

Quality Matters

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Quality Assurance: A Complex and Dynamic Program

Our current standard specifications define Quality Control/Quality Assurance as “the program used jointly by the contractor and the Department to control and assure compliance with the requirements of the contract.” The specifications further define Quality Assurance as “the process used by the department to inspect, sample and test, and accept the contractor’s work.” The term *Quality Control/Quality Assurance*, or QC/QA, has been commonly used since the release of the 1995 version of the

Federal Highway Administration’s code on Quality Assurance Procedures for Construction (23 CFR 637).

Based on these definitions, QC/QA has been a source of confusion since the specifications separate the contractor’s responsibility for quality control from quality assurance and erroneously define quality assurance as being the acceptance process for materials and workmanship. This has contributed to the misinterpretation that duplication of testing exists by requiring quality control tests and acceptance tests in our quality assurance program.

In 2004, FHWA published *Technical Advisory T 6120.3*, which clarifies the definition of quality assurance.



Pictured above: Mike Bailey, Chemical Unit

The advisory redefines quality assurance as the combination of quality control and acceptance testing/inspections. It also maintains that a fundamental separation exists between the following: 1) quality control testing that is performed for the sole purpose of controlling a construction process and is not necessarily done on a random sampling basis, and 2) acceptance testing that assesses the quality of the finished product on a random basis. Both types of testing are necessary for an effective

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<http://www.dotd.louisiana.gov/highways/construction/lab/home.asp?page=forms>

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Chemical Unit Spotlight

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For many years, the Materials and Testing Section's Chemical Unit has served as both a primary testing facility and a support arm for other laboratory units within the section as well as LTRC, district laboratories, and DOTD's Procurement Section, and other state and municipal agencies. As the only resource offering chemical analysis services within the Department, this unit has unique responsibilities in DOTD's Quality Assurance program. The Chemical Unit consists of the Quantitative Lab, Paint Lab, Cement Lab, X-Ray Lab, and Research and Evaluation Laboratory. The unit reports to Henry Lacinak, Materials Testing and Evaluation Engineer Administrator.

The MatLab's Chemical Unit is able to consistently achieve superior test results, which provides internationally-recognized credibility to our analyses.

Due to recent technological advances, the Chemical Unit has upgraded its facilities while maximizing the impact of taxpayer dollars. For example, the chemical analysis of Portland cement and fly ash has evolved from conventional wet methods to modern x-ray fluorescence spectrometry, resulting in optimum accuracy. In 1992, nearly 80 per-

cent of the laboratories participating in NIST's CCRL Proficiency Sample Program used x-ray technology for cement chemical analysis, but DOTD was unable to take advantage of such advances because of budget constraints. However, the Materials Section was able to acquire a state-of-the-art PANalytical X-Ray Fluorescence Spectrometer and related peripheral instruments in early 2002.

Within months, Chemical Unit personnel achieved AASHTO accreditation for the first time, thus designating DOTD the only AASH-

TO-accredited facility for Hydraulic Cement Chemical Analysis (AASHTO T105/ASTM C114) in Louisiana. By utilizing the spectrometer's standardless software, the chemical composition of fly ash and unknown materials can be quantified with a level of accuracy that consistently achieves top results in NIST's CCRL Proficiency Sample Program. With these advances, the MatLab's Chemical Unit is able to consistently achieve superior test results, which provides internationally-recognized credibility to our analyses.

More recently, the Department acquired a research-grade Bruker Fourier Transform Infrared spectrometer for identifying organic substances. This is accomplished by sending infrared light through or onto samples and comparing the spectrum with spectra of



MatLab Continues Commitment to AASHTO Accreditation Program

In keeping with the MatLab's mission to provide an exceptional quality assurance program, we continue to maintain our accredited status through the AASHTO Accreditation Program. The program provides a mechanism for recognizing a laboratory's competency to perform specific tests on highway construction materials and calibrate testing equipment.

Shortly after AASHTO completed the development of the program in June of 1988, the MatLab was awarded accreditation in the following September, making us the first highway construction laboratory to receive accreditation through the AASHTO-sponsored program.

Accreditation is dependent upon meeting several respective parameters, with the first being the development and implementation of a Laboratory Quality Systems Program meeting the requirements of AASHTO R 18, *Establishing and Implementing A Quality System for Construction Materials Testing Laboratory*. The program is

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designed specifically for the individual laboratory providing detailed guidelines used to document the activities associated with laboratory quality assurance requirements, standard operating procedures, employee qualifications, equipment inventory, in-house calibration procedures and test reporting.

The second parameter is on-site laboratory assessment. The assessments are performed routinely—every 18 to 24 months. The AASHTO Material Reference Laboratory (AMRL) performs the assessment for soils, asphalt cement, cutback asphalt, emulsified asphalt, bituminous mixtures, and aggregates. The Cement and Concrete Reference Laboratory (CCRL) performs the assessment for cement, concrete, and steel bars. The assessment consists of a review of the Laboratory Quality Systems Program, an examination of the laboratory's facilities, equipment and test apparatus, and calibration records as well as an evaluation of the ability of laboratory technicians to conduct the specified tests on construction materials in accordance with ASTM and AASHTO standard methods. If any deficiencies are noted during the assessment, the accredited laboratory must

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Pictured above: Wilson Battley, Chemical Unit

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Quality Assurance *(cont. from page 1)*

quality assurance program. DOTD's new standard specifications will follow this lead by defining **Quality Assurance** as a multi-functional program that includes both quality control testing by the contractor for process control and acceptance testing by the Department for assessing the quality of the contractor's materials and workmanship. The terms *Quality Control/Quality Assurance* or *QC/QA* will no longer be used in our definitions.

For years, DOTD has taken the traditional approach in which it performs acceptance tests and the contractor

performs tests to control the construction process. Early versions of FHWA's code for quality assurance were written using this approach, but the code

was revised to recognize the concept of state agencies using the contractor's test results in the process of accepting materials and workmanship. Since 23 CFR 637 and FHWA's Technical Advisory allow contractor's test results to be used in the assessment of quality for acceptance, some states have considered this as an opportunity to reduce staffing levels by decreasing the sampling and testing functions that are performed by agency personnel. Even DOTD has evaluated this as a possible way to streamline its quality assurance program.

A strict interpretation of the code and the advisory, however, indicates that the amount of sampling and testing will increase if the contractor's data is used in the acceptance process. This increase would result from 1) the increased testing responsibilities for the contractor since quality control testing will still be required for process control in addition to any contractor testing performed for acceptance, and 2) DOTD's need for statistical verification testing as mandated by 23 CFR 637, which could result in an increase in the amount of agency tests.

Over the past several years, the Materials and Testing Section has worked with various committees to evaluate the Department's sampling and testing requirements. This group identified opportunities for significant reductions in the amount of sampling and testing required on projects. "Small quantity rules," which define the maximum amounts of material that can be used on a project before sampling and testing is required, have been implemented on a significant number of construction materials since 1999. Other changes include reducing sampling frequencies for non-critical materials, using pre-tested or pre-certified

materials on projects, and even eliminating sampling and testing requirements by substituting visual inspections by project

personnel for acceptance. The major criteria used during the evaluation of the sampling and testing requirements consisted of failure rates and the nature of the material or workmanship with regards to being critical (safety sensitive or cost sensitive) or non-critical. Even the Department's Independent Assurance program was recently changed to reduce the amount of IA sampling and testing by 80 percent.

Simply reducing sampling and testing will not assure the public of a quality transportation network. Testing and inspection will always be needed to assure quality. Certified inspectors, independent assurance programs, acceptance testing, verification testing, and quality control tests will still be required to protect the public's investment and comply with federal mandates. Everyone involved in the quality assurance program must understand and commit themselves to the concept of the program. The contractor's role is clearly to construct quality into each phase of a project, so quality control testing becomes a critical part of his

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DOTD's New MS4 Web Site

The Storm Water Program, which is overseen by the MatLab's Environmental Evaluation Unit (EEU), serves DOTD by developing and implementing best management practices (BMPs) to minimize or eliminate the pollutants in runoff from Department maintenance facilities and highways from entering Louisiana's waterways. According to the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit, issued by the Louisiana Department of Environmental Quality (LDEQ) governs water pollution by regulating point source discharges to these waterways. The EEU's role is to provide guidance to responsible parties to ensure compliance with the LDEQ's permit limitations.

In satisfying the requirements of the NPDES permit, the EEU must also implement measurable goals for six minimum control measures. The DOTD's Municipal Separate Storm Sewer System Web site is published to meet a control measure requirement of the department's statewide MS4 Phase II permit. The Web site was launched on August 10, 2005, and is available to the public for information and contact purposes. The MS4 Web site provides valuable information on the scope of the MS4 program and associated regulations. It is designed to assist in the national effort to educate the public on the program's initiative to protect the nation's surface waters. Additionally, it provides a means for concerned citizens to report illicit discharges within DOTD's highway system.

Visit <http://www.dotd.louisiana.gov/highways/construction/lab/ms4/>

The department and the EEU's goal is to provide pertinent information to citizens so they may contribute to this effort. To that end, the Web site provides best management practices that can be incorporated into one's daily activities. These practices ensure viable streams and lakes for essential Louisiana industries, such as fishing, seafood, and water recreation. Some of the BMP categories included on the Web site are car washing, lawn and garden maintenance, and water conservation, with specific control measures addressed for each. As required by the permit, an annual progress report is required. This document is available for viewing on the MS4 Web site.

US. Census maps of urbanized areas that are covered under the Department's permit are available for downloading. Within these areas, coverage for illicit discharge monitoring is required. Examples of common illicit discharges can also be viewed on the Web site. Additional technical information is available via links that are accessible from the MS4 Web site. These include the Environmental Protection Agency, the Louisiana Department of Environmental Quality, and the U.S. Census Bureau.

At DOTD, quality matters! The EEU encourages all DOTD employees to visit the site so that we may provide excellent customer service through knowledge of department initiatives.

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Chemical Unit Spotlight (cont. from pg. 2)

known substances within the instrument's library. Utilizing FT-IR technology, the Chemical Unit can "fingerprint" samples, such as paint, epoxy, and steel to ascertain that materials used on DOTD projects are the same materials originally approved by the Department. Beyond the routine samples, new product evaluation and research projects have become the norm for the Chemical Unit.

DOTD's 15-year-old Leco Carbon Sulfur determinator continues to play a major role in the analysis of steel samples, which range from fence posts to the nuts and bolts that literally hold bridges together. The possibility of one lot of defective nuts and bolts on a bridge project vividly illustrates the added value of quality assurance to the traveling public.

Whether the material is as vital to maintenance and construction as steel, paint, or concrete, or as innocuous as herbicides, surfactants, or even seldom-used de-icers, the MatLab's Chemical Unit plays a significant role in the Department's Quality Assurance Program. Despite budgetary constraints, administration and personnel continue to advance and maintain the unit's rightful place as a state-of-the-art facility. Using these capabilities ensures that only materials meeting DOTD's strict quality standards are used to build and maintain Louisiana's transportation infrastructure.

AASHTO Accreditation (cont. from pg. 3)

provide AASHTO with satisfactory evidence noting that all deficiencies were either corrected or that action is currently being taken to correct the deficiency. Failure to respond or correct deficiencies can result in having accreditation revoked.

Proficiency testing is an additional parameter used to evaluate the laboratory's performance. Proficiency samples for soils, aggregates, and bituminous materials are prepared by AMRL. Cement and concrete proficiency samples are prepared by CCRL. The samples are forwarded to all participating laboratories, and the specific tests are performed and results returned to AMRL or CCRL for analysis and ratings. Laboratories later receive a final report indicating how each laboratory's results and ratings compare with the other participating laboratories. If low ratings are obtained on proficiency samples, the accredited laboratory must attempt to determine the cause of the low ratings and report the finding and the actions taken to AASHTO. As with inspection, failure to respond to low ratings can result in having accreditation revoked.

Currently, the MatLab's scope of accreditation includes bituminous materials, Portland cement concrete, soils, aggregates and hydraulic cement. Through laboratory accreditation, we not only **ensure** the capabilities of our laboratories and technicians performing specific tests on highway construction materials, we also **assure** that maximum quality assurance requirements are met and that superior materials are incorporated into our finished highway infrastructures.

Additional information on the AASHTO Accreditation Program and the AMRL and CCRL programs for proficiency testing and laboratory assessment can be found at the AMRL website at www.amrl.net.

New Zinc Paint System Approved for Structural Steel

Effective October 1, 2005, Qualified Products List 78: Zinc Paint Systems for New Structural Steel and 100 Percent Bare Existing Structural Steel, was established for use by the Department. Zinc Paint Systems that have met the DOTD Qualification Procedures will be listed on QPL 78 and tested for conformance to the property target values established by the Materials Laboratory at the time of approval.

Link for DOTD Qualification Procedures

www.dotd.louisiana.gov/highways/construction/lab/qpl/qual_pro/qual_proc.shtml

Link for QPL 78

www.dotd.louisiana.gov/highways/construction/lab/qpl/qpl%2078%20.pdf

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Customer Service Survey



In order to provide the best possible service to our clients and customers, we must continually improve our operations. The Materials and Testing Section is developing a Customer Service Survey to find out where to focus our improvement efforts. Thanks in advance for your support.

Quality Assurance (cont. from pg. 4)

program. At times, the contractor may have to intensify the frequency of QC sampling and testing in order to avoid pay adjustments or rejection of materials and/or work. At the end of a construction phase, however, the department can only identify the level of quality already constructed. Currently, this is accomplished through DOTD's sampling, testing, and inspection processes.

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