11/23/2015
Appendix J

Asphalt Materials District Testing and Monitoring Instructions and Guidelines

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1) General Plant and Testing Items

a) Plant Random Scale Checks

Random weighting of trucks for checking scales should be a minimum of once per day. Should questions come up, the District Engineer of Tests can check scales as often as necessary to solve the problem.

Should truck and plant scales be outside +/-1%, the first such load of mix is allowed to be placed. Adjustments should then be made by watching the plant operations. If the next load is also outside +/-1%, then that load is to be rejected.

b) Screen-less Batch Plants

Asphalt batch plants with the screen deck removed are allowed for production of 301, 302, and Type (2) (441) asphalt provided the following conditions are met and maintained. If uncontrolled and/or inconsistent material properties (AC, voids, segregation etc.,) exist, screens will be required and no future screen-less operation of that plant will be allowed. Additional testing may be required by ODOT at the discretion of the OMM.

Requirements:

1) The modified plant must be inspected and approved by the Laboratory.
2) The material flow must be diverted into the center of one hot bin.
3) The plant must have extended dividers on cold bins.
4) A device to sample total flow with the belt in motion.
5) Lockable cold feeders.
6) Calibration of RAP and virgin belts.
7) Scalping screens on RAP and virgin belts. (2in)
8) Weight Bridges on RAP belts
9) Sensors on all cold feeders
10) Maximum of 30% RAP.
11) Give written approval.
12) This approval is subject to field verification.

Following is the procedure for the quality control and acceptance of small quantities of asphalt concrete. The contractor must have an approved Quality Control Plan (QCP) for producing under this procedure.

c) Small Quantity Asphalt Concrete Testing and Acceptance

This procedure is intended for the use of the contractor. However, small quantity acceptance is not permitted for JMF's that have not been verified by acceptable production under normal testing during the current construction season. The use of new JMF's for small quantities must be approved by the District. The total seasonal production per project for each material type shall not exceed 1500 tons.

The District can sample, test and/or reject any material received under this procedure. Material may be rejected by visual inspection by the project or rejected thru district comparison testing. Poor plant or mix control, poor mix performance, poor mix quality, failure to submit the required form as required or ongoing District sample failures can mean disallowing further use of this procedure on the project or future projects. This procedure may be disallowed by the District for any contractor when documented pre-mature small quantity mix failure in any application has occurred on the contractor's previous project(s).

When material is being produced under this procedure and has a quantity of less than 200 tons a day for each type, the acceptance is by contractor certification as outlined below. No quality control testing is required. A quick check plant calibration must have been performed in accordance with the contractor's QCP as outlined in 403. Computerized plant operation tickets, a copy of the dated and signed quick check calibration(s) and a TE 199 SMQ form (attached) must be submitted as outlined below.

If the daily production does not exceed 500 tons a day for each type, the acceptance shall be by contractor certification as outlined below. The contractor shall perform an asphalt binder content test for every two hours of production. The asphalt binder content shall be determined by a nuclear gauge that has been properly offset for the JMF being used. Computerized plant operation tickets and a TE-199 SMQ form must be submitted as outlined below. Contractor samples shall be held at the lab for three days.

The required certification (TE 199 SMQ form) and other required information must be submitted by the next working day to the District testing office unless otherwise notified by the District. The TE-199 SMQ form shall be signed by an employee of the contractor having authority to represent the contractor as outlined in the contractor's QCP. The TE 199 SMQ form shall be sent to the Project Engineer if desired by the district.

Ohio Department of Transportation

Small Quantities of Asphalt Concrete Form TE 199SMQ

Project No. _____ JMF Number _____

Producer _____ Location/Plant _____

Send to: Project Engineer or District Engineer of Tests as required by the district.

This is to notify you that small quantities of asphalt concrete have been produced.

Production Date	Quantity (tons)	AC% 1	AC% 2	Ref No	ODOT Sample ID

Note 1 - To be provided by contractor

Attached are copies of worksheets (gauge printouts, gradation, etc.), plant printouts and our most recent quick check calibration. I certify that the material was produced in accordance with our approved QCP. The asphalt plant was operated at the approved JMF and the mix met specifications.

Signed: Date:

Title:

d) Testing with the Nuclear Asphalt Content Gauge, Offset Form, Calibration Worksheet and Calibration

Testing

The following procedure will be followed when testing using the nuclear asphalt content gauge. The intent is to make use of the plant and (1) district nuclear gauges, (2) plant quality control testing and (3) computerized plant data for an accurate and consistent acceptance and monitoring test procedure.

Verification Sample

A minimum of (2) work days prior o the start of production, a JMF Calibration Verification Sample (Verification Sample) shall be made by the Contractor with a Department representative observing. The Contractor shall mix a sample of asphalt concrete meeting the JMF and fill an AC gauge pan with the sample in accordance with Supplemental Specification 1043.06. A verification sample shall be made for each JMF and held by the contractor as long as the JMF is active.

Initial Offset

Prior to the start of production, the asphalt binder content of the verification sample shall be determined by the Contractor's plant AC gauge in accordance with Supplement 1043. An initial offset, if needed, will be entered into the plant AC gauge so it will read the proper asphalt binder content of the verification sample. The AC gauge printout for this test shall be retained by the Department. For determining the asphalt binder content for 448 acceptance or 446 monitoring samples the District will also enter an initial offset, if needed, into their AC gauge to read the proper asphalt binder content of the verification sample. The Contractor's plant AC gauge is now correlated with the District's AC gauge. All of the data used to calculate the initial offsets shall be recorded on a form approve by the laboratory.

Total Offset

A total offset, if needed, for the plant gauge shall be determined by the Contractor and / or Department within the production of (2) lots or (3) production days, whichever comes sooner. For 441 mixes the total offset will also be applied to the District AC gauge. This offset shall be based on asphalt binder content data from the Computerized Plant System, verified by the extraction of samples of asphalt concrete obtained from the material represented by the plant data. This plant data shall consist of one of the following.

The average of (5) consecutive readings from a drum mix plant.

The average of (5) consecutive readings when a batch plant's asphalt concrete is loaded from a storage silo.

The asphalt binder content from a single batch weight ticket when a batch plant's

asphalt concrete is loaded directly in a truck.

A minimum of (3) sets of Computerized Plant System data verified by (3) corresponding extractions checked for gradation shall be used to establish the total offset. All of the data used to calculate the total offset shall be recorded on a form approved by OMM.

Prior to entering the total offset into an AC gauge, determine a plant sample's asphalt binder content with the AC gauge. Enter the total offset in the AC gauge and record the amount of the offset and the time it was performed on the Contractor's Quality Control Report (TE199). At this time, the asphalt binder content of the same plant sample as above will be determined by the plant AC gauge to verify the total offset was entered correctly. For 441 mixes, if the total offset is verified, this sample, still in the AC gauge pan, shall be held by a representative of the Department so it can be used to enter a total offset into the District's AC gauge using the same procedure described above.

Should discrepancies occur over the asphalt binder content between the district and plant after all of the above procedures are followed and no indication of any other correctable reasons are evident to the OMM, then 403 acceptance shall revert to full extraction testing, corrected for aggregate absorption. For 448 mixes the following testing procedure shall be followed:

For district testing at a minimum all nuclear gauge acceptance samples for lot one are to be extracted for gradation.

For lot two all four sub-lots are to be extracted for gradation but the sub-lot acceptance samples can be quartered and only one bowl run for asphalt binder determination.

For lots three and higher one randomly chosen sample will be extracted for gradation. This random sample can be quartered so that only one bowl is run for asphalt binder determination. Acceptance will be using a (4) test tolerance from 448 Table D or less if a partial lot. If not in tolerance samples for the entire lot will be run.

When quartering a sample the remaining portion of the sample must be retained until the extraction is complete. If the extracted sample meets the gradation tolerances as in the specification then that extraction result stands. If it is outside of the specification then the remaining portion of the original sample will be extracted and the results combined for a composite gradation. If the composite gradation is still out then the entire lot is to be run for lots three and higher.

Office of Materials Management

AC GAUGE VERIFICATION AND OFFSET RECORD

District _____ Date_____

Project No._____Contractor _____

JMF No._____Calibration No. _____ Type _____

JMF AC_____P-4 _____ %RAP _____

Original Calibration Constants:

A1_____A2_____A3_____

Blank Sample Weight_____g

Verification Sample Gauge correlation and Initial Offset:

Plant Gauge_____Avg._____Gauge Serial No. _____

District Gauge_____Avg_____Gauge Serial No. _____

Initial Offset Plant = JMF AC-Plant Avg=+/- _____

Initial Offset District=JMF AC-District Avg=+/- _____

Initial Offset Calibration No. Plant_____District _____

Total Offset Determination for Plant Gauge:

Minimum three extractions at the plant required. Test results on page two.

Plant Offset Avg=+/- _____

Total Offset Plant = Initial Offset Plant + Plant Offset =

Initial Offset Plant + Plant Offset= (+/-)_____+ (+/-)_____= (+/-)_____

Plant Offset Calibration No. _____

Total Offset Determination for District Gauge: Total Offset District=

Initial Offset District + Plant Offset= (+/-)_____+ (+/-)_____= (+/-)_____

District Offset Calibration No._____Note: AC data to be two decimal places.

Enter offsets using same plant sample before and after.

Offsets Verification from Extraction and Plant Data (Attach plant tickets and gauge printouts)

Extraction (plant)

1. Date Time P-4 AC

Plant Ticket Avg AC Plant Gauge - Moisture = Corrected Plant Gauge

Difference (Plant Ticket AC-Corr. Plant Gauge) = +/-

2. Date Time P-4 AC

Plant Ticket Avg AC Plant Gauge - Moisture = Corrected Plant Gauge

Difference (Plant Ticket AC-Corr. Plant Gauge) = +/-

3. Date Time P-4 AC

Plant Ticket Avg AC Plant Gauge - Moisture = Corrected Plant Gauge

Difference (Plant Ticket AC-Corr. Plant Gauge) = +/-

4. Date Time P-4 AC

Plant Ticket Avg AC Plant Gauge - Moisture = Corrected Plant Gauge

Difference (Plant Ticket AC-Corr. Plant Gauge) = +/-

5. Date Time P-4 AC

Plant Ticket Avg AC Plant Gauge - Moisture = Corrected Plant Gauge

Difference (Plant Ticket AC-Corr. Plant Gauge) = +/-

Plant Offset Avg =Avg Difference (Plant Ticket AC-Corrected Plant Gauge) = +/-

Note: Is extraction sample P-4 +/- (6%) of JMF? If not, resample and check plant. Does extraction data reasonably confirm plant data? If not, do not proceed with offset procedure and check plant operation / calibration. If so, calculate offset using plant ticket data. Calculating the plant offset average may require judgment on the part of the monitor if any one value appears to be out of place. If a value is out but the rest are close then use the remaining data to calculate the average.

Level 2 Tech Sign._____ Date _____

Office of Materials Management
Calibration Inspection Worksheet for A.C. Nuclear Gauge

Producer: **at** **Date:**

Coarse Aggregate 1: **Coarse Aggregate 2:**
Fine Aggregate 1: **Fine Aggregate 2:**
RAP ID: **Other:**

JMF(s) to be covered by this calibration:

Mix ID	Calib #	P4%	CA%	C.A. 1%	C.A.2%	F.A.1 %	F.A.2 %	RAP%

Background count **Background verification count**

Is Background verification within 1% of original? Yes/No

New Background count (if needed)-

Blank sample weight (grams)-

Calibration Pan Counts:

Pan #	AC %	Counts	Counts	Counts

Fit Coefficient: Verification Sample:

Desired % AC (A): **Wt. of mixing bowl : g**

Aggregate wt. (C): g **Wt. of AC (AxC)/(100-A): g**

Gauge Counts: **Allowable AC Range: to**

Note: Nuclear Asphalt Content Gauge Calibrations All nuclear gauge calibrations can be verified by the district at any time. This can be done either with an existing verification sample, a new verification sample or a new calibration if discrepancies cannot be resolved. The tolerance of +/- .14% still applies.

e) Asphalt Concrete Plant Auto Ticket Printer

Only those auto printer tickets generating the following minimum information will be permitted to be used in lieu of the TE-27

DATE, PROJECT NUMBER

PRODUCER NAME, PRODUCER LOCATION OR PLANT NUMBER

MATERIAL IDENTIFICATION, TIME LEFT PLANT

GROSS WEIGHT, NET WEIGHT, TARE WEIGHT

f) Determining Moisture Values for Asphalt Concrete Plant Computers

When a drum plant is used to produce asphalt mix, the moisture content of each aggregate will be determined at the start of production, then at least once each day, and whenever conditions change the moisture content more than 1% from the previous determination. Enter into the plant computer the previous day's moistures each morning until new moistures have been determined for that day. On the first day of production of any new aggregate or RAP the moisture content is to be set at 5% maximum for the total aggregate and RAP until new moisture tests have been completed, unless moistures were determined the previous day as follows. Samples may be taken in the late afternoon or evening and allowed to dry overnight to expedite the results for the following day. The District monitor may request a verification of any moisture value while present.

The moisture content of RAP will be taken at the start of production, then at least once every two weeks thereafter.

The moisture sample will be taken from the open working face of a stockpile or from the plant feeders if sampling thieves are installed on the plant. If a working face or a front end-loader is not available to obtain a representative moisture sample, hand dig into the area of the stockpile at least 3 feet from the bottom of the pile, and at least 1 foot into the pile to obtain the sample. Keep all surface dried stockpile material from entering the moisture sample.

Test the moisture content by drying to constant weight using a suitable heat source, such as a gas or electric oven (no ignition oven), hot plate, heat lamp, skillet, microwave oven, etc., that can effectively remove the water from the aggregate. Report the result to 0.1%. Report the moisture content of each individual aggregate, or the composite result (depending on the plant input), on the TE-125 or TE-199 form each day. Maintain all worksheets and test data in the plant lab.

Alternate methods must be approved by the Laboratory.

The minimum mass of RAP and Aggregate to be obtained for test shall be based on the following table:

Maximum Nominal Size	**Minimum**	**Sample Size**
1 1/2" or greater		2000 grams
< 1 1/2" – 3/4"		1200 grams
<3/4 – 1/2"		1000 grams
<1/2"		500 grams

Determine the mass of the wet material, dry to constant weight at a minimum of 230°F, cool, and determine the dry mass. The sample is thoroughly dry when further heating causes, or would cause, less than 0.1% additional loss in mass.

Calculate the % moisture to 0.1% as follows:

$$\% \text{ Moisture} = 100 \times \frac{\text{Wet Mass - Dry Mass}}{\text{Dry Mass}}$$

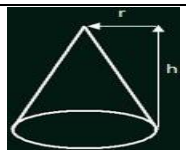
g) Estimating RAP Pile Tonnages

Record all data for RAP piles per ODOT C&MS 401.04 requirements. Keep all worksheets and records in plant lab.

The initial estimated tonnage shall be established by either recording the plan quantity of RAP removed from a project, recording the quantity of RAP processed (if known from metering during the process), or by measurement. Note method used on worksheets used to determine RAP pile tonnages.

If the estimated quantity is established by measurement, one of the following procedures will be used depending on the type of pile:

Rectangular RAP Piles
(Average Width, ft x Average Length, ft x Average Height, ft) / 27 x 2.0 = tons
Example: A RAP pile 50 ft wide, 50 ft long and 25ft tall = (50ft x 50ft x 25ft) /27 x 2 = 4629.6 tons

Conical RAP Piles
$V = (1/3)\ \pi \times r^2 \times h\ / 27 \times 2 =$____tons 
Example: A RAP pile has a 50 ft radius and is 25 ft tall = ((3.1416/3 x 50 x 50 x 25) / 27) x 2 = 4848.1tons

For unique RAP pile shapes define on the TE 199 how it's size will be determined.

All dimensions can be measured by using a tape, wheel, pacing, or surveying equipment. Note method used on worksheets.

Record the RAP quantity on the RAP control chart (example below) and site map.

If RAP is used at any time, update the control chart once each week for all ODOT projects. Re-estimate the quantity of RAP used by re-measuring the piles. Record this new quantity on the RAP control chart and site map.

RAP CONTROL CHART example				
	Milled RAP #1	Milled RAP #2	Processed RAP	Un-processed
11-20-09	150	2400	28,000	40,000

h) Dust Correction Procedure for Centrifuge Extraction

Questions have been raised recently concerning the proper procedure for obtaining a 100 ml sample of effluent for determining a dust correction for a centrifuge extraction test. The questions have pertained to the use of a 100 ml ladle vs. pouring the sample out of a jug.

Accepted practice has been to use the 100 ml ladle and dip the sample from a bucket or wide mouthed container. This is how all the Level 2 Schools have taught the procedure.

The consensus of a state/ industry group was to use the bucket and ladle method over the pouring method with the following caution. When stirring the effluent in the bucket clockwise and counter clock-wise care should be taken not to spin the effluent so fast that a deep vortex is formed because in doing this some of the dust can be forced to the outside edge. The proper method is to stir the effluent clockwise and counter clock-wise enough to lift settled dust off the bottom into suspension and then agitate the effluent several times across the diameter of the bucket. Dip the ladle 1/3 of the way across the diameter of the bucket for the 100 ml sample.

If a wide mouthed container which can be sealed is used then the container can be shaken and then the ladle dipped for the 100 ml sample.

i) Non-approved Personnel in Testing

Concerns have been raised in the industry about the use of non-approved (Level 2) personnel working on jobs. Past practice has been to allow limited involvement of non approved personnel at the plant provided they are under direct hands-on supervision of a Level 2 or level 3 person. This practice allowed for flexibility in the use of personnel by the contractor and also provided a training period for personnel intended to receive Level 2 status.

The following policy has been decided to maintain a level of flexibility in the use of personnel and provide a suitable training period. This policy will at the same time maintain ODOT's need for clarity in quality control responsibilities at the plant for both the District's and the technician's benefit.

A three month period is allowed in which a non approved person can work under the direct hands-on supervision of a Level 2 or Level 3 person at the plant. The intent is that this person will be receiving training and experience leading to Level 2 approval. A Level 2 test can be scheduled to accommodate those needing certification.

Any person not approved and who is involved in any manner in testing should have their name noted on the TE-199 each day of involvement. This way monitoring teams can have assurance as to the involvement of both Level 2 and non Level 2 personnel.

2) 403 (301, 302, 448), 441, 442 Specific Items

a) 301 Blend Calculations

The 301 Blend shall be calculated from the gradations of the individual components and the blend percentages supplied by the Contractor. The following example demonstrates the procedure to be followed:

The blend is to be (85%) Sand and Gravel, (10%) No. 57 Gravel and (5%) Natural Sand. The amount passing the No. 4 shall be (45%).

Laboratory Gradations:

Sieve	Sand & Gravel	No. #57	Natural Sand
2”	100	100	n/a
1”	99	100	n/a
¾”	92	86	n/a
½”	78	37	n/a
3/8”	68	18	n/a
No.4	49	2	100
No.8	37	0	92
No.16	26	n/a	73
No.30	17	n/a	50
No.50	8	n/a	22
No.100	4	n/a	7
No.200	2.6	n/a	3.8

The final blend is arrived at by multiplying the percentage of that component in the Blend. The Sum of the products on each sieve is the blend percentage.

Sand & Gravel	#57	Natural Sand	Blend
100x85= 85	100x.10= 10	*100x.05= 5	100
94x85= 84	100x.10= 10	*100x.05= 5	99
92x85= 78	86x.10= 9	*100x.05= 5	92
78x85= 66	37x.10= 4	*100x.05= 5	75
68x85= 58	18x.10= 2	*100x.05= 5	65
49x85= 42	2x.10= 0.2	100x5= 5	47**
37x85= 31	n/a	92x.05= 5	36
26x.85= 22	n/a	73x.05= 4	26
17x.85= 14	n/a	50x.05= 2	16
8x.85= 7	n/a	22x.05= 1	8
4x.85= 3	n/a	7x.05= 0.4	3
2.6x.85= 2.2	n/a	3.8x.05= .19	2.4

* Note that these are included in the calculation since all sieves larger than the one passing 100% of the material also pass 100%.

** Note that the amount passing the No. 4 sieve is within the +/- 6% allowable.

b) Testing Priorities for 441 Mixes

Following are listed various asphalt samples in order of testing priority. In some case is difficult to say one sample type has priority over another, but you are already aware of this and judgments must be made. However, IN GENERAL and MOST OF THE TIME the following applies.

1. 403 Verification Samples: (Top priority for 3 samples from earliest production per project minimum and tested and reviewed within one day of receipt)

2. At least one set of Rice and Bulk samples from earliest production andtested and reviewed within one day of receipt. Investigate and document any comparison problems.

3. 446 lots 1,2: (tested and reviewed within 1 day of receipt)

4. Remaining 403 Verification samples (within 3 days) (Note: ALL 403 samples and contractor tests must be compared and recorded with responses.)

5. Remaining monitoring samples (within 3 days, reduce to 5 days after 3 consecutive good tests)

6. Remaining 446 lots (within 5 days)

7. Maintenance (purchase order) samples (within 20 days)

Important! As in the past, should you find yourself in a position of not keeping up testing at peak season please contact OMM. In many cases in the past we have been able to help but if not we can find a district which may be a bit slow at that time to help out.

c) Monitoring 403, 441, 442 projects

Following is a discussion of the QC specification and also district monitoring procedures.

The QC specification places greater emphasis on the contractor to do what is necessary to maintain his mix rather than the district taking on the unnecessary burden of ensuring the technician follows some cookbook testing program. The district has the full authority and responsibility of assuring and satisfying itself that the mix is being made properly.
This is accomplished thru monitoring
procedures of split samples, plant lab visits, IAS testing and sometimes most importantly direct communication between the plant and the District Engineer of Tests or Asphalt

Supervisor as to production progress or concerns. Lack of district satisfaction with mix quality or control should lead to reasonable problem resolution on the contractors part provided district monitoring provides evidence a problem exists. Lack of a reasonable response by the contractor or proper mix control is justification for production being stopped or going to a load and hold process. In the case of 403 projects removal from Verification Acceptance is always an option.

Official monitoring of a job is accomplished thru the testing of split samples and plant monitoring reviews. Any monitoring activity should only validate or invalidate particular contractor tests, technician procedures or plant operations. A response to invalid tests or procedures should be quick, decisive and documented. Reviews of test and procedures must also be documented. Reasonable response by the contractor to invalid tests or procedures is expected because of the terms of the contractor QC program and job contract. Responses to invalid tests can include additional testing, retests, load and hold tests, plant re-calibration, a

different technician , scale checks or whatever legitimate action is necessary to achieve proper mix control.

The minimum monitoring requirements are as follows unless altered by 403. In event of conflicting results, the District should contact OMM to referee.

1. **446 Daily FHWA Sample**
These samples have been required by the FHWA for some time for the purpose of monitoring the asphalt plant testing . The daily nuclear asphalt binder content on a properly offset gauge and only one extraction for gradation per week are necessary to meet FHWA requirements. In order to accomplish this, three plate samples will need to be taken per Supplement 1035 from the project or sufficient sample from the plant or hopper. Initial and final offsets may be determined as specified above. The intent of the sample is to compare the test result to the corresponding contractor test on the daily TE-199. Doing so will help check for possible poor contractor testing. In the past we looked for differences in AC of +/-0.3 % two days in a row before investigating. This will still be a good starting point but with using the nuclear gauge the tolerance could become tighter.

2. **Run a minimum of (1) MSG split sample and (1) contractor AC Gauge sample each week.** (Rice comparisons to be within 0.012, 0.012 to 0.020 as an alarm and investigate and above 0.020 – confirm, stop production and/or investigate. If most comparisons are between 0.012 and 0.020 do not allow production to continue until resolved.)

3. **Run a minimum of (1) set of pills produced by the contractor to check for air void compliance each week.** (air voids within 0.2% are OK, between 0.2% and 0.3% OK if not consistently different over multiple tests and above 0.3% confirm, stop production and investigate.)

4. Observe a minimum of (1) set of QC tests in the first 2 days of production.

5. **Verify test procedures at least once a week.**

6. **Verify plant AC and moisture settings at least once a week. (monitor form)**

The specification discusses split sample retention. The AC Gauge sample does not have to be an actual split sample. Instead the contractor will hold all AC Gauge samples in the pan for two days. If an AC Gauge sample is not picked up after two days it can be dumped and the pan reused.

Besides more accurate air voids results because of the MSG testing other useful information can be derived from the MSG testing. However, a discussion of the MSG testing and control in detail is necessary so as to not confuse MSG test results and their indication of production quality versus AC tests, gradations and air voids and what they show about mix quality. The Rice (MSG) test is an accurate test of the mix maximum specific gravity. A change in Rice values indicates primarily either an asphalt binder content change, abnormal gradation change, a blend change or an aggregate gravity change. Of course more than one of these things can change at the same time. Initially, for our purposes, the most important thing we can learn from all the extra Rice testing is the possibility of an asphalt binder content change. To accomplish using the test in a meaningful way it was decided to look at a band of +/- .012. This value, in general, could indicate a potential asphalt binder content change of +/- 0.3%.

However, the specification is misleading at this point as to the intent of using the +/- .012. The confusion is because blend, aggregate gravity, or even sample quality can make individual Rice results go outside of the +/- .012 and the asphalt binder content may still be OK. The +/- .012 is not a magical number. It is only useful in so far as indicating a potential asphalt binder content change.

A proper use of the Rice test in the revised QC specification should be as follows. If an individual Rice value goes outside the +/- 0.12 the contractor must contact the District Engineer of Tests. At that point the District Engineer of Tests will ask what corresponding AC gauge, gradation and air voids results are. If there is indication of an asphalt binder content change or other change thru the AC test or air voids test then corrective action must be taken. Regardless, the contractor should immediately test a new Rice sample and again report the results to the District Engineer of Tests. In many cases no asphalt binder content or air voids change will be indicated by the AC and voids testing.

This simply indicates that something else may have happened such as a poor sample, bad test or a trend change in the aggregate specific gravities.

Should the District Engineer of Tests be satisfied that asphalt binder content, air voids and gradation are OK, but a trend toward the high or low side of the band is confirmed by several Rice test results the District Engineer of Tests can allow the contractor to re-establish an MTD. The MTD should be based upon test results representative of the new

trend and proceed with the +/- 0.12 from that point.

Finally, if no other reasons can be found for a trend in Rice tests changing it can be reasonably assumed aggregate gravities are changing. Should this progress to an extreme the contractor will have difficulty controlling air voids. At some point the contractor will have to be told to correct the situation thru a stockpile change and / or redesign. Re-establishing the MTD is useless at this point until the mix properties are back in control.

d) Procedure for Establishing the MTD

By specification, the contractor shall determine the MSG by the rice method (corrected for moisture content) once per test series. Calculate the average of all the MSG determinations performed each production day and report this average on the Quality Control Report. When the range of three consecutive daily average MSG determinations is equal to or less than 0.020 average these three average MSG determinations to determine the Maximum Theoretical Density (MTD). After the MTD is established, compare all individual MSG determinations to the MTD.The following must also be met on the Rice test, to be accepted for establishing the MTD.

1. The pay sieves must be within the tolerances of (½ +/-6%,#4 +/-5% and #8 +/-4%)

2. The Fines / Asphalt ratio shall be maintained so no F/A Ratio is less than 0.5 or greater than 1.1

3. The asphalt binder content must be +/-0.5% (corrected for moisture) from the design.

4. No Air void determination shall be less than 2.0% or greater than 6.0%

If any of the above requirements are not met, the Rice can be used for determining the air void content but not for establishing the MTD.

e) Use of Mineral Filler in JMF's

It has been requested of ODOT to look into a policy for the use of mineral filler as an addition to asphalt concrete mixes for the purpose of controlling air voids or F/A ratio.

Mineral filler will be used in mixes in the following manner. A design in which it is desired to use mineral filler will be submitted to the OMM with the mineral filler incorporated into the mix up to 2% of blended aggregates. Calculation of the VMA will be done as if no mineral filler has been added to the mix. The percent mineral filler should be added to the percent of fine aggregate for calculation of VMA. In extreme cases this will cause a 0.1% change in VMA but will eliminate the question of specific gravity of the mineral filler.

Adjustment of the JMF to meet air voids or F/A ratio specified limits for production shall follow the 441.04 field adjustment procedures except for the following procedure:

After an attempt to adjust gradation to meet air voids or F/A ratio according to 441.04 it is found the mix is still out of the specified limits a mix that has an approved incorporation of

mineral filler may be adjusted by changing the amount of mineral filler up to +/- 1%. If this change does not solve the air voids or F/A ratio problem then JMF a re-design is required.

Following the mineral filler adjustment a rice test must be performed to show conformance to the MTD within .020 provided an MTD has been established. Mineral filler must be added to the mix separately from its own dry storage. Provision for accurate proportioning is required.

f) District Asphalt Re-approval Process

1) Note received date.
2) Check plans and or proposal/supplemental spec 800 for any particular notes that may apply.Check CMS for JMF validity and is within the 2 (3) year time frame.
3) Materials Codes checked to see if correct.
4) Aggregate Producers checked for 1069 program and any group list changes.
5) If 442, sample course gravel aggregate for crush count if not known, sample fine aggregate for FAA if not on the FAA web site. Only sample what you know will be used on the project.
6) Check for approved binder
7) If JMF is using RAP is the source listed in remarks and does RAP pile need checked?
8) Precursory review JMF agg percentages, liquid content percentages, voids etc
9) Looked at for problems that may have occurred on previous project
10) Update PBOM and enter conversion factor when enough detail of what is actually being used is known.
11) Send approval letter to contractor, copy project inspector and construction and others as district desires or use the contractor request letter, attach the BCJMF printout, send out and notify the contractor.

Additions to this list may be made as experience dictates is necessary.

g) Procedure for Isolating Causes of Test Comparison Problems

Apply this method if your normal evaluation of test discrepencies do not solve the issues! This method will apply to any test where technician procedure or technique is key to an accurate test result. This method should be used when District comparison tests are outside acceptable tolerances when compared to the contractor QC test. Typically monitoring or QA samples split or obtained from QC samples are what are tested for comparison. The specification and this section of the S&T Manual will spell out requirements for sampling frequency and type. For sake of simplicity the MSG or Rice test will be used as an example. All testing must be documented!

1) When a comparison problem is noted first contact the QC Manager and plant technician. Most of the time this solves the problem. Immediately take a new comparison sample upon notification and test.

2) If a repeated history of poor comparison with a given project, technician or plant equipment exists take ALL monitor Rice samples from the QC lab to the District. Stopping or continuing mix production will depend on the circumstances. Run more than one sample to develop a record of the issue. It is also useful to have a different District technician run the same sample to verify results. Notify the QC Manager.

3) At this point a specific investigation should be conducted as follows:
    a. Do a cursory check of the District and Plant lab equipment: temperatures, pressures, hoses, anything obvious. If problems are found correct and re- run samples on both equipment to verify. End the investigation and deal

       with future comparison issues (on this project or other projects with the same QC technician or plant) as below. If no problems are found use the below procedure to isolate the problem cause.
    b. Choose one of the Rice samples already run with known results from the District and QC lab. Have the District and QC technicians (both technicians must be the same ones who ran the previous tests in question) run the same sample at the QC and District labs. This should be done together (all personnel present) at both labs and the District should have a third person present to help observe procedures. The contractor can have any additional person present they want. Record all results. Email the results to the OMM.
    c. Several conclusions can be reached from this special testing: 1) Good comparison, 2) Differences between lab equipment but good technician comparison, or 3) Differences between technicians. Discuss with the OMM what constitutes good comparisons for technicians vs labs.
        i. Good comparison between technicians and labs with the original District test result. This means the equipment is sound and the technicians are capable of good test technique. However, this also means the contractor QC technician incorrectly performed the original test. Please inform the QC manager and the technician in writing of the results and state in the letter that a copy of the letter will be placed in the technician file in Central Office. Send a letter copy to the OMM for filing in the technician certification file.
        ii. Good comparison between technicians and labs but not with the original District test result. This means the equipment is sound and the technicians are capable of good test technique. However, this also means the District technician incorrectly performed the original test (unless an equipment problem was

found previously). Review the technician procedure. Have the technician come to Columbus for retraining in the OMM if necessary.

iii. Differences between lab equipment. Contact the OMM to send someone to investigate the equipment.

iv. Differences between technicians. Send the same sample to the OMM to run. The OMM conclusion, after a review of available information, will be final. Send the QC technician or District technician to the OMM for a review of procedures and retraining.

v. There may be a rare possibility of both items iii. and iv. happening. If so carry out instruction for both items.

3) Asphalt Binder Items

a) Asphalt Binder Sample Containers

Compliance with AASHTO T40 "SAMPLING BITUMINOUS MATERIALS" requires that the following materials be sampled into appropriate containers for shipment to the Laboratory.

Metal Quart (Friction Top) - PG Binder, Asphalt Concrete Underseal (M-238), Waterproofing Asphalt (702.06), Bituminous Pipe Joint Filler, Polymer Modified Expansion Joint binder (per plan note)

PLASTIC QUART (SCREW TOP) – Material Codes beginning with 104
SS-1, SS-1H, CRS-2, CSS-1H, RS-2, CMS-2, MS-2, CSS-1, MWS-90, MWS-150, MWS-300, HFRS-2, SBR Asphalt Emulsion, CRS-2P Type A, CRS-1P Type B, HFRS-1P Type B, Non-tracking Tack products (702.12), SBS Emulsion

METAL QUART (SCREW TOP)
MC-30, MC-70, MC-250, MC-800, MC-3000, Asphalt Primer (702.05), Primer-20

Distribution of this requirement should include all personnel required to sample or observe sampling of the above items. It should also be noted that each container should be full and the lid be applied securely.

b) Sampling PG Binders

Increased check sampling has brought out some issues with proper sampling procedures. Sample integrity is critical when deductions are to be incurred.

It is common for monitors to hand a plant person cans for taking samples because of plant operational issues etc.. That is not a problem BUT here are the only ways this is acceptable.

1) TWO sample cans of each grade must be taken for each check sample desired and sent to Columbus. These will be under ONE sample ID. If we see a failure we will contact you to take new samples to determine the extent of the problem.

2) The cans must be labeled as to grade BEFORE the sample is taken. (Do your monitors have permanent markers for labeling?)

3) The monitor must witness the samples being taken from a tank or truck. (If you have new personnel who have no clue about how to take a tank sample then send them to us for training or train them yourself.)

4) The monitor must witness the handling and control of the samples until he takes possession. The monitor must take immediate possession of the samples.

5) If the monitor has any question about the proper labeling of a sample, handling of a sample or integrity of a sample throw it away and take another one.

6) The monitor must hand deliver the sample to the district lab ASAP for processing and sending to Columbus.

c) Taking a Liquid Binder Sample

There are four critical steps to having a legit sample.

1) Use only a clean container. Use only containers as described in Appendix J, Section 3a above.

2) When sampling from a valve drain a minimum of 1 gallon of material into a separate container and have the contractor discard. The ASTM language below describes this for valve sampling. Dip sampling described below does not require the 1 gallon disposal. Take sample (s).

a) From ASTM D140-01

10. Sampling from Tank Cars, Vehicle Tanks, Distributor Trucks or Recirculating Storage Tanks

10.1 The sample may be taken from the sample valve or tap if the tanks are provided with them. When such sampling devices are required, they are to be built into the tank itself. A sampling device of this type is shown in Fig. 1. Before the sample is taken, 4 L(1 gal) shall be drawn from the sample valve and discarded.

10.2 Samples of liquid materials and materials made liquid by heating may be taken by the dip method using a clean wide-mouth or friction-top can in a suitable holder as

shown in Fig. 4. A clean container must be used to take each sample, and the material sampled shall then be transferred to another new and clean container for retention or testing sample.

b) For SBR modified PG binders, sample after the injection of SBR for drum plants. For batch plants take a sample the SBR latex and a sample of the neat PG binder for batch plants. For drum plants, follow the steps below:
   (i) Using a metal, 5-gallon bucket, a minimum of 1 gallon of material shall be drawn from the sample valve and discard.
   (ii) Using a clean, metal, 5-gallon bucket draw out about 3 gallons of material but no more than two-thirds of a full bucket while the sample valve is fully open.
   (iii) Stir the contents with a clean stirring rod or spoon.
   (iv) Transfer material from bucket to required containers.

3) Properly label the side of the container with material type, amount represented, project number, and date sampled as well as all other required data on forms and required per this manual. Do NOT put label information on the lid of the containers.

4) Maintain custody of the sample(s) from beginning to end and send to OMM for test. Ensure sample(s) is stored from freezing and extreme heat between sampling and sending to OMM.

d) QA of Binder Delivery and Bills of Lading

It has come to our attention that we (ODOT QA and industry QC) currently do not do a good job of validating loads of PG binder delivered to plants to assure they meet JMF requirements. The current process is informal or non-existent. Currently monitors and often techs typically rely on a verbal from the plant operator that the correct source is being used and delivered. A verbal, 'Everything is OK' is not validation for QC or QA purposes.

1) Contractor QCPs will now include a section to meet the following:

For contractor QC we are requesting copies of binder Bill of Ladings with BOL load number, binder source and grade be reviewed against running JMFs and be kept in the plant lab for the duration of the project. Eventually, with further printing, scanning and automation capabilities labs will be able to have these records become part of the TE-199, 125 QC records. But most labs are not quite there yet. Some labs may find a log sheet with BOL# and other needed data in list form may be useful.

2) District Testing has the following responsibilities:

For ODOT QA, asphalt monitors at least once per week and at job start (or when loads are being delivered) need to validate that the correct grade AND certified source is being delivered. Do this by witnessing load delivery,

obtaining a copy of that delivery Bill of Lading (that has date, grade and source) and looking up the source on the Certified Binder list on the web. Place the word ‘Confirmed by and the monitor initials’ on the BOL copy and attach to the monitoring records. Some districts may elect to do the above based on time of sampling which may be fine in some cases but the above frequency needs met. It is not acceptable to review the contractor QC information in place of this QA process.