

# TEXAS PUBLIC HEALTH LABORATORY: KEEPING A LARGE POPULATION SAFE

by Emily Mumford, writer

Texas has become synonymous with the concept of “large.” A “Texas-sized” portion at a steakhouse anywhere in the US guarantees a huge portion of meat. As the second largest and the second most populous state (with more than 23 million residents), it comes by its reputation honestly.

Founded more than 100 years ago, the main facility of the Texas Department of State Health Services Laboratory Services Section is located in Austin. Formerly a series of buildings dating to the 1950s, a new building was completed about six years ago, 100 feet away from the original site. Today’s lab is a seven-story, stand-alone building with approximately 120,000 square feet of usable space. Recently, despite the facility’s size and modernity, one of the older buildings has been reclaimed and renovated for unknown sample triage. Designed in the 1990s—before the 2001 anthrax and white powder crises changed the landscape of public health laboratory science—the new building did not have an ideal set-up for handling potentially deadly, unknown samples.

The oversized nature of the work, said director Susan Neill, PhD, MBA, is one of the laboratory’s biggest challenges. Receiving specimens from far-flung regions, testing in enormous volumes, introducing pricy new equipment in multiples, staffing hundreds of positions and managing the vast quantity of data are part of the daily mix for this large public health laboratory.

The public health laboratory employs 430 people; approximately 300 are scientific staff. Fortunately, due to the proximity of UT-Austin and Texas A&M, filling empty positions has not been too difficult. The laboratory routinely trains entry-level laboratorians.

Such a large staff is necessary to meet the needs of the state. The lab receives 2 million samples per year; 1.5 million of those are screened at the Austin facility. The remaining samples are tested in two branch public health laboratories: the San Antonio-based Women’s Health Laboratories, which conducts tests for the Texas Center for Infectious Disease and for women’s health programs and a BSL-3 rated facility in southern Texas, which performs local testing and specializes in border infectious diseases, TB and clinical care.

In Austin, the work is organized into two units at the lab: the Laboratory Operations Unit, which includes Biochemistry and Genetics, Microbiological Sciences, Environmental Sciences and Emergency Preparedness; and the Quality Assurance Unit.

## BIOCHEMISTRY AND GENETICS

The laboratory’s highest volume of testing is for the newborn screening program. In addition to a large number of births each year, Texas requires that every newborn be screened twice, bringing in 800,000 specimens per year. In December 2006, the newborn screening process at the lab leapt forward dramatically, expanding its screening panel from 7 disorders to 27.

“The expansion of our newborn screening panel really stands out as one of our biggest success stories,” said Neill. “The expanded screening went live with the new testing after an implementation timeline that kept getting shorter and shorter, due to external factors. In a short six months from approval of the expansion, staff laid the groundwork—working closely with the vendors,

bringing in new technology, testing, validating, hiring new staff, training everyone. It was a phenomenal success for the laboratory.”

Another area of high volume is clinical chemistry. The laboratory performs the testing for a Medicaid program called the Texas Health Steps Program, in which children undergo well-child checks for blood lead, sickle cell anemia, total hemoglobin, diabetes and cholesterol/lipids. The lab processes 1,200-1,800 of these samples per day.

## FULL SERVICE MICROBIOLOGY

“Right now,” said Neill, “our busiest area in the lab is probably public health bacteriology. They handle foodborne outbreak testing, running PFGE on isolates. We are very busy testing tomatoes and other produce as well as clinical samples for salmonella.” Texas has been hit hard by the recent national foodborne outbreak, and the lab has been processing 81 PFGE tests per day. More samples arrive every day, and staff are rushing to complete the testing as quickly as possible.

“Last week, late on Friday afternoon, an epidemiologist called, worried that some of the tomato samples that had just been received by the lab would end up sitting over the weekend. But staff already had the samples on the gels and were able to give answers to the epidemiologist just one to two hours after the call.”

The microbiology section of the lab performs a full array of tests: checking the safety of water, milk and meat; conducting Gen-Probe STD screening; and running PCR tests for pertussis or arbovirus. A diagnostic serology group tests blood for diseases such as HIV, STDs, arbovirus, measles, mumps and rubella. The parasitology program is robust, working with US immigration officials to test refugees entering the country.

“We do TB testing and lots of it,” said Neill. “All three labs do TB testing.” Also in the microbiology division is a virology department that runs 8,000-10,000 rabies tests per year. The same group tests 150,000-200,000 mosquitoes per year for arbovirus. “Our virus isolation group can culture almost any human virus, from enteroviruses to dengue,” said Neill. “We are fortunate to have an electron microscope here for rapid detection

of viral particles.” The microscope is a relatively infrequent occurrence in public health laboratories because it is expensive and requires dedicated personnel.

### ENVIRONMENTAL SCIENCES

Among its variety of capabilities, the Texas lab handles all of the testing for EPA’s safe drinking water program, measures toxins in seafood and searches foods or consumer products for harmful additives, such as lead.

The lab also performs surveillance on the state’s nuclear power plants, looking for radionuclides in environmental samples. “We have a mobile radionuclide lab,” said Neill. “In fact we just got a new one this year. We use it regularly for water testing to make sure it is always in good working order, ready for any emergency. We also use it a few times per year in large-scale state drills involving the power plants.”

### PREPAREDNESS

For other emergency events, such as bio- or chemical terrorism, the lab’s preparedness division would be called into action. The chemical laboratory is a Level 2 rated facility, and the bio side can provide the full reference level testing expected of an LRN reference laboratory.

### QUALITY ASSURANCE

Underpinning all of this scientific work is the lab’s quality assurance division. This division works with everyone, handling quality assurance, specimen acquisition, data entry and reporting. “All 2 million samples must be entered into the system upon arrival,” remarked Neill. “There is always a lot of work.”

Strengthening the laboratory’s ability to manage all of this data is one of Neill’s goals. “Right now we have disparate LIMS [laboratory information management systems]. We need to link them or merge them,” she said. “Our newborn screening LIMS will always be separate because the program is so enormous. But we also have one for microbiology, one for clinical chemistry, one for environmental chemistry and one for the pathology done at the San Antonio branch.”

Neill is able to set big goals for the lab, confident in the staff’s high quality work performance. “We have really dedicated and committed teams in place. The staff makes the lab.”

The importance of having a personal connection and commitment to the job can’t be underestimated. Neill herself was originally guided toward public health by a professor at the University of Texas. This professor taught the public health class and, while serving as a mentor and providing an opportunity for Neill to work in her research laboratory, encouraged her in further work in public health. “I was always interested in public health, but that experience really made a difference to me,” she reflected.

Neill received her bachelor’s degree in microbiology from UT-Austin, her master’s degree in microbiology from the University of Illinois at Champaign-Urbana and her doctorate from the University of Illinois. She returned to Texas for her post-doctoral work. After sev-

eral years in the public health laboratory, she went back to school and received a Master’s of Business Administration from St. Edward’s University in 1998. She still remains true to her roots as an avid fan of UT athletics. Neill attends all of the home football games and splits season tickets to the basketball games with friends.

After school and after three years working in research and development for a diagnostic company, Neill returned to the public health laboratory in 1987, spending four years as the section chief of the rabies arbovirus unit. For eight years, Neill served as supervisor of the virology branch. After a short stint as the head of the division of biochemistry and genetics, Neill became acting laboratory director in 2001.

Neill is well-known among APHL leadership, serving on the Board of Directors as secretary-treasurer since 2002 and is now APHL’s president-elect. Running APHL’s budget might seem relatively straightforward to Neill, since her laboratory operates on an annual budget of approximately \$32 million. Of that, 22% is state general revenue, 17% is federal grant funds and 60% is revenue (Medicaid and insurance reimbursements, as well as direct fee for service).

“The biggest challenge we have here is trying to juggle the diverse revenue streams,” said Neill. “We have to manage cash flow since most of the time the lab doesn’t get paid until the work is done. The volume and complexity of our lab add to our challenge.”

And, despite the big picture of the lab’s large operating budget, it is often challenging to add new technology. The enormous population of Texas creates such a large volume of testing that an upgrade typically means not one new machine, but many. “When we upgraded our newborn screening testing panel, we had to add 10 tandem mass spectrometers to handle the testing volume. This can be a staggering hurdle to implement new technology,” said Neill. And that’s to be expected in other lab areas, too. Despite the intrinsic challenges, the lab continues to investigate new technology that will keep its work on the cutting edge.

Moving forward, Neill continues to set goals. “We handle a large amount of specimens, and we need a courier system to ensure that specimens get to our lab in a timely manner,” said Neill. Establishing a courier system is complicated by the state’s geographic size; that awkward distance is also why it’s so vital for the state to have a fast courier system that gets specimens to the lab promptly. “Right now samples are transferred around in every way imaginable—FedEx, USPS, UPS, bus,” said Neill. “There are too many transit delays.” The lab is requesting resources in the next year to develop a courier system.

The challenges of a large population and a large geographic area have required the laboratory to be resourceful over the years. Modernizing facilities, training staff and expanding services will always be outsize projects. Yet the bustling state laboratory facility, tucked close to some of its clients in residential Austin, has managed to thrive, delivering quality public health services over the years. ■