

Appendix 1
SCDOT Aggregate QC/QA Policy

**SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
POLICY FOR QUALIFICATION OF COARSE AGGREGATE SOURCES
(AGGREGATE QC/QA PROGRAM)
AUGUST 30, 2012**

1. General

Only coarse aggregates (including graded aggregate base material) from aggregate sources listed on the Department's Qualified Products List are qualified for use on SCDOT construction projects or maintenance operations. For an aggregate source to become qualified for use in Department work, the source must be qualified following the procedures established in this policy. In general, this policy is set forth to provide guidelines by which coarse aggregate sources will be inspected, sampled, tested, and qualified for use in SCDOT projects. In the event this policy conflicts with other Department requirements, the SCDOT Standard Specifications, Supplemental Specifications, Special Provisions, Plans and/or Construction Manual shall govern over this policy. This policy is for source qualification only. The supplied material will be tested at its point of use and will be required to meet all applicable specifications at that time.

For an aggregate source to be considered for qualification, the source must have a processing operation in place and have material already processed to meet SCDOT specifications. Aggregate stockpiles shall be sufficiently separated from one another and clearly identified. The material will be sampled from the last point of source handling (quarry or terminal). *The responsibility for locating coarse aggregate, determining the quality of the material, and developing the source rests solely with the aggregate producer.* Once an operation is in place, the supplier will be required to have:

- an approved Quality Control Plan,
- results of previous material property testing,
- a certified testing laboratory, and
- a certified Aggregate QC Technician(s).

Each of these requirements is explained in greater detail within this policy.

2. Quality Control (QC) Plan

All coarse aggregate suppliers must have *two copies* of a QC plan submitted to and approved by the Department's Geotechnical Materials Engineer prior to being permitted to supply aggregates for Department work. A report of the supplier's previous quality control test results (30 to 60 days of tests) for each material produced shall be submitted with the QC plan. The supplier is required to immediately submit a new QC plan for approval if there are changes to any of the items listed. A copy of this approved QC plan is to be kept at the source site at all times and shall be readily available for review by the Department.

At a minimum the QC plan must include:

- A. A map showing the location of the quarry or terminal.
- B. Information on company personnel to include name, job title, phone number, statement of current SCDOT certification status with expiration date, and job function as it relates to the QC of aggregate production. This information is required for all personnel involved in the sampling and testing of the aggregate production. The statement shall include identification of a *designated primary contact person* regarding actions involving this policy. This contact person is not required to be a certified aggregate QC technician.
- C. Identification of all materials intended to be produced to meet specifications for Department work. This identification is to include the material gradation classification, parent rock type and description of the material (e.g. crushed stone, river gravel, marine limestone, gneiss, granite, dolomitic limestone, lightweight aggregate, marble, manufactured, non-steel slag, steel slag, quartzite, schist, shale, etc.).
- D. Identification of what tests will be performed (cite AASHTO test designation), what frequency they will be performed, and where the samples will be obtained. The Department's *required minimum* testing frequencies are listed in Table 1.

- E. Procedure for monitoring QC test data. The procedure is to address what the QC manager will do when he/she notes test results that are out of the tolerance range or are exhibiting a trend towards a supplier-determined control limit or Department specification limit. This procedure should include the action required, what will be done to address the problem, and who is responsible for taking the action. Identify which QC personnel (by title or position) will be reviewing or monitoring the QC data for the purposes of adhering to this policy.
- F. Identification of procedure for submitting monthly QC data to the Geotechnical Materials Engineer at the SCDOT Office of Materials and Research using an electronic format. A computer file in the appropriate format can be obtained either on disk or by email by contacting the Geotechnical Materials Engineer at (803) 737-6692 or lockmangm@scdot.org. Requirements for submitting QC data to the Department are located in Section 5 of this policy.
- G. Location of the testing laboratory in relation to the aggregate source. When applicable, indicate which labs will perform which tests.
- H. QC plans are to be signed by a company official responsible for activities at that location.

The Department may require additional information depending on individual conditions at each site.

Table 1. Required Minimum Aggregate Testing Frequency

Test	Procedure	Materials	Value Range ⁽¹⁾	Min. Testing Frequency
Aggregate Dry Gradation ⁽²⁾	AASHTO T27	All	All	1 each 1000 tons shipped for DOT work – 1 sample per day when not shipping for DOT work
L.A. Abrasion (Type B and C)	AASHTO T96	Stone (non-slag)	55.0 & above	1 daily
			50.0-54.9	1 weekly
			40.0-49.9	1 monthly
			Less than 40.0	1 every 6 months
		Slag	35.0 & above	1 weekly
			Less than 35.0	1 every 6 months
Sand Equivalency (unwashed screenings only)	AASHTO T176	Stone (Non-Limestone)	45.0 & less	1 weekly
			Over 45.0	1 monthly
		Limestone	33.0 & less	1 weekly
			Over 33.0	1 monthly
Specific Gravity (Bulk, Bulk (SSD), Apparent), & % Absorption	AASHTO T85	Stone (non-slag)	2.85 & above (apparent)	1 weekly
			Less than 2.85 (apparent)	1 every 3 months
		Slag	2.00 & less (apparent)	1 weekly
			2.01 – 2.84 (apparent)	1 every 3 months
		2.85 & above (apparent)	1 weekly	

⁽¹⁾ This range will be determined for each source by the Geotechnical Materials Engineer based on the average of the supplier's tests from the most recent month.

⁽²⁾ Applies to *each individual material produced* with the intent to meet SCDOT specifications. Marine limestone operations providing graded aggregate base material shall also perform AASHTO T-11 for the No. 200 sieve.

If the last point of handling is a terminal or sales-yard supplying material from a source that is already on the Qualified Products List, and the originating source is properly complying with this policy, then the terminal shall be required to provide only gradation test results per Table 1. Physical property monitoring will be based on information obtained from the originating source (the quarry). If the originating source is not on the Qualified Products List, then the terminal or sales-yard will be considered the point of last handling and will be subject to all of the

requirements of Table 1. Additionally, sources not producing or supplying unwashed screenings (as indicated in the QC Plan) will not be required to submit Sand Equivalent test results. Any special circumstances concerning source requirements will be dealt with on a case by case basis.

3. Technician Certification

All personnel that are involved in the QC sampling and testing will be required to be certified by the Department as an *Aggregate QC Technician*. This certification is required of all personnel involved in the QC sampling and testing of aggregates including supplier, Department and sub-contracted (e.g. consultant) personnel and is valid for a period of 5 years.

The Department's Technician Certification Board formally controls certification and recertification matters. This board maintains authority over the process and may be involved in any certification-related concerns or disputes.

The Aggregate QC Technician certification is divided into two levels that are referred to as Level 1 and Level 2. Level 1 certification primarily emphasizes aggregate sampling and gradation analysis. This level of certification is required for any technicians performing any aggregate quality control testing. Level 2 certification emphasizes the other required aggregate tests (non-gradation). Any technicians performing the LA Abrasion test, Sand Equivalent test, Flat and Elongated Particle test, or the Specific Gravity & Absorption test, shall be Level 2 certified. *All technicians who desire Level 2 certification must first obtain and continue to maintain Level 1 certification.*

Technicians who are not sampling material, but only performing the required testing within an AASHTO AMRL accredited laboratory, and who are certified through the laboratory's certification program in the specified aggregate tests, will not be required to be Level 1 or Level 2 certified.

The supplier shall have a certified Level 1 technician on site at all times while producing or shipping material to meet Department specifications. If an inspection indicates that the supplier is producing or shipping material without a Level 1 technician on site, the Geotechnical Materials Engineer will provide a written warning to the supplier's representative. If the same supplier is found producing or shipping without a Level 1 technician for a second time within a year at the same location, the source will be suspended from the approval listing for 45 calendar days. A third occasion of producing or shipping material without a Level 1 technician present will result in the supplier's source being removed from the approval listing for one full year.

A. Initial Certification for Level 1

All persons pursuing Level 1 certification will be required to do the following:

1. Demonstrate proficiency in coarse aggregate sampling and gradation testing to a certified Level 2 technician that does not work for the same company as the person pursuing the Level 1 certification.
2. Pass a Level 1 written exam at Tri-County Technical College covering aggregate production, aggregate sampling, and aggregate testing. For exam information and schedules, refer to the Tri-County Technical College website at:

www.tctc.edu/scdot

A nominal registration fee will be charged.

B. Recertification for Level 1

To remain Level 1 certified, personnel must renew their certification every 5 years by doing the following:

1. Demonstrate proficiency in coarse aggregate sampling and gradation testing to a certified Level 2 technician that does not work for the same company as the person pursuing the Level 1 certification.

2. Pass a Level 1 written exam at Tri-County Technical College covering aggregate production, aggregate sampling, and aggregate testing. For exam information and schedules, refer to the Tri-County Technical College website at:

www.tctc.edu/scdot

C. Initial Certification for Level 2

All persons pursuing Level 2 certification will be required to do the following:

1. Obtain Level 1 certification.
2. Attend a Level 2 training class approved by the Department. For class information and schedules, refer to the Tri-County Technical College website at:

www.tctc.edu/scdot

A nominal registration fee will be charged.

3. Demonstrate proficiency in coarse aggregate tests: LA Abrasion (AASHTO T96), Specific Gravity (AASHTO T85), Flat and Elongated Particles (SC-T-77), & Sand Equivalency (AASHTO T176).
4. Pass a written exam covering aggregate production, aggregate testing, Department specifications and QC program requirements.

D. Recertification for Level 2

To remain Level 2 certified, personnel must renew their certification every 5 years by doing the following:

1. Maintain Level 1 certification.
2. Attend a Level 2 recertification class approved by the Department. For class information and schedules, refer to the Tri-County Technical College website at:

www.tctc.edu/scdot

A nominal registration fee will be charged.

3. Demonstrate proficiency in coarse aggregate tests: LA Abrasion (AASHTO T96), Specific Gravity (AASHTO T85), Flat and Elongated Particles (SC-T-77), & Sand Equivalency (AASHTO T176).
4. Pass a written exam covering aggregate production, aggregate testing, Department specifications and QC program requirements.

E. Certification from Other State Agencies

Certifications from other states will not be sufficient to reduce or waive certification requirements as outlined above.

4. Testing Laboratory

A. General

All testing conducted in conjunction with this policy will be performed in a laboratory that has been certified by the Department's Geotechnical Materials Engineer or his representative. Subcontracted laboratories (e.g. consultants), quarry laboratories and terminal laboratories will all be subject to this requirement.

Each laboratory will be required, at a minimum, to contain the equipment necessary to perform the testing indicated on the supplier's approved QC plan for that location. If the laboratory is AASHTO Accredited in the required tests, it will not be necessary to have a Department inspection; however, the Department must approve the laboratory. Any laboratories utilized based on their AASHTO accreditation will be required to provide the

Geotechnical Materials Engineer with a copy of their valid accreditation certificate when submitting any test data in regard to this policy. A listing of all personnel who will be performing the aggregate testing in the AASHTO accredited laboratory, along with a listing of the tests each is certified to perform (related to this policy), shall be provided with the laboratory accreditation certificate.

In all cases, for initial laboratory certification, the supplier's representative shall submit a written request to the Geotechnical Materials Engineer requesting initial certification. The Geotechnical Materials Engineer will review the request and schedule the necessary on-site inspection. All laboratories used by the supplier for the purposes of adhering to this policy shall be listed in the QC plan submitted for Department approval.

B. Equipment Calibration and Verification

At the time of inspection, the laboratory representative shall provide a schedule of equipment calibration and verification checking as well as a notebook or computer file showing the actual calibration or verification checking data. All instruments and equipment used for calibration or verification shall be traceable to the National Institute of Standards and Technology (NIST). The calibration verification schedule shall be in accordance with the requirements of AASHTO R-18. The Department does not provide a list of required equipment (equipment necessary for testing is listed in each test procedure), nor does it stipulate the physical size of the laboratory (laboratory size and condition are left up to the supplier to determine what is suitable for their needs).

C. Laboratory Certification

When the Department inspects a laboratory, it will be inspected for those tests specified in the supplier's QC plan. The laboratory certification letter will list exactly what tests the laboratory is approved to perform. Inspection of laboratories for foreign sources will be dealt with on a case by case basis.

1. Period of Certification - Once approved, the supplier laboratories will remain qualified until such time as the Department determines there is sufficient cause to rescind that laboratory's qualification. Each supplier laboratory will be inspected during any source inspection visit to assure continual policy compliance.
2. Fee – No fee will be charged inspections of sources and/or laboratories located in South Carolina, North Carolina or Georgia. A fee to recover the actual costs for travel expenses will be charged for inspection of sources located elsewhere. Follow-up inspections to verify specification compliance *when an inspection showed deficiencies* will have a similar expense-recovery fee charged to the supplier. No source will be added to the qualified listing until any charged fees have been received by the Department.
3. Revocation of Certification – If the Department determines that a certified laboratory no longer meets the certification requirements (e.g. equipment missing, broken or not calibrated), and the deficiency cannot be repaired before the next required test is due to be performed, the supplier representative will be notified of the deficiency in writing and will be given 15 calendar days to correct the deficiency.

After 15 days, the Department's Geotechnical Materials Engineer representative will re-inspect the laboratory and, if the deficiency has been corrected, the laboratory's certification and the source's qualification status will continue. If the supplier has demonstrated that he/she is actively attempting to remedy the noted problem, or is waiting for parts, etc., he/she may request additional time between inspections to complete the necessary repairs. Additionally, the supplier is permitted to utilize an approved off-site laboratory (without modifying the QC plan) until such time as the main laboratory is found to be in compliance with these requirements.

If the deficiency has not been properly corrected within the 15 calendar-day period, the Department will revoke the laboratory certification and qualification status of the source for a minimum of 45 calendar days. The Geotechnical Materials Engineer will notify key

supplier personnel by registered mail and Department personnel by e-mail informing them of the action taken.

After the 45-day period, the Geotechnical Materials Engineer or his representative will re-inspect the laboratory and, if the deficiency has been corrected, will reinstate the laboratory's certification and the source's qualification status. If, at the time of this inspection, the deficiency has not been satisfactorily corrected, the Geotechnical Materials Engineer will remove the source from the Department's Qualified Products List. This removal notice will be through registered mail to the supplier and by e-mail to the appropriate Department personnel.

Once removed, the source will not be permitted to supply material to existing or pending Department projects or maintenance forces. The supplier source representative may apply in writing to the Geotechnical Materials Engineer for re-inspection after 12 months have elapsed from removal from the Qualified Products List. The laboratory will be inspected at that time and will be treated as a "new" laboratory subject to the requirements stated in this document.

5. Supplier QC Test Report Submittals

A. General

All material produced for intended use on Department projects shall be sampled and tested according to the supplier's approved QC plan. For the Department to monitor the supplier's material properties, the supplier will furnish to the Geotechnical Materials Engineer the test results, as identified in Table 1 and in the QC plan. ***Gradation results are to be listed by material type and listed for the month by each sieve of each material (list the sieve's target value).***

Target values are values established by the supplier for each material property and may not always relate directly to Department specifications. These values are for use by the supplier to control material properties based on material variability.

Both in-tolerance and out-of-tolerance QC test results are to be reported since the Department will use this information for the development of a material-variability database. The only test results that will be directly compared to one another will be the ones from samples taken during site visits when split-samples are obtained ^{Note 1}. It is recommended that suppliers retain a copy of their test results for at least one calendar year.

Note 1: If suppliers continuously submit only those samples that meet specifications and not those that are out of specifications, then any analysis of the submitted data for future use (refining the specification tolerances, etc.) may indicate an unusually low testing variability that could possibly translate unintentionally into tighter comparison specifications.

The supplier shall also submit a listing of all corrective actions taken during the reporting period.

B. Submittal Format

The QC test results that will be submitted to the Geotechnical Materials Engineer shall be provided in an electronic format (computer file) that will be provided to the supplier by the Department. It is required that each supplier has access to a personal computer in order to properly submit these results. The Department will define the appropriate electronic format and provide a template computer file.

C. Submittal Location

All QC test results are to be mailed to:
SCDOT Office of Materials and Research
Attn: Geotechnical Materials Engineer
P.O. Box 191
Columbia, SC 29202

Or delivered to:
SCDOT Office of Materials and Research
Attn: Geotechnical Materials Engineer
1406 Shop Road
Columbia, SC 29201

The Geotechnical Materials Engineer can be reached at (803) 737-6692 if there are any questions or concerns. **Whenever possible, the supplier is encouraged to arrange for QC data submittal using electronic mail.**

D. Submittal Conditions

The QC test results for the prior month are to be submitted to the Geotechnical Materials Engineer by the end of the 10th of each month. *If no material is produced during the reporting month, then a note to this affect should be submitted in lieu of test results.* The absence of either test results or an appropriate note by the 10th of the month will signify that the supplier is no longer interested in remaining on the Department's Qualified Products List. The Geotechnical Materials Engineer will attempt to contact the supplier to determine why the information has not been received; however, it is ultimately the responsibility of the supplier to submit the test results within the given time frame.

If it is determined that the supplier is not adhering to this policy, or wishes to be removed from the qualified products list, the Geotechnical Materials Engineer will notify the company's primary contact person by certified mail that the supplier will be removed from the approval list in 30 days. The company official may provide a written request to remain on the list during this time. It will be left to the discretion of the Geotechnical Materials Engineer as to what actions will be necessary for the supplier to remain on the list. When a source is removed from the qualified products list, an email notification will be immediately sent to all Department Districts and appropriate units and the qualified products list will be updated accordingly.

6. **Department Monitoring**

Each established coarse aggregate source will be inspected when the Department deems it necessary. Inspection intervals may vary from more than once per year to once every 3 to 5 years. Inspection intervals may vary from source to source and may be affected by consistency of materials, frequency of failing samples, or other factors as determined by Department representatives. During the source inspection, a Department representative will inspect the QC laboratory, may obtain split-samples, review supplier QC data, review equipment and personnel certification records and discuss any new developments or concerns. Samples obtained for qualification shall represent material already processed and produced to meet SCDOT specifications. Any samples obtained by the Department inspector will be obtained in the presence of the supplier QC representative. The Department reserves the right to have the supplier's QC representative obtain the material sample while being observed by the Department's inspector. Samples are to be obtained from the most recently produced stockpiles of each aggregate type.

After the sample is obtained and split, one portion will be promptly submitted to the Office of Materials and Research for testing. Tests to be conducted on the split-samples may include:

Table 2. Split-Sample Aggregate Tests

Test Designation	Sampling Procedure	Testing Procedure	Comparison Limits
Aggregate Dry Gradation (No. 4 sieve and coarser)	AASHTO T2/T248	AASHTO T27	± 7.0
Aggregate Dry Gradation (Finer than No. 4 sieve)	AASHTO T2/T248	AASHTO T27	± 3.0
Los Angeles Abrasion	AASHTO T2/T248	AASHTO T96	± 12.7% of average
Percent Absorption	AASHTO T2/T248	AASHTO T85	± 0.41
Bulk (Dry) Specific Gravity	AASHTO T2/T248	AASHTO T85	± 0.038
Bulk (SSD) Specific Gravity	AASHTO T2/T248	AASHTO T85	± 0.032
Apparent Specific Gravity	AASHTO T2/T248	AASHTO T85	± 0.032
Sand Equivalency (Unwashed screenings only)	AASHTO T2/T248	AASHTO T176	± 12.0

Test results from samples taken at this time will be compared to the split-sample test results from the supplier. The Geotechnical Materials Engineer will compare the test data and look for any potential problems or general trends. Using the established comparison limits listed in Table 2, test results that are not in conformity with one another may prompt additional monitoring by the Department. Additionally, the Department may require that the supplier perform additional QC testing. The Department, at its sole discretion, may elect to make additional unannounced site visits at any time.

The intent of the Department’s Qualified Products List is to identify coarse aggregate sources on the basis of (1) the materials meeting quality requirements, and (2) the source personnel maintaining an acceptable quality control program. Therefore, appearance in the Qualified Products List does not preclude testing of the material immediately before and during use in Department work. Acceptance testing will be done at the time coarse aggregate is incorporated into the work.

7. Removal from the Qualified Products List

In addition to reasons stated elsewhere in this policy, there may be cases where the Geotechnical Materials Engineer may remove the source from the qualified products list either by individual product or in entirety. The intent of this section is to provide a means for the Department to reasonably limit the amount of non-conforming material that may be supplied to Department work, even if all other sections of this policy appear to be in conformance.

In the event that the supplier appears to be in compliance with the other sections of this policy (providing QC data, maintaining a certified laboratory, utilizing certified QC technicians, etc.), but the end product does not meet the intended Department specifications, then the Geotechnical Materials Engineer may take steps towards suspending the supplier’s qualification status.

Before suspending the supplier’s product or source qualification status, the Geotechnical Materials Engineer will notify the supplier’s representative by phone (with a follow-up letter sent by certified mail) and give 15 calendar days to correct the problem. After the 15 days, the Department’s Geotechnical Materials Engineer will review the material data, and if the deficiency has been corrected, the source’s qualification status will continue. If the supplier has demonstrated that he/she is actively attempting to remedy the noted problem he/she may request additional time (between reviews) to complete the process. During this time, the project’s Resident Construction Engineer or Resident Maintenance Engineer may elect to suspend use of the product until satisfactory test results can be obtained.

If the problem has not been properly corrected after the 15 days and no extension is granted, the Department will revoke the qualification status of the individual product or the entire source for a minimum of 45 calendar days. The Geotechnical Materials Engineer will notify key supplier personnel

by registered mail and Department personnel by e-mail informing them of the removal. After the 45-day period, the Geotechnical Materials Engineer or his representative will review actions taken by the supplier and recent test results, and if the problem has been corrected, will reinstate the source's qualification status.

If at the time of the 45-day review the problem has not been satisfactorily corrected, the Geotechnical Materials Engineer will remove the supplier's product or entire source from the Department's Qualified Products List. Once removed, the source will not be permitted to supply the suspended material to existing or pending Department projects or maintenance forces. The supplier source representative may apply in writing to the Geotechnical Materials Engineer for re-qualification after 12 months have elapsed from removal from the qualified products list. The source will be reviewed at that time and will be treated as a "new" source subject to the requirements stated in this document.

SCDOT contact: G. Michael Lockman
 Geotechnical Materials Engineer
 SCDOT Office of Materials and Research
 PO Box 191
 Columbia, SC 29202
 (803) 737-6692 FAX: (803) 737-6649