond., leather, sunroof, heated seats, alloy wheels, CD changer, remote keyless entry, \$22,000/obo, 626/568-8298. '88 JAGUAR XJ6, black/beige int., 100k

mi., exceptionally gd. cond., new Pirelli tires, sunroof, serv. records, \$7,500. 626/798-4056

626/798-4056.

[88 NEWPORT sailboat, 30', fully equip, spinacre & multi bars, engine rebuilt 97; running exc., in the water, ready to sail, \$12,500'obo, 248-0491.

[95 PLYMOUTH Acclaim, 4-dr, silver gray, auto, ac, PSWIL, cruise, tilt whl, V6, 90K mi., AMFM/csss., very room 6-passngr, orig, owner, gd cond., \$5,995, 790-0335.

[95 SATURN, \$1.2, 4-dr, sedan, MC, AMFM/tape, cruise control, 5-spd., exc. shape, low mileage (28K), \$8.400.

[626/797-3310, eves/weekends.]

626/79/-3310, eves/weekends. TIRES, 4 Michelin X 185/70 R13, less than 500 mi. on BMW 320I, steel rims, all for \$100/obo. 790-4457.

'95 TOYOTA Supra SE, auto, 58K mi., CD, power windows/locks, am/fm/cass., spoiler, black/black, salvage title, exc. cond., \$17,500/obo. 909/599-3230.

'94 TOYOTA 4 x 4 pickup, 5 spd., ps/pb, matching shell, CD player, bedliner, ~81K mi., exc. cond., new tires, brakes and shocks, \$9,800. 626/666-4170.

791 TOYOTA 4-Runner, white, V6, sunroof, pwr windows/locks, grey cloth interior, \$9,000/obo. 909/621-4392, olivegrove@mindspring.com., evenings. 89 TOYOTA Supra, "turbo" look wifactory spoiler, ext/int, silver/grey leather, VR-rated tires, Targa sports rf., alloy whls., factory alarm, 109K mi., exc. cond., \$6,500. 874-7668.

'74 VW Bug, vg cond., high-perf. 1800 engine, 26 mpg city, new tires, needs no work, \$2,800. 626/791-3797, Dennis McMurray.

wanted
ARC WELDER, 110-120 volt, single phase, prefer wire feed. 626/797-1673, Anthon.
CARPOOLER, Rancho Cucamonga, Upland, Claremont, LaVerne area, neder eliable 3rd driver (prefer a Packers fan) to share commute, relax and enjoy carpo tol hare commute, relax and enjoy carpo tol hare on 210, 7:00 to 3:45 (best for parking and traffic), Leaven 10:40-40, 20:40-40,

GRADUATES, Belmont High School, L.A., '57-'62. 956-1744, Barbara. HOUSE to rent in Altadena, 1-2 bd. for professional, creative person. 626/796protessional, C., 1286, evenings.

RADIO/VACIJIM TURFS '20s/'30s: L A radio ads & catalogs of radio mfgrs. & dealers. 242-8961. TV 20" + 626/431-2999

 ZU +. 020/431-2333.
 VOLLEYBALL PLAYERS, coed, all levels of play, every Tues. nt. 8-10, Eagle Rock High School, \$3/nt. 956-1744, Barbara. WORLD BOOKS from '90s. 626/797-1673.

Free

DOG, cute black lab mix, abandoned approx. 6 mo., gentle, soft mouth, intelligent, loves people, good w/other dogs, needsloving family w/fenced yd., no cats. 626/791-4519.

For Rent

EAGLE ROCK, furn. rm in single-fam. house, nice area, 10 min./JPL, priv. entr and ba., share kitch./laundry privileges, \$350 incl. util. 323/256-1785.

GLENDALE condo, downtown, 1-yr. lease, 2 bd., 2 ba., underground prkg., appliance furn., credit report, no pets, non-smoker, ref. Required, walking dist. to Galleria. 548-0588.

548-0588.

PASADENA condo near Caltech in nice and quiet neighborhood, 2 bd., 2 ba., pool, Jacz., sauna, ex. rm., rec. rm., garage, all utilities paid except electricity, \$1,050. 626447-4028, Kumar or Ratnakumar Bugga.

PASADENA, room in 3-bd. apt to share w2 others; pool, parking, a/c, washer/dryer; \$460 + 1/3 util. 626/564-1078.

SAN GABRIEL, housemate to share 3 br., 2 ba., house, all amenities included, easy mi./JPL, \$500. 626/281-2179, Mike. SIERRA MADRE house, 3 bd., 2 full ba., LR, DR, fam. rm., lg. kit., laundry/utility room, detached 2-car garage, lg. yard w/fruit trees, \$1,500/mo. 310/662-5764, days.

Real Estate

ARCADIA townhouse, great location, 1,612 sq. ft., 3 bd. 3 ba., lots of upgrades, private patio, pool, exc. schools, must sell, job relocation, \$238,888. 626/574-7462, Pam.

Pam.

BIG BEAR, Sugarloaf area, 2-story cabin, 1,440 sq. ft., incl. 320 sq. ft. garage, 1 bd., bath & garage downstairs, 1 bd. bath Jr, fp. kitchen, laundry upstairs, nat. gas, sewer, pawed road, easy access, sale by owner, 574,900/obo. 760/631-2675.

NORTHRIDGE townhouse, gated community, approx. 1,300 sq. ft., 2 bd., 2.5 ba., 2-car att. garage, immac. unit w/many upgrades, beautiful backyard, complex has pools, Jacz., tennis, 25 min./JPL, \$205,000, 360-5235.

min./JPL, \$205,000. 360-5235.
PMSADENA, townhouse built '98 nr Rose
Bowl, 3.5 ml./JPL, gated community,
approx. 1.450 sq. ft., 3 bd./2.5 ba., 2-car
att. garage, prof. organized closets, tiled
FP, alarm, celling fans wlights in all bedr,
covered balcony off master, Pergo maple
firs everywhere, all Corian counters, Ig enclosed backyd fully landscaped w'auto
sprinklers, palm/fruit trees, pool, Jacz.,
basketball court, \$260,000'obo. 6205688298.

Vacation Rentals

BIG BEAR LAKE cabin, near lake, shops, village, forest trails, 2-bd., sleeps up to 6 f/p, TV, VCR, phone, microwave, BBQ and more, JPL disc. from \$65/night. 909/599-5225.

BIG BEAR LAKEFRONT, lux. townhome, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548.

bd. suite, sleeps 6. 948/786-6548.
CAMBRIA, ocean front house, sleeps up to
4, exc. view. 248-8853.
DAYTONA BEACH, FI. for YZK, priv. beach
access, 1 bd., 2 ba., cable TVV/CR, FM
stereo, full kitch. w/dishwasher &
microwave, laundry w&d in-rm, veranda
overlooking ocean, Jacuzzi, sauna, pool,
game room, indoor garage; easy access to
shopping, nightlife; JPL discount, 5-day
min. sleeps 4; avail. 12/17/99-17/00.
909/981-7492.

909/981-7492.

HAWAII, Maui condo, NW coast, on beach w/ocean vw., 25 ft./surf, 1 bd. w/loft, compl. furn., plone. color TV, VCR microwv., dish-washer, pool, priv. lanai, slps. 4, 4/15-12/14 rate S95/nite/2, 12/15-4/14 rate S110/nite/2, S10/nite add'l person. 949/348-8047.

4/14 rate \$110/nite/2, \$10/nite addr person. 949/348-8047.

HAWAII, Kona, priv. house & guest house on 166 ft. of ocean front on Keauhou Bay, private house and guest house comfortably sleep 6, 3 br. 2 ba., rustic, relaxing & beaut., swimming, snorkeling, fishing, spectacular vlews, near restaur., golf courses, other attractions. 626/584-9852. LAS VEGAS, 2 bd., furn., New Year's Eve weekend, \$150/night, 2-nite min., close to the Strip, 702251-9021, Rick or Laura. MAMMOTH. Chamonix condo, at lifts 7, 8, 16, 17; walk to Warming Hut; 2 bd., 2 ba., sleeps 6, fully equip, elec. kitch., nuicrowave & extras, fireplace, calaber Jacuzzi, satura, game, rec. & laundry ms, BBQ area, conv. to lifts. hiking, shops & summer revents, dailyweekly rates, summer rates thu Oct. 249-8524. OCEANSIDE, on the sand, charming 1 bd. OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier or harbor, pool, spa, game rm., sleeps 4. 949/786-6548.

949/786-6548.

LAKE TAHOE. North shore, 2 bd., 2-1/2 ba., sleeps 6-7, private sandy beach, great location, all amenities, hiking, golfing, fishing, 2 miles to casinos, special low rates for Oct/Nov, 3-day min.626/355-3886, Rosemary or Ed.

3886, Rosemary or Ed.

MAMMOTH, Snowerek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kit. incl. microwave, D/W, Cable TV, VCR, phone, balcony w/mtn. view, Jacz., sauma, streams, fishponds, close to Mammoth Creek, JPL discounts. 626/798-9222 or 626/794-0455.

0433.
PACIFIC GROVE hse, 3bd, 2 ba, fp, cable tv/vcr, stereo/CD, well-eqpd, kit w/microwv, beaut furn, close to golf, bches, 17 Mile Dr., Aquarium, Cannery Row, JPL discount. 626/441-3265.

ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv., secure parking. 626/794-

SOUTH LAKE TAHOE KEYS, waterfront, 4 SOUTH LAKE TAHOE KEYS. waterfront, 4 bd., 3 ba., hop access fair, sleeps 12+, frplc. on 2 levels, decks overlook priv. dock & ski lifts, gourm. kitch. bikes, boats, 3 color TVs. VCR, ster., indoor/outdoor pools, hot tub/beach, lighted tennis, 10 min./skiing, casinos, golf, 1 hr./wine country. 3-day min. 51,095/wk for high seas, 15 June to 15 Sept., 22 Nov. to 1 March; \$495/wk low season, + \$900 cleaning fee. 949/515-5812, Jim Douglas.