

Deadly UCLA lab fire leaves haunting questions

By Kim Christensen March 01, 2009

UCLA's Molecular Sciences Building was mostly closed for the holidays on Dec. 29 as research assistant Sheri Sangji worked on an organic chemistry experiment.

Only three months into her job in the lab, the 23-year-old Pomona College graduate was using a plastic syringe to extract from a sealed container a small quantity of t-butyl lithium -- a chemical compound that ignites instantly when exposed to air.

As she withdrew the liquid, the syringe came apart in her hands, spewing flaming chemicals, according to a UCLA accident report. A flash fire set her clothing ablaze and spread second- and third-degree burns over 43% of her body.

Eighteen excruciating days later, Sangji died in a hospital burn unit.

"It is horrifying," said her sister Naveen, 26, a Harvard medical student. "Sheri wasn't out doing something stupid. She was working in a lab at one of the largest universities in the world. She gets these horrific injuries and loses her life to these injuries and we still don't know how it happened or why it wasn't prevented."

Sangji's death was more than a tragic workplace accident. It also raised serious questions about the university's attention to laboratory safety.

"It was totally preventable," said Neal Langerman, a San Diego consultant and former head of the American Chemical Society's Division of Chemical Health and Safety, whose members were given a detailed account of the incident by a University of California safety official.

"Poor training, poor technique, lack of supervision and improper method. This was just not the right way to transfer these things," Langerman said. "She died, didn't she? It speaks for itself."

Two months earlier, UCLA safety inspectors found more than a dozen deficiencies in the same lab, Molecular Sciences Room 4221, according to internal investigative and inspection reports reviewed by The Times. Among the findings: Employees were not wearing requisite protective lab coats, and flammable liquids and volatile chemicals were stored improperly.

Chemical Safety Officer Michael Wheatley sent the inspection report to the researcher who oversees the lab, professor Patrick Harran, as well as to the head of the Chemistry and Biochemistry Department and a top UCLA safety official. The report directed that problems be fixed by Dec. 5.

But the required corrective action was not taken, records show, and on Dec. 29 all that stood between Sangji's torso and the fire that engulfed her was a highly flammable, synthetic sweater that fueled the flames.

Under scrutiny

The California Division of Occupational Safety and Health is investigating, as are the Office of the State Fire Marshal, the National Institute for Occupational Safety and Health and the U.S. Chemical Safety and

Hazard Investigation Board. A spokeswoman for Cal/OSHA, the lead agency, said she could not comment on the investigation.

UCLA officials say they are cooperating with all of the agencies.

"We consider this a profoundly tragic accident, and the campus community is still reeling from the loss of Sheri as a member of the Bruin family," said Kevin Reed, vice chancellor for legal affairs.

Harran, the organic chemistry professor for whom Sangji worked, said he could not comment on the accident because of the pending investigations. But he said he's heartbroken.

"Words cannot convey my grief or that of those who work in my lab, and our pain cannot possibly compare with the immeasurable anguish felt by Sheri's family," he wrote in an e-mail. "Sheri's death is a tragedy that has left her friends, colleagues and co-workers here in our department devastated."

UCLA has launched a comprehensive review of lab safety protocols and has stepped up inspections and shortened the time allowed to correct serious violations. Chancellor Gene Block also established a campuswide lab safety committee and ordered enhanced accountability measures.

Such efforts are of little comfort to Sangji's family. Her parents, Shaukat Sangji, a small-business owner who lives in Toronto, Canada, with his wife, Maimoona, a Montessori schoolteacher, were too distraught to be interviewed, said Naveen, who relayed an e-mail message to The Times from her father.

"They say time will heal, but I know for sure nothing can heal this," he said. "This has completely destroyed our lives forever."

Born and raised in Pakistan, Sheharbano "Sheri" Sangji followed her older sister to Pomona College, a small, top-tier liberal arts school in Claremont, in 2003. Their parents and younger brother moved to Canada.

"Sheri always loved science and fell in love with chemistry," Naveen said, but she also was interested in the rights of women and immigrants, environmental policy and law. She decided to become an attorney, with an eye toward a career that would blend her interests.

"She was brilliant, just so impressive," her sister said.

Daniel O'Leary, Sheri's chemistry professor for nearly three years at Pomona, recalled her as being upbeat, with a good sense of humor, and an independent problem-solver who published two papers as an undergraduate in professionally vetted chemistry journals.

"She was a talented researcher and a very involved student in the chemistry department," said O'Leary, who earned his doctorate at UCLA and now teaches at Bowdoin College in Maine.

Sangji graduated in May and had applied to some of the nation's top law schools.

In October, she took a job in a lab run by Harran, a rising star who joined the UCLA faculty in July as the first Donald J. Cram Chair in Organic Chemistry. In 2007, Harran and colleagues at the University of Texas Southwestern Medical Center gained notice for their work on a synthetic toxin that shrinks cancerous tumors in mice.

"Sheri was excited about this job . . . and was so happy when she got it," said her friend Jahan Bruce, 24, a special-education teacher. "She wanted to be in the research area and wanted to be in a university setting. All of her friends thought this was perfect for her."

On Dec. 29, Sangji was performing an experiment related to Harran's work on a potential anti-obesity drug, UCLA's Reed said.

She was trying to transfer up to 2 ounces of t-butyl lithium, which was dissolved in pentane, another highly flammable chemical, from one sealed container to another. It was the second time she had performed that procedure in Harran's lab, UCLA officials said.

"The barrel of the syringe was either ejected or pulled out of the syringe, causing liquid to be released," the UCLA accident report stated.

Sangji's rubber gloves caught fire, searing her hands. Her sweater, made of a synthetic material, was so flammable that Langerman, the chemical safety expert, compared it to "solid gasoline." It, too, was quickly engulfed.

The panicked young woman ran away from a nearby emergency shower instead of toward it, records state, costing her precious time.

"She might have been fine" had she quickly made it to the shower, said Russ Phifer, head of the American Chemical Society's safety division, who also reviewed the UC official's account of the accident.

A postdoctoral researcher, who UCLA officials say was just a few feet away, rushed to Sangji's aid and tried to smother the flames with a lab coat. Another ran in from an adjoining room, helped douse the fire, then called 911 and summoned Harran, Reed said.

"He said when he got there Sheri was sitting with her arms outstretched in front of her and someone was throwing water at her from a sink," said Naveen, who spoke with Harran later at the hospital. That account squares with the UCLA accident report.

From the Ronald Reagan UCLA Medical Center, Sangji was transferred to the Grossman Burn Center in Sherman Oaks.

It is unknown whether a typical cotton lab coat would have saved her. But even if it caught fire, it could have been removed much more easily than a burning synthetic sweater, safety expert Phifer said.

"I can't imagine why she didn't have protective clothing if she knew she was working with chemicals that dangerous," Sheri's friend Bruce said.

Training questioned

But just how much Sangji knew about the procedure that took her life is an open question.

"The employee may not have been using best work practices while handling the syringe to transfer a pyrophoric liquid," a UCLA accident report concluded. "The employees should be instructed in safer handling techniques."

Harran told a UCLA investigator the day after the fire that a syringe "was the appropriate method" for transferring t-butyl lithium -- and that Sangji had been trained how to do it. But according to the investigator's report, Harran did not know when that training occurred and had no record of it, as required by Cal/OSHA and UCLA lab safety standards.

UCLA's Reed said Sangji "was trained by senior chemists within Dr. Harran's lab to conduct this specific experiment and handle these specific chemicals." But he couldn't say why there was no record of it.

"We're still trying to figure that one out," he said, adding that Cal/OSHA is also looking into it.

At the hospital, Naveen said, her sister told her that she was not given safety training: "She was very clear about the lack of safety training, because I asked her directly."

It was not unheard of for people in Harran's labs to work without protective gear, UCLA records show.

On Oct. 30, two months before the fire, an annual safety inspection uncovered more than two dozen deficiencies in his four labs, including the one where Sangji worked. Among other things, inspectors found excessive amounts of flammable liquids and missing chemical spill cleanup kits.

"Eye protection, nitrile [rubber] gloves and lab coats were not worn by laboratory personnel," the inspection report said.

The Nov. 5 report said lab coats "must be worn while conducting research and handling hazardous materials in the lab" and assigned the Dec. 5 deadline to correct the deficiencies.

After the accident, however, Bill Peck, UCLA manager of occupational safety and employee health, wrote in his report that "most of the corrections in the laboratory were not accomplished by 12/30/08."

A first-aid kit and spill cleanup materials were still lacking; flammable materials and water- and air-reactive chemicals were still being stored improperly; and employees still weren't using protective equipment, the report said.

Cal/OSHA is investigating why the deficiencies were not corrected sooner, UCLA officials said. One potential factor, they said, is that Harran had planned to move the lab.

Phifer and Langerman saw other potential problems: At the time of the fire, Sangji worked at a cupboard-like "fume hood," which pulls potentially harmful vapors out through an exhaust system. It has a tempered-glass vertical sash that probably was not lowered enough, they said, because if it had been, only her hands and forearms would have been burned.

In addition to the fume hood, Sangji would have been better protected if she had used a "blast shield," a free-standing portable device made of brass that chemists put between themselves and potentially dangerous experiments, the experts said. A blast shield was not required for that experiment, Reed said, and it is unknown if one was available.

Langerman also questioned the safety of transferring t-butyl lithium with a syringe.

"The preferred method is to use pressure to push the liquid out of the source bottle into your receiver through a stainless-steel tube," he said.

Both experts also wondered if Sangji and the postdoctoral researchers who risked their lives to help her had received adequate fire safety training. UCLA officials say they had.

"The response afterward is probably most responsible for her death," Phifer said. "The fact that she immediately turned away from the shower and went in the opposite direction is a problem. It means that she wasn't properly trained in what to do in the event she caught fire."

Final days

At the burn center, Sangji's family found her wrapped in bandages, her arms suspended from the ceiling. Deep burns covered her back, legs, torso and ears.

"It was really hard to see her like that," Naveen said. "They gave her a lot of sedation and oxygen therapy, but she was in a lot of pain. Her big concern was her hands. She really worried that she wouldn't get function back. She kept asking about her hands: 'Will they get better? How long will it take?' "

Naveen said her sister could not bring herself to discuss the accident: "She was having flashbacks and nightmares, and she didn't want to talk about it."

Only family members were permitted visits, so friends dropped off cards and posters with photos

and messages of encouragement for Sheri, an avid soccer player. She seemed to make progress for about a week, her sister said, but began to decline at about the time of a second surgery to remove burned tissue.

On Jan. 16, she succumbed to respiratory failure, infection and other complications, according to a coroner's report.

"Sheri was such a fighter that it just never entered our minds that she wouldn't make it through," her sister said.

A day before her funeral in Toronto, her family learned that she had been accepted to UC Berkeley's Boalt Hall School of Law.

"It was her dream school," Naveen said.

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State fines UCLA in fatal lab fire

<http://www.latimes.com/features/health/la-me-uclalab5-2009may05,0,6665233.story>

Cal/OSHA cites safety lapses and lack of training in imposing \$31,875 penalty.

By Kim Christensen May 5, 2009

State regulators on Monday fined UCLA more than \$31,000 for three "serious" violations of workplace safety laws in the fatal burning of a staff research assistant in a Dec. 29 chemistry lab fire.

The findings by the California Division of Occupational Safety and Health concluded that Sheharbano "Sheri" Sangji, 23, had not been properly trained and was not wearing protective clothing when an experiment exploded, spreading second- and third-degree burns over 43% of her body. She died 18 days later.

Cal/OSHA also cited UCLA for not addressing deficiencies noted in an internal safety inspection two months before the fatal fire in professor Patrick Harran's organic chemistry laboratory, including a finding that workers were not wearing lab coats.

The 10-page report, which contained scant detail of the Cal/OSHA investigation, left many questions unanswered about the lab's protocols, equipment and supervision, said Sangji's sister, Naveen, a Harvard medical student.

"This report sheds very little light on the incident. Sheri went to work that day and never got the chance to come home," she said. "She suffered agonizing injuries, and these . . . pages do not explain what happened or how it happened."

Cal/OSHA officials said the UCLA fine was the largest among seven recent cases involving accidents at academic research labs or those in the chemical and biotechnology industries.

Fines in the six previous cases, which included serious injuries but not fatalities, ranged from \$1,200 to \$19,135.

"The important point to make here is that these penalties are not designed to compensate for injury or loss of life," said Dean Fryer, a Cal/OSHA spokesman, explaining that the fines merely address the civil violations of workplace regulations.

As in any accident resulting in death, Fryer said, Cal/OSHA will prepare an additional report to present to the Los Angeles County district attorney for consideration of criminal prosecution. Cal/OSHA as a matter of routine does not contact the district attorney before civil penalties are assessed.

UCLA officials, who ordered a comprehensive review of lab safety after Sangji died, said they would not appeal the fines.

New measures in place or in the works include increased inspections, a shortened time span for correcting serious violations and the purchase of flame-resistant lab coats.

"Although substantial progress has already been made, we will continue to thoroughly monitor and assess our lab training and safety protocols as an integral component of our daily operations," Chancellor Gene Block said in a statement. "The Cal/OSHA report will provide critical assistance with these ongoing efforts."

Sangji was transferring about two ounces of t-butyl lithium from one sealed container to another when a

plastic syringe came apart in her hands, splashing her with a chemical compound that ignites instantly when exposed to air.

The resulting flash fire set ablaze her rubber gloves and synthetic sweater.

The \$31,875 fine issued Monday included \$18,000 for the fact that she wasn't wearing a lab coat, which might have kept her highly flammable sweater from catching fire.

Serious violations carry a maximum fine of \$25,000 and a base penalty of \$18,000, which can be increased or reduced based on the circumstances.

Born and raised in Pakistan, Sangji graduated in 2008 from Pomona College in Claremont with plans to become a lawyer. While applying to law schools, she took a \$46,000-a-year job in October in a lab run by Harran, a researcher with a rising reputation in organic chemistry.

A former member of the faculty at University of Texas Southwestern Medical Center, he joined the UCLA faculty in July as the first Donald J. Cram Chair in Organic Chemistry, according to his biography on UCLA's website.

A day after the fire, Harran told a UCLA investigator that a syringe "was the appropriate method" for transferring t-butyl lithium, and that Sangji had been trained how to do it. But Harran did not know when that training occurred and had no record of it, as required by Cal/OSHA and UCLA lab safety standards.

Two months before the fire, an annual safety inspection conducted Oct. 30 uncovered more than two dozen deficiencies in Harran's four labs, including the one where Sangji worked.

Among other things, inspectors found excessive amounts of flammable liquids, and workers who lacked the required lab coats and other required safety gear, such as rubber gloves and eye protection.

Some of the fixes were made immediately, Harran later told colleagues in e-mails, but others were delayed because the lab was in the process of moving to another floor and was to have been reinspected afterward.

A campus safety official agreed to the delayed reinspection, according to UCLA records reviewed by The Times.

In a statement Monday, Harran said that he and his students "deeply mourn the death of our friend Sheri Sangji," describing her as exceptionally gifted.

He also said that although it is important to develop a culture of lab safety, the inspection and training records that have garnered scrutiny since Sangji's death had little relation to the accident.

"Sheri was an experienced chemist and published researcher who exuded confidence and had performed this experiment before in my lab," he said.

"However, it seems evident, based on mistakes investigators tell us were made that day, I underestimated her understanding of the care necessary when working with such materials."

Statement of Patrick Harran

<http://www.latimes.com/features/health/la-me-ucla-statement5-2009may05,0,2826268.story>

UCLA's Donald J. and Jane M. Cram Professor of Organic Chemistry.

My students and I deeply mourn the death of our friend Sheri Sangji, and we realize our pain cannot possibly compare with the anguish felt by her family. She was an exceptionally gifted young woman with a bright future ahead, and her loss is truly tragic.

Since Sheri's death, attention has focused on inspection and training records. These protocols are very important in developing and documenting a culture of safety, but in this case they are largely unrelated to the accident of Dec. 29, 2008. Sheri was an experienced chemist and published researcher who exuded confidence and had performed this experiment before in my lab. Sheri had previous experience handling pyrophorics, chemicals that burn upon exposure to air, even before she arrived at UCLA. Her most recent position prior to joining the group involved "scale-up process safety." However, it seems evident, based on mistakes investigators tell us were made that day, I underestimated her understanding of the care necessary when working with such materials.

Sheri's death resulted from a tragic accident. The California Division of Occupational Safety and Health has found no willful violations in its report. Throughout my career, I have strived to create a culture of safety. I am haunted by memories of this tragedy and wish that nothing like it happens again – in my lab or any other. In continuing our research, I go forward with a heavy heart in remembrance of Sheri and with a rededication to safety. I will also work tirelessly to achieve Chancellor Block's goal of making UCLA the leader in safe laboratory practices.

Changes since fatal fire May 5, 2009

<http://www.latimes.com/news/local/la-me-uclabox5-2009may05,0,3588360.story>

- Higher-risk labs are inspected more rigorously.
- Flame-resistant lab coats have been purchased and distributed.
- Time has been shortened for corrective action and reinspection of critical violations.
- Procedures have been updated for handling chemicals that ignite when exposed to air.
- Training and documentation of use of safety gear such as lab coats, eyewear and gloves have been improved.
- An automated reporting system is being developed to make inspections more timely and efficient.

Source: UCLA. Graphics reporting by Kim Christensen