

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF TRANSPORTATION**

**Bureau of Project Delivery  
Materials and Testing Division  
81 Lab Lane  
Harrisburg, PA 17110-2543**

**BULLETIN 14  
Publication 34  
AGGREGATE PRODUCERS**

**1. DESCRIPTION**

**A. General.**

The aggregate producers listed in this Bulletin have demonstrated their capability to produce material meeting the Department's specification requirements for the type and source listed. Listing in this Bulletin does not provide assurance that the material from these sources will meet the requirements of the specifications at all times.

**B. Meaning of Terms**

For the purpose of this Bulletin, the term "producer" is any individual, firm, partnership, corporation, joint venture or other entity manufacturing aggregate with the intent of meeting the Department Publication 408, Section 703 requirements. A source is a single, specific quarry, pit, or bank location. An agent is any individual, firm, partnership, corporation, joint venture or other entity distributing aggregates with the intent of meeting the Department Publication 408, Section 703 requirements.

The language in this bulletin is generally written in the imperative mood. In sentences using the imperative mood, the subject, "the Producer" is implied. Also implied in this language are "shall", "shall be", or similar words and phrases. The word "will" generally pertains to decisions or actions of the Department and/or the Engineer. The following words, or similar words, refer to actions of the Department and/or the Engineer, unless otherwise stated: "directed", "required", "permitted", "ordered", "designated", "prescribed". Also, the words "approved", "acceptable", "satisfactory", "considered", or words with similar intent, mean by, or to, the Department and/or the Engineer, subject in each case to the final determination of the Secretary, and subject to further review, as permitted by law or permitted elsewhere in this bulletin or the Department's specifications, Publication 408.

**2. PRELIMINARY APPROVAL PROCEDURE**

Aggregate Producers:

Prospective aggregate producers offering a source for approval shall request an investigation from the appropriate District Materials Engineer/Manager (DME/DMM) responsible for the source location. All available information relative to the exploratory work conducted in developing the source shall be made accessible for review by the DME/DMM. Test results shall be provided from an independent testing agency indicating the quality of the aggregate being offered meets Department requirements as set forth in Section 703 of Pub. 408. The DME/DMM will review this information and, if satisfactory, will proceed with the investigation. The Bureau of Project Delivery, Innovation and Support Services Division, Laboratory Testing Section (LTS) has the responsibility to approve the listing and assign the codes for the aggregate producers in this Bulletin following the investigation and recommendation for approval by the DME/DMM. It is not the policy of the Department to provide exploratory testing to qualify sources offered by prospective suppliers. The LTS, however, will provide a preliminary Skid Resistance Level rating for coarse aggregate samples completely identified as to source and location. The producer is solely responsible for determining if any

federal or state approval or permit is required for the material and for applying for and obtaining all required federal and state approvals and permits. Any material sold to the Department must be in full compliance with all federal and state laws and regulations and must have state approvals and permits that allow the material to be sold and used for the Department's required use. This includes verification, where applicable, that a specific material is a "co-product" in relation to the Department of Environmental Protection residual waste regulations. Producers of non-natural occurring aggregate material particularly must be sure they are complying with regulations issued by the PA Department of Environmental Protection regarding slag, cinders, bottom ash, etc. This applies to all aggregate sources listed in this Bulletin, regardless of when they were originally approved.

Agents:

Prospective aggregate agents offering an aggregate distributing source location for approval shall request an investigation from the appropriate District Materials Engineer/Manager (DME/DMM) responsible for the aggregate distributing source location.

**A. Facility Requirements**

At each source, provide a building of sufficient size with all of the following equipment at the quarry site. The facility and equipment must be in place prior to receiving the recommendation for approval from the DME/DMM and must be maintained to continue the source listing in the bulletin:

**(1) Equipment**

**a. Fine Aggregate**

No.	Equipment
1	F.A. Mechanical Sieve Shaker with Timer
1	Sample splitter having an even number of equal width chutes that discharge alternately to each side of the splitter. A minimum of twelve total chutes is required. The minimum width of the individual chutes is to be at least 50 percent larger than the largest particles in the sample and the maximum width of the individual chutes is to be 20 mm (3/4-inch). Include two receptacles to hold the samples following splitting. Splitter design must allow samples to flow smoothly without restriction or loss of material.
2	Set of Standard Sieves for F.A., meeting ASTM E11 standards
1	Balance conforming to the requirements of AASHTO M 231 for the class of general purpose scale required for the principal sample mass (weight) of the sample being tested, PTM No. 616.
1	Oven capable of maintaining a uniform temperature of 110 °C ± 5 °C (230F ± 9F)
1	Thermometer, ASTM E1.

**b. Coarse Aggregate**

No.	Equipment
1	C. A. Mechanical Sieve Shaker with Timer
1	Sample splitter having an even number of equal chutes that discharge alternately to each side of the splitter. A minimum of eight total chutes is required. The minimum width of the individual chutes is to be at least 50 percent larger than the largest particles in the sample. Include two receptacles to hold the samples following splitting. Splitter design must allow samples to flow smoothly without restriction or loss of material.
2	Set of Standard Sieves for C. A., meeting ASTM E11 standards
1	Cylindrical Metal Measure [25 L (1 cu. Ft.)] AASHTO T 19
1	Balance conforming to the requirements of AASHTO M 231 for the class of general purpose scale required for the principle sample mass (weight) of the sample being tested, AASHTO T 85
1	Platform scale conforming to the requirements of AASHTO M 231 for the class of general purpose scale required for the principle sample mass (weight) of the sample being tested,

- PTM No. 616.
- 1 Oven capable of maintaining a uniform temperature of 110 °C ± 5 °C (230F ± 9F).
  - 1 Thermometer, ASTM E1.

Provide a separate set of sieves for exclusive use by the Department. The remaining equipment is to be shared by the producer and the Department. If time or space conflicts arise, or if the Department does not have consistent access to shared equipment when testing is to be performed, provide a separate set of equipment for the Department.

During production, provide the necessary incidental equipment to conduct and document the tests. The equipment and test result documentation is a condition for source acceptance, source re-qualification, and continued listing in this Bulletin.

**(2) Facility and Maintenance**

Perform routine maintenance and repair all equipment whether shared or for exclusive Department use. Have balances calibrated annually by an independent agency acceptable to the Department. Verify oven temperatures every 120 days using the thermometer supplied as required equipment. Maintain accurate records of calibration and temperature checks. Have back-up equipment available so that no tests are missed.

Provide a source of clear, running water satisfactory to the DME/DMM.

Provide a complete library of all pertinent PTMs, Pub. 408 Specification Sections, ASTM and AASHTO standards, and Pub. 194 (Trucker Handbook).

Provide the following office equipment in the facility for exclusive Department use:

<b>No.</b>	<b>Equipment</b>
1	Desk and chair
1	Electronic calculator with tape and statistical function
1	Work table 760 mm x 2100 mm x 760 mm high (2 ½ feet x 7 feet x 2 ½ feet high)
1	4 drawer, fire resistant (D-label) metal file cabinet (A two drawer fire resistant cabinet may be substituted with permission of the DME/DMM).
1	Closet or locker for storage

If testing equipment is to be shared, provide a minimum of 14 m<sup>2</sup> (150 square feet) of office and workspace. If a separate set of testing equipment is provided for the Department, provide a minimum of 22 m<sup>2</sup> (240 square feet) of office and workspace to accommodate both the office and the testing equipment. The office and work space area provided must be heated/air-conditioned and have on-site access to a water cooler, telephone, fire extinguisher, and sanitary toilet facilities. Clean office area and work space routinely as required.

Agents are to provide an approved pad for all stockpiles. The stockpiles are to be clearly identified with aggregate supplier code and material type.

**3. QUALITY CONTROL**

This section outlines the minimum measures that must be implemented and maintained. Measures exceeding these minimum standards may be required by the DME/DMM or the LTS.

**A. Quality Requirement Tests**

**(1) Quality Control Tests**

Perform strength ratio, soundness, and abrasion tests at intervals sufficient to ensure the quality of the material. The tests for strength ratio, soundness, and abrasion tests may be performed by the producer or by an independent laboratory. Document the results of tests made during production and make them available to the Department upon request.

**(2) Annual Quality Requirement Tests**

Obtain and test samples of the source product for the various quality requirements of Pub. 408, Section 703, at the minimum frequency as indicated below. Testing may be performed by the producer or by an independent laboratory. Provide copies of the producer or independent laboratory test results to the DME/DMM and LTS. Take appropriate action to assure that only materials meeting Department requirements are provided to the Department.

**Coarse Aggregate-**

If requalification samples are not scheduled to be collected during the calendar year, obtain and test materials according to the following table for that calendar year (samples may be collected at anytime during the calendar year).

Quality Parameter	Test Method	AASHTO No. 8 Coarse Aggregate	All Other Sizes of Coarse Aggregates
Specific gravity and absorption	AASHTO T 85	Required	Required
Sodium sulfate soundness	PTM No. 510	Required	Required
Los Angeles abrasion	AASHTO T 96	Required	Required
Crushed fragments	ASTM D5821	Required	Required
Unit weight	AASHTO T 19	Required	Required
Thin and elongated	AASHTO D4791	Required	Required
Petrographic analysis	PTM No. 518	Required	Not Required

If requalification samples are scheduled to be collected during the calendar year, a split sample of the requalification sample must be tested for specific gravity and absorption, sodium sulfate soundness, and Los Angeles abrasion.

**Fine Aggregate-**

If requalification samples are not scheduled to be collected during the calendar year, obtain and test materials according to the following table for that calendar year (samples may be collected at anytime during the calendar year):

Quality Parameter	Test Method	Cement Concrete Sand Fine Aggregate	Bituminous Concrete Sand Fine Aggregate
Specific gravity and absorption	AASHTO T 85	Required	Required
Sodium sulfate soundness	PTM No. 510	Required	Required
Uncompacted voids	AASHTO T 96	Required	Required
Unit weight	AASHTO T 19	Required	Required
Petrographic analysis	PTM No. 518	Required	Required
Strength ratio	AASHTO T 21	Required	Not Required
Sand equivalency	AASHTO T 176	Not Required	Required

If requalification samples are scheduled to be collected during the calendar year, a split sample of the requalification sample must be tested for specific gravity and absorption, and sodium sulfate soundness.

## **B. Quality Control Plan**

Prepare and submit a Quality Control Plan (QCP), for initial source approval and annually thereafter or as otherwise required, to the DME/DMM for the aggregate production and testing process to assure compliance with specification requirements. A new QCP must be submitted if there are changes made to production, such as the addition of AASHTO # 57 or AASHTO #8. Meet the minimum QCP requirements as set forth in Pub. 2, Project Office Manual, for Aggregate Suppliers. Establish and positively identify aggregate stockpiles which have been tested in accordance with the approved QCP and meet Department specifications. Ensure that material not meeting Department specification is isolated from all stockpiles intended for Department use. Assure that all personnel involved in the production, stockpiling, and the shipping process are advised of quality control measures and proper stockpile identification.

## **C. Quality Control Technician**

Provide, and assign to the work, a PENNDOT Certified Aggregate Technician properly instructed and trained to perform all required quality control tests. Allow the technician(s) sufficient time, free of any additional unrelated conflicting work, to assure compliance with the specification requirements and the QCP. Publication 725 outlines the aggregate technician certification requirements and process. The technician is responsible for, but not limited to, the following duties:

- Assist in development of the QCP as required
- Be cognizant of production quality levels of the source and quality parameters required to maintain source approval
- Lift and test quality control samples
- Document test results made during production in plant records within 24 hours of obtaining results
- Review and discuss test results and production processes with Department representatives as needed
- Assist the Department representatives in sampling and testing as needed
- Take appropriate action to ensure that the production process is controlled so that aggregate is in compliance with the specifications and requirements.
- Prepare and supply certifications for material shipped when required.
- Control and direct loading operations so that only aggregates from identified and approved stockpiles are shipped to the appropriate Department projects
- Control and direct loading operations so that stockpiles are properly mixed to provide consistent, non-segregated aggregate to the Department.
- Control and direct loading operations so that aggregate is properly loaded in trucks with beds sufficiently clean to prevent any contamination of the aggregate.
- Delegate to other properly trained personnel these duties when necessary, while maintaining supervision and responsibility.
- Identify and reject any aggregate not meeting specifications and take appropriate action to prevent shipment of any non-specification aggregate to any Department project.
- Maintain and calibrate test equipment as required.
- Maintain necessary skills and qualifications to perform QC technician duties to the satisfaction of the DME/DMM.

## **SAMPLES**

### **A. Sample Types**

(1) Preliminary Samples (Sample Class: PS) are obtained from a prospective aggregate source where there is no crushing and screening plant in operation and the material is processed at some other location. It is permissible to have several truckloads of the unprocessed material hauled to another operating plant location to be processed into the appropriate aggregate sizes. These test results, however, will not constitute final approval.

(2) Qualification Samples (Sample Class: QS) are obtained from new aggregate sources where a crushing and screening plant is in operation and sufficient material (minimum 200 tons of each aggregate size intended to be produced) has been processed and stockpiled. QS samples could also be obtained from an existing approved aggregate source for any aggregate size not currently approved, but where the producer is seeking approval of this aggregate size for approval. Such samples will not be evaluated more frequently than quarterly and will not be evaluated if the existing approved source has previous failing test results on approved aggregate products that have not been addressed. Address previous failing test results by conducting an investigation and submitting an investigation report to the DME with a copy forwarded to LTS. Include in the investigation report: cause of failure, corrective action, passing independent lab results, site map with area of work, etc. After the report is approved by the District in consultation with the LTS, and corrective action is taken, the District will resample the material.

(3) Requalification Samples (Sample Class: RS) are obtained at least biennially from each aggregate source and of each aggregate material or size approved and listed in Bulletin 14 to maintain approval in Bulletin 14 for each source and material. The requalification samples may be obtained at any time during the year from the source of supply. For those sources that have a previous test result history showing test results at or near the acceptable limits of the specification requirements, or when there is any indication that the quality of the material has changed, the frequency of requalification or investigational sampling will be increased to a level that will assure the Department of acceptable quality.

(4) Quality Assurance (Sample Class: QA) samples may be obtained by the Construction Quality Assurance Section (CQAS), Bureau of Project Delivery. QA samples are obtained at the discretion of the Department to assure quality levels.

(5) Independent Assurance (Sample Class: IA) samples may be obtained by the Quality Assurance Section (CQAS), Bureau of Project Delivery. IA samples are obtained at the discretion of the Department to provide an unbiased, independent evaluation of the technicians, sampling and testing procedures, and the equipment used in the acceptance program.

All Preliminary, Qualification and Requalification Samples will be tested at the LTS, in Harrisburg, PA. The sampling must be performed by or witnessed by Department personnel. The samples must be accompanied by a correctly completed Form TR-447 - Sample Identification. The TR-447 Forms for Requalification samples must also show the Bulletin 14 Supplier Code for the source. In addition, Form TR-430A, "Aggregate Source Evaluation Report", shall be completed and sent to the LTS. A file copy shall be retained by the DME/DMM. Sources will not be listed in Bulletin 14 without Form TR-430A on file at the LTS with the DME/DMM's recommended approval indicated on the Form TR-430A.

## **B. Sample Size**

Sample size includes the number of sample increments (i.e., bags) and the quantity of material in each bag and is dependent on the type of aggregate (fine or coarse), aggregate quality, sample classification, and aggregate size (e.g., AASHTO No. 8). Obtain the sample increments by random sampling procedures from stockpiles at either the source or at point of delivery. When specified, use PTM No. 1 for selecting random samples. When obtaining samples of aggregate, the stockpiles of processed material must be sampled according to PTM No. 607 so that the gradation of the samples will accurately represent the gradation of the stockpiled material. Obtain aggregate samples consisting of the following minimum quantities for each type and size listed below:

<b>TABLE 3</b>				
<b>Sample Size by Aggregate Type, Quality Level, Sample Class, and Size Designation</b>				
<b>Aggregate</b>	<b>Aggregate Quality Type (Type A, B, C, or S)</b>	<b>Sample Class (QS or RS)</b>	<b>Aggregate Size</b>	<b>No. of Bags (50 lbs./bag)</b>
Fine Aggregate	A, B, and C	Qualification Sample (QS)	Each Size	3
		Requalification Sample (RS)	Each Size	1
Coarse Aggregate	A and B	Qualification Sample (QS)	AASHTO No. 8 (# 8)*	7 or 3*
			AASHTO No. 57 (# 57)*	8
	C and S	Qualification Sample (QS)	AASHTO No. 8 (# 8)	3
			AASHTO No. 57 (# 57)	4
			PennDOT No. 2A	6
	A and B	Requalification Sample (RS)	AASHTO No. 8 (# 8)	3
			AASHTO No. 57 (# 57)	4
	C and S	Requalification Sample (RS)	AASHTO No. 8 (# 8)	3
			AASHTO No. 57 (# 57)	4
			PennDOT No. 2A	6
Select Granular Material (2RC)	All Types	All Sample Classes (QS and RS)**	2RC	2
Anti-Skid Material	All Types	All Sample Classes (QS and RS)	Each Size	2
Rock Lining	All Types***	All Sample Classes (QS and RS)	Submit R-3 Size to Represent all Sizes	2
* If both AASHTO No. 8 (#8) and AASHTO No. 57 (#57) are submitted at the same time, four sample increments (i.e., 4 bags) may be omitted from the AASHTO No. 8 (#8).				
** If the Select Granular Material (2RC) source location is an existing approved aggregate source listed in Bulletin 14, no samples are required to be obtained for quality testing.				
*** If the Rock Lining source location is an existing approved Type A, Coarse Aggregate source listed in Bulletin 14, no samples are required to be obtained for quality testing.				

### C. Test Results

Aggregate quality testing will require at least 60 days for completion and reporting from time of arrival of samples at the LTS. Upon completion of all required quality testing, an evaluation of the test result data will be made to determine the acceptability of the aggregate for its intended use.

Conformity with the specified gradations of Publication 408 Section 703 is required. When the gradation or wash test of the sample deviate significantly from the specified limits, the results of the quality testing may be affected. The DME/DMM will be notified to resample when it is determined that the results are questionable.

The value (test results) shown for specific gravity and absorption are as recent as the Lab number code indicates (the first two numbers are the year code). Test results from samples will be sent from the LTS to the producer and the DME/DMM submitting the samples. These results will be used to determine conformance with the specifications.

If the sample fails, the producer may contact the DME/DMM to discuss the areas in which the aggregate failed to comply.

## **FINAL APPROVAL PROCESS**

Source approval will be granted when the facilities, equipment and processing plant are in place, as required, and material from actual production has been tested for quality and gradation and found to be in compliance with all specification requirements.

## **AGGREGATE SOURCE LISTING\QUALITY TEST FAILURE PROCESS**

Step 1. Initially, the District approves the aggregate source based upon its investigation of the source and the LTS test results. Form TR-430A and a letter requesting listing in Bulletin 14 are to be sent to the Bureau of Project Delivery.

Step 2. Requalification samples are taken by the DME/DMM biennially (every two years) as a minimum. Samples may be taken and tested for quality requirements more frequently depending on the source's historical test results. Samples are subject to testing based on the requirements of Pub. 408, Section 703. QA samples may be taken on a random basis and may be tested for quality requirements.

Step 3. If a qualification, requalification, or QA sample fails on the gradation or wash test, the failure is to be investigated at the source by the District. After making some minor changes in processing, samples of newly processed material are tested either at the source or at the LTS to verify the material meets specification requirements for these tests.

Step 4. If a qualification, requalification or QA sample fails on sulfate soundness, deleterious shale, L.A. abrasion, crush count, or other quality tests (other than gradation and wash), the DME/DMM is to notify the source to take immediate corrective action. After corrective action has been taken the DME/DMM is to resample (N=3) the material as soon as possible and notify the LTS.

Step 5. If all the resamples pass, resample (N=3) the source at least quarterly for the next six months to ensure there is not a quality problem. Calculate the percent within limits (PWL) for the material based on the last 5 year history and if it is below 90%, go to STEP 6. PWL is based on only LTS test results for sulfate soundness, deleterious shale, L.A. abrasion, crush count, and other quality tests.

Step 6. If any one of the three resamples fails or if the PWL (based on the last five year history) for the material falls below 90%, LTS may suspend the source from Bulletin 14 for the particular material involved. The source is to investigate the problem and present a written report to the District and a copy is to be forwarded to LTS. The report is to include: causes of failures, corrective actions, passing private lab results, site map with area of work, etc. After the report is approved by the District in consultation with the LTS, and corrective action is taken, the District will resample (N=3) the material. If warranted the Bureau of Project Delivery may recommend the establishment of a new historical data base.

Step 7. If all resamples from STEP 6 pass, the suspension of the source may be lifted. Resample (N=3) at least quarterly for the next twelve months to ensure there is not a quality problem. If any samples fail during this twelve months period, LTS may suspend the source. Go to STEP 8.

Step 8. If any samples from STEP 6 or 7 fail, calculate the PWL (based on the last ten years history) and if it is below 90%, the source is to be downgraded to a level where the material passes or the source will be removed from Bulletin 14. The Bureau of Project Delivery will notify the source regarding downgrading or removal.

## **MAINTAINING APPROVAL STATUS**

After approval by the LTS, by letter, the source will remain on the approved list until such time as it is removed for any of the following reasons:

1. Any actions or inactions that may affect the quality of the product, the integrity of the testing results or the applicable quality control plan.



2. Material fails to meet specification requirements.
3. Failure to maintain an effective quality control plan.
4. Operations remain inactive for two years.
5. Major changes are made in processing equipment or operating procedures that degrade the quality of the aggregate.
6. Failure to meet/comply with Publication 408, Section 106.03(a)2.a thru 2.f.
7. Actions relative to the Aggregate Source Listing\ Quality Test Failure Process listed above.
8. Failure to have a PennDOT certified aggregate technician perform and document testing, and manage the quality control process as required in the QUALITY CONTROL section above.
9. At the request of the aggregate producer to be removed.

The DME/DMM will recommend source approvals, suspensions, removals, or quality type downgrades or upgrades to the LTS. The LTS will have final authority regarding approvals, suspensions, removals, quality downgrades or upgrades.

#### **UPGRADING AN AGGREGATE TYPE**

The request to upgrade an aggregate type must be submitted in writing to the DME/DMM. Along with this request, the aggregate producer must submit a written report to the District and a copy is to be forwarded to the LTS. The report is to include: corrective action (if upgrade request is due to a previous downgrading of aggregate type), passing independent lab results meeting the upgraded quality type specification requirements, site work with area of work where the aggregate is being mined, dredged, or acquired, QC Plan, etc.

After the report is approved by the District in consultation with the LTS and corrective action is taken (if required), one sample will be obtained by a Department Representative once per month for six consecutive months for a total of 6 samples. All six samples will be tested for quality at the LTS.

The percent within limits (PWL) will be calculated on the six samples. If the PWL is above 90%, the aggregate will be upgraded. If warranted the Bureau of Project Delivery may recommend the establishment of a new historical data start point (date) to represent the current quality of material or production process of the aggregate source.

#### **BIDDING**

To receive bid proposals, request an application from the Department of General Services, Bureau of Procurement, 555 Walnut Street, 6<sup>th</sup> floor Forum Place, Harrisburg, PA 17101

## CODE IDENTIFICATION

### Supplier Code:

**XXX01ABB**

XXX – Producer  
01 – County or State code  
A – Source Identification  
BB- Bulletin Code

### Materials Code:

203 = Coarse Aggregate  
207 = Fine Aggregate  
249 = Antiskid (Numbers following are Type e.g. AS1, AS2, AS3 and AS4 etc.)  
283 = Rock Lining

### Materials Class

A = Stone Type A  
B = Stone Type B  
C = Stone Type C

### Rock Type:

GL = Gravel  
SL = Slag  
RL = Rock Lining  
LW 3/4 = Coarse Aggregate, Lightweight  
LW 1/2 = Coarse Aggregate, Lightweight  
LW4 = Fine Aggregate, Lightweight  
If None Shown the Default is Stone

### Examples:

203 A8 = coarse aggregate #8 stone  
203 C2A = coarse aggregate #2A stone  
203 A8SL = coarse aggregate #8 slag  
203 A57GL = coarse aggregate #57 gravel  
203 LW3/4 = coarse aggregate light weight 19.0mm (3/4 in.) nominal  
207 B = fine aggregate type B  
249 AS1, AS2, AS3, AS4 = antiskid type(s) AS1, AS2, AS3, AS4

**MATERIAL CLASSIFICATION BY COMPOSITION**

AR = Argillite	PH = Phyllite
BA = Bottom Ash (Cinders)	QZ = Quartzite
BL = Basalt	QS = Quartz Sand
BS = Boiler Slag (Wet Bottom)	RD = Anthracite Red Dog
CH = Chert	RSG = Reclaimed Granulated Slag
CB = Coal Mine Waste (CULM BANK)	SB = Blast Furnace Slag
CS = Calcareous Sandstone	SBMA = Spent Bed Mat'l. - Anth.
DI = Diabase	SBMB = Spent Bed Mat'l. - Bit.
DO = Dolomite	SC = Schist
FS = Foundry Sand	SG = Granulated Slag
GB = Gabbro	SH = Shale
GD = Granodiorite	SL = Silt Stone
GL = Gravel	SR = Serpentine
GN = Gneiss	SS = Sandstone
HF = Hornfels	SO = Steel Slag (Open Hearth)
LS = Limestone	SSCG = Sandstone & Conglomerate
LW = Light Wt. Aggregate	SM = Molybdenum Slag
MB = Marble	RC = Recycled Concrete

NOTE: Petrographic comparison (P) with samples of satisfactory quality from the same source may be substituted for sodium sulfate soundness (SODS) at the discretion of LTS. Otherwise results are given as Percent (%) Loss.

**COUNTY CODE IDENTIFICATION**

<b>County</b>	<b>Dist. No.</b>	<b>County</b>	<b>Dist. No.</b>
01 Adams	8-1	34 Juniata	2-9
02 Allegheny	11-1	35 Lackawanna	4-2
03 Armstrong	10-1	36 Lancaster	8-7
04 Beaver	11-2	37 Lawrence	11-4
05 Bedford	9-1	38 Lebanon	8-8
06 Berks	5-1	39 Lehigh	5-3
07 Blair	9-2	40 Luzerne	4-3
08 Bradford	3-9	41 Lycoming	3-2
09 Bucks	6-1	42 McKean	2-5
10 Butler	10-2	43 Mercer	1-4
11 Cambria	9-3	44 Mifflin	2-7
12 Cameron	2-4	45 Monroe	5-4
13 Carbon	5-2	46 Montgomery	6-4
14 Centre	2-1	47 Montour	3-3
15 Chester	6-2	48 Northampton	5-5
16 Clarion	10-3	49 Northumberland	3-4
17 Clearfield	2-2	50 Perry	8-9
18 Clinton	2-3	51 Pike	4-4
19 Columbia	3-1	52 Potter	2-6
20 Crawford	1-1	53 Schuylkill	5-6
21 Cumberland	8-2	54 Snyder	3-5
22 Dauphin	8-5	55 Somerset	9-7
23 Delaware	6-3	56 Sullivan	3-6
24 Elk	2-8	57 Susquehanna	4-5
25 Erie	1-2	58 Tioga	3-7
26 Fayette	12-1	59 Union	3-8
27 Forest	1-3	60 Venango	1-5
28 Franklin	8-3	61 Warren	1-6
29 Fulton	9-4	62 Washington	12-4
30 Green	12-2	63 Wayne	4-6
31 Huntingdon	9-5	64 Westmoreland	12-5
32 Indiana	10-4	65 Wyoming	4-7
33 Jefferson	10-5	66 York	8-4
		67 Philadelphia	6-5

### **STATE CODE IDENTIFICATION**

The same as the Postal two letter code, e.g. NY = New York and OH = Ohio  
For Canadian or other foreign sources the following code(s) are used: OT = Ontario

### **SKID RESISTANCE LEVEL (SRL)**

#### Aggregate Friction Guidelines for Bituminous Wearing Surfaces

The course aggregate used in bituminous wearing surfaces or the fine aggregate, in the case of FJ-1 Wearing surfaces, shall have the following aggregate Skid Resistance Level (SRL) letter designation based on the current Average Daily Traffic (ADT) for resurfacing and anticipated initial Daily Traffic on new facilities.

<b>ADT</b>	<b>SRL</b>
20,000 and above	E
5,000 to 20,000	E, H, Blend of E & M, or Blend of E & G.
3,000 to 5,000	E, H, G, Blend of H & M, or Blend of E & L
1,000 to 3,000	E, H, M, G, Blend of H & L, or Blend of G & L OR Blend of E & L
1,000 and below	A N Y

\*All blends are 50% by weight and shall be made by an approved method of blending.

Using the above guidelines, special provisions for contracts or purchase orders shall be prepared stating the aggregate SRL letter designation and/or SRL Blend requirements.

### SKID RESISTANCE AGGREGATE TYPES

SRL	Aggregate Type
<b>E</b>	Sandstones; siltstones; Loyalhanna Limestone sources (calcareous sandstones) which consistently contain more than 30% + #200 acid insoluble residue; gneisses and igneous rocks which contain high amounts of micas; several quartzite sources which have been sheared so that they have softer, sheared microcrystalline quartz surrounding the remaining intact quartz grains; and gravels which contain either a.) < 25% carbonates, < 10% chert, and high percentages of dirty sandstones and siltstones; or b.) < 10% carbonates, < 15% chert, and high percentages of dirty sandstone and siltstones.
<b>H</b>	Argillites; diabases, gneisses, granites and granodiorites, basalts, and gabbros which do not contain large amounts of micas; open hearth slag; blast furnace slag; metamorphic quartzites (no difference in hardness between quartz cement and quartz grains); sandy limestones; a few coarsely crystalline dolomites (e.g., the Ledger dolomite); and gravels which contain either: a.) > 25% and < 34% total carbonates, and <10% chert; or b.) > 15% chert and < 25% chert, and < 10% carbonates; or c.) large amounts of quartzite.
<b>G</b>	Siliceous limestone and dolomite; limestones and dolomites with consistent wide textural variation (i.e., they always contain finely to moderately or coarsely crystalline dolomite or limestone); gravels which contain more than 34% carbonates and more than 10% chert; and serpentinites.
<b>M</b>	Many dolomites and some limestones that are not consistently finely textured all the time.
<b>L</b>	Most limestones and some dolomites that are very finely textured, and contain very little, if any, acid insoluble residue retained on the #200 sieve

## **RE-EVALUATING SRL RATINGS USING RIBBED TIRE SKID DATA PROCESS**

### **Aggregate Producer Responsibilities:**

1. Compile a list of at least ten to twelve 9.5 mm (3/8") Nominal Maximum Aggregate Size (NMAS) asphalt mixture wearing courses, including the following information for each roadway:
  - a. State Route (S.R.) Number (4-digit number) or, if Municipal roadway, roadway name (e.g., Murphy Road) and/or designation (e.g., T-321),
  - b. County
  - c. Municipality (if roadway / roadway segments are Municipal roadways),
  - d. Beginning and ending roadway Segment/Offsets or, if Municipal Roadway, beginning and ending points (landmarks, intersecting roadways, etc.),
  - e. Bituminous Job Mix Formula (JMF) for each roadway / roadway segment,
  - f. Average Daily Traffic (ADT) of the roadway / roadway segments.
    - i. If the ADT is unknown (e.g., Municipal roadways), a consultant engineering service must be hired by the Producer to measure the ADT. The privately-obtained traffic counts must be conducted over a 24-hour period of maximum traffic, preferably during the period of a Tuesday through Thursday from midnight to midnight. The traffic count shall be a combination of a classification count and a volume count (see Note 1).
  - g. The 10-12 roadways / roadway segments must meet the requirements listed in the Requirements of the roadway / roadway segments section below.

#### Note 1:

- A. Classification count – counts the number of different classes of vehicles in each lane in each direction.
  - B. Volume count – for a divided road, a volume count obtains a count for each direction across all lanes, but not on individual lanes. For an undivided road, a volume count obtains the total volume on all lanes in both directions.
2. Gather and prepare roadway maps detailing location of each roadway /roadway segment and specifically showing the beginning and ending points of each roadway / roadway segments in each direction.
  3. Prepare a letter to the responsible District Materials Engineer/District Materials Manager (DME/DMM) requesting SRL re-evaluation. The letter is to include the aggregate supplier company name, location, and supplier code of the aggregate source to be evaluated as identified in PennDOT Publication 34, Bulletin 14. The letter is to be addressed to the DME/DMM responsible for the aggregate source location.
  4. Submit the letter and two copies of both the list of roadways and maps to the DME/DMM. It is highly recommended to submit the list of roadways and maps at the beginning of the calendar year as ribbed tire testing for SRL re-evaluation is only performed from June 15 to November 15 each year.
  5. When requested, obtain 6-inch diameter pavement core samples from the roadways / roadway segments and/or specific locations as requested by the Department for further Department analysis. Coordinate obtaining the pavement cores with the Engineering District (RMS Unit) responsible for the roadways / roadway segments. A Department Representative from the Pavement Design Unit must be present during drilling of the pavement cores and will take immediate possession of the pavement cores.

### **Requirements of the roadway/roadway segments to be submitted for SRL reevaluation:**

1. Must have a wearing course with a 9.5 mm (3/8") NMAS.
2. Must be under traffic for at least one year.
3. Must be at least ¼ mile long.
4. Virgin coarse aggregate in the wearing course asphalt mixture must be 100% from the aggregate source for which producer wants the SRL rating re-evaluated. If any of the wearing courses that

the aggregate producer wants to submit for SRL re-evaluation contain RAP, the mix design and the gradation of all the aggregates and the RAP used in the mix design must be submitted to the LTS for evaluation of the suitability of the mix design for skid testing before any wearing courses laid using that mix design can be accepted for skid testing. Any JMF-containing RAP in which aggregate from the RAP contributes 10% or more of the total blended aggregate retained on the #4 sieve will be rejected for use for SRL re-evaluations.

5. ADT of entire length of roadway where the wearing course is located must be known. ADT along a length of roadway may be affected and different due to intersecting roadways located between the beginning and ending points of the roadway. If a selected roadway / roadway segment contains intersecting roadways, provide the ADT of the selected roadway / roadway segment between each of the intersecting roadways.
6. Cannot have rutting exceeding a maximum depth of 3/8" at any location (includes rutting from buggy traffic, farm traffic, plastic deformation of the pavement layers under traffic, or improper or inadequate pavement base support).
7. Cannot have more than 10% of the area of the wheel paths that consist of repairs or patching.
8. Cannot have any cracking due to base failure.
9. Within the 10-12 roadways / roadway segments submitted for the SRL re-evaluation, the roadways must have a range of ADTs in order to assist the analysis with extrapolating the SRL above the existing SRL level.

#### Department Responsibilities:

1. The Engineering District responsible for the roadways / roadway segments will review the list of roadways / roadway segments and maps submitted and verify or complete the ADT for each roadway / roadway segment using ADT data from the Roadway Management System (RMS) or other District ADT data.
2. LTS will request locked-wheel skid testing from the Bureau of Maintenance & Operations on all the roadways / roadway segments.
3. LTS will analyze the skid data.
  - a. If the data has a defined aggregate performance, then a letter is sent to the producer with results of the re-evaluation.
  - b. If the data gives inconclusive aggregate performance, then a letter is sent notifying the producer of what additional work needs done. This typically includes obtaining 6-inch diameter pavement cores from each of the 10-12 roadways / roadway segments submitted or from a specific number of the 10-12 roadways / roadways segments submitted.
  - c. The Engineering District (RMS Unit) responsible for the roadways / roadway segments will submit any collected pavement core samples to the District Construction Materials Unit. The District Materials Engineer/Manager will submit the pavement cores to LTS. Submit pavement core sample identification information through eCAMMS using Material Code 218 (Concrete Core), Material Class BTMNS, and Sample Class IF-Information.
    - i. Upon submission of requested pavement cores from the roadway segments that were skid-tested. The LTS will extract the asphalt from the cores using solvent extraction. The extracted aggregates will be evaluated. A letter will be sent to the producer with the results of the re-evaluation.