Natural OUTLOOK
PD-020/16-07 SEPTEMBER 2016

PASSING THE TEST

TCEQ's Houston-area Environmental Lab Moves into New Facility

Aging buildings are known for their challenges. In one particularly memorable event at the Texas Commission on Environmental Quality's former environmental laboratory in Houston, chemists had to contend with wet ceiling tiles falling on them, thanks to issues with the air-conditioning system.

In another, a bird somehow ended up inside a wall, which had to be demolished and rebuilt.

Such challenges can be particularly problematic for chemists testing for contaminants in various types of samples, but they managed to cope. Nevertheless, these incidents were an indication that the time was right for the TCEQ to find a new space for the environmental laboratory.

The former Houston lab, which was more than 25 years old and not specifically designed to be a laboratory, had other problems that were even more pressing: It had a dysfunctional physical arrangement, inadequate lab infrastructure, and an inefficient HVAC system with improper ventilation, and posed significant safety hazards to lab personnel, according to a study performed by an outside consultant.

Earlier this year, more than four years since the search to find a new laboratory began, the agency finally opened its new and nearly 15,000-square-foot laboratory in Sugar Land. The lab—which provides the TCEQ with analytical support for a wide variety of water, wastewater, and air testing—was especially designed for all of its needs.

"We are very pleased," says Shirley Best, the lab's manager and one of its employees since 1980, when it operated under the Texas Department of Water Resources, one of the TCEQ's predecessor agencies. "The work environment is more conducive for analytical activities, the employees are comfortable, and it feels safer now."

The lab, which has 21 employees, tests more than 5,000 samples per year for more than 49,000 different analytes. The same sample can often be used for a wide spectrum of tests.

Designed to Be a Laboratory

The new laboratory tightly controls its environmental conditions to prevent unwanted contaminants—such as metals carried in with the dirt on the bottom of shoes—from somehow finding their way into a sample. Given the sensitivity of the equipment, even tiny extraneous particles can alter test outcomes. The levels for metals such as mercury and arsenic, for instance, are measured in parts per billion, which are amounts far smaller than what can be seen by the naked eye.

Chemist K.M. Rahman takes hydrometric measurements of sand, silt, clay, and gravel in a sediment sample.

Sugar Land Laboratory Manager Shirley Best, who recently celebrated 35 years with the TCEQ, explains the process for testing metals in water. When Best started with the lab in 1980, the agency that ran it was then known as the Texas Department of Water Resources.

Features that help keep samples clean include epoxy-coated floors, walls made of a special material that inhibits dust, mats that pick up dirt from shoes, separate air-conditioning and humidity controls, air-pressure controls, fixtures made of stainless steel, and more.

"It is a nice lab," says Debbie Phillips, the assistant lab manager. "When we came here, we had everything designed the way we wanted. The old lab no longer met our needs."

Because of the extreme precision required in environmental testing, the very environment that the tests are conducted in needs to be fully controlled.

"Certain tests have temperature requirements," says Phillips, who has been with the TCEQ since 1993, when it was known as the Texas Natural Resource Conservation Commission. "For some tests at the old laboratory, it was too hot, or it was too cold. Certain tests have to be humidity-free." Some tests are even light-sensitive.

Another reason that the conditions in the lab must be maintained according to specific standards is because of the equipment that the chemists use.

"Components of the mass spectrometer could be destroyed if the heat generated by the instrument is not drawn off properly," Best says.

Properly Sized and Priced Right

The old environmental laboratory had originally shared the same building with the TCEQ's regional Houston office. But years ago, the regional office moved away for bigger digs, and the space left behind was too big for the lab and clearly not adequately engineered for the increasingly complex work.

The TCEQ, which was assisted by the Texas Facilities Commission in its hunt for a new laboratory, could have built a new laboratory from the ground up or repurposed a blank space, such as a former Goodwill Store. Best says that she had an ominous feeling at one of the empty buildings she toured when the door fell off as they tried to enter.

After an extensive search, they decided on the facility in Sugar Land that had previously been a stem-cell laboratory.

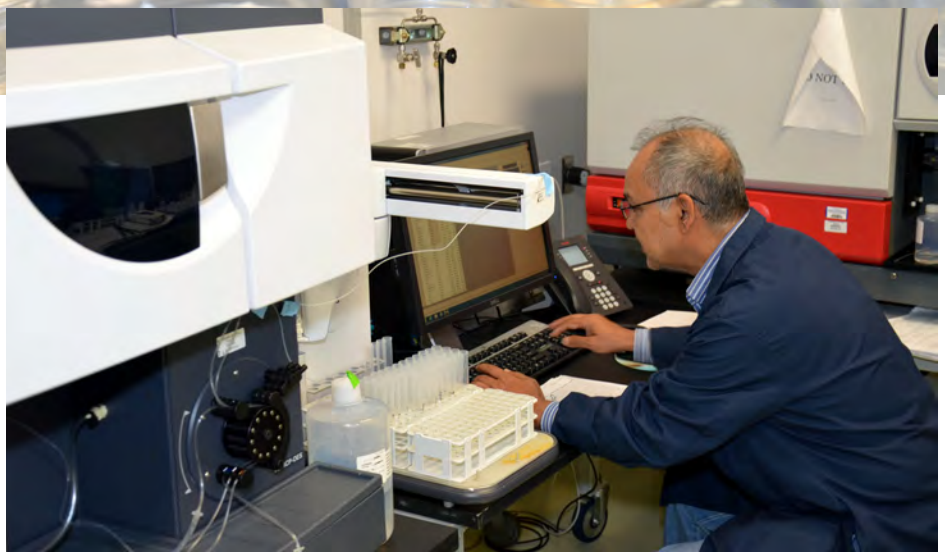
New Features at the Sugar Land Lab

- A built-in cold room where the samples are stored at just above freezing temperature, to maintain their integrity. The unit in the old facility was outdoors in a separate structure.
- Four new, acid-resistant fume hoods, which replaced the old, rusty metal hoods.
- A video security system.
- A remote-controlled security entry fence that provides access to the loading-dock area.
- A new separate computer room AC (CRAC unit) that keeps the computer servers cool and functioning properly.
- A built-in emergency back-up generator, which replaced the previous separate stand-alone generator and provides power to critical units in the laboratory during unforeseen power outages.
- Separate dedicated power outlets and switches for the clean room, which eliminates the need to turn the power on or off at the breaker box.
- New HEPA filters in the ICP-MS and metals prep area that create a clean-room environment for better quality assurance in metals testing.
- Two new Miele laboratory-specific dishwashers.
- A new, once-through HVAC system for the main lab room, which provides a safer and more robust and balanced air flow, to ensure proper ventilation.
- A large sample-receiving room that allows the ice chests to be placed indoors, versus stacking them outside in the parking lot.
- Tile and professional epoxy-coated flooring that covers approximately 98 percent of the floors.

A big advantage of this choice was that the previous occupants had already invested significant sums in infrastructure.

It took a year, from May 2015 to May 2016, to modify the building for the TCEQ's purposes. Redesigning and retrofitting the stem-cell facility for the special functional requirements of an environmental laboratory also cost $900,000.

While the new lab is about 8,000 square feet smaller than the old space in Houston, it is designed for exactly what the TCEQ needs. The new facility also saves money in annual leasing costs. The old building in Houston cost $318,555 per year, while the new facility runs at $240,000.



Chemist Muhammad Ali sets up and prepares an analytical run for metal samples utilizing inductively coupled plasma mass spectrometry.

TCEQ staff celebrate the completion of the new Sugar Land laboratory with a ribbon cutting on June 23. Left to right: Assistant Lab Director Debbie Phillips; TCEQ Chairman Bryan W. Shaw, Ph.D., P.E.; Lab Director Shirley Best; Office of Water Special Counsel Kevin McCalla; TCEQ Executive Director Richard Hyde; and Office of Water Deputy Director L'Oreal Stepney.

Transitioning to a New Space

In January, the laboratory started operations on a limited scale, to allow for the fine-tuning and optimization of specialized instrumentation. Accreditation was transferred, and a relocation assessment was conducted by the Louisiana Department of Environmental Quality to verify the effects of the move on the laboratory's performance. The Sugar Land lab's reassessment was completed in August.

The LDEQ is the primary accrediting authority that performs onsite assessments to ensure that the laboratory is in compliance with National Environmental Laboratory Accreditation Conference standards. Even though the TCEQ itself accredits environmental labs, it would be a conflict of interest to do this for its own laboratory.

During the downtime when the lab was under construction, another laboratory took up their workload. Many of the chemists took short vacations, but they also helped with the move and consulted with the special technicians who dismantled equipment at the old facility and reassembled them in Sugar Land.

The downside of moving the lab from Northeast Houston to Sugar Land, which is southwest of the city, however, has been that it significantly increased the commuting distance for some employees. Some chemists decided that they did not want to endure the new commute and, consequently, left the agency.

"We had to start with several new staff," Phillips says. "It was like starting over. The new chemists had to learn the process."

But at the end of the day, the shiny and safer new facility in Sugar Land, designed for the specific needs of the TCEQ, made it all worth it.

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