METHOD OF TEST FOR
QUANTITATIVE DETERMINATION OF
ASPHALT CEMENT CONTENT OF BITUMINOUS MIXTURE
USING THE NUCLEAR ASPHALT CONTENT (AC) GAUGE

1. SCOPE
1.1 This method covers the quantitative determination of asphalt cement in a bituminous paving mixture using the nuclear asphalt content gauge.

2. RELEVANT DOCUMENTS
2.1 ASTM D-4125-92
2.2 MTO Method LS-261
2.3 MTO Method LS-282
2.4 AI Mix Design MS-2

3. APPARATUS
3.1 NUCLEAR AC GAUGE: Consisting of (a) Neutron Source - an encapsulated and sealed radioactive source of americium/beryllium and (b) Detectors - thermal neutron detectors such as helium - 3.
3.2 STAINLESS STEEL SAMPLE PANS: Of uniform size and mass (minimum of five recommended).
3.3 PLUG FIXTURE (optional): When testing with briquettes, the plug fixture is used to position the compacted sample briquettes in the sample chamber for testing.
3.4 CONTROL CONSOLE/READOUT INSTRUMENT: The operator interface to the system. It consists of a keypad, scalar display providing a direct digital reading device calibrated in percent asphalt and the microprocessor that is used to process the sample data.
3.5 SERIAL PRINTER (optional): Capable of interfacing with the nuclear gauge.
3.6 BALANCE OR SCALE: 10000 g capacity with an accuracy of ±0.1 g.
3.7 OVEN: Of suitable capacity and capable of maintaining a temperature in the range 100 to 180°C ± 3°C.
3.8 HOT PLATE/OVEN: Thermostatically controlled and capable of heating asphalt cement to a temperature of 100 to 180°C ± 3°C.
3.9 MARSHALL MOLDS/MECHANICAL COMPACTOR/MANUAL COMPACTION HAMMER: In accordance with LS-261.
3.10 STRAIGHT EDGE: Steel, approximately 450 mm in length.
3.11 LEVELING PLATE: Plywood 19 mm or heavier, 13 mm plexiglas, or metal plate 10 mm or heavier, having an area slightly larger than the sample pans.

3.12 MECHANICAL MIXER: 19 L Hobart or similar equipment.

3.13 Assorted spoons and mixing bowls.

3.14 THERMOMETER/TEMPERATURE PROBE: Suitable for measuring temperature of aggregates, asphalt and bituminous mixtures in the range of 10 to 250°C with sensitivity of ±3°C.

3.15 KETTLE OR CONTAINER: Of sufficient capacity to hold approximately 4.5 L of asphalt cement.

3.16 GLOVES: Heat resistant for handling hot equipment.

3.17 BRIQUETTE EXTRACTOR: Steel, in the form of a disk with a diameter not less than 100 mm and 13 mm thickness. The extractor shall be any device, either electrical or hand operated that will force the briquette from the mold into the extension collar at a uniform rate without causing any deformation to the specimen.

4. PREPARATION OF CALIBRATION SAMPLES

4.1 Prepare specimens for specific % AC yielding 5 data points with the middle point being the proposed JMF target % and the remaining 4 points being two below and two above the target % AC in 0.5% increments.

4.2 Dry aggregates to a constant weight at 110°C and separate the aggregates by dry sieving into the desired size fractions according to the JMF.

4.3 Arrange the individually sized coarse aggregate(s) and fine aggregate(s) in bags or in suitable containers on a bench, in order of decreasing sieve sizes. See weigh card for the particular mix.

4.4 PREPARATION OF PAN CALIBRATION SAMPLES.

4.4.1 Blank Sample Preparation for Pan Calibration - If for the JMF the asphalt sample size (mass - kg) to be placed in the pans for calibration and testing is not available from historical records, a blank sample of aggregate should be prepared to estimate the asphalt sample size.

4.4.2 Select an empty sample pan and obtain the weight (tare weight).

4.4.3 Blend the aggregate(s) in the proper proportions (at least 10 kg total).

4.4.4 Fill the sample pan with the blended aggregate in two or three layers, avoiding segregation. Using a scoop or spatula, distribute the aggregate to reduce voids and segregation. For each layer, raise the pan approximately 20 to 50 mm from the working surface and let it drop two or three times to settle the contents. Fill the pan to a point slightly above the top edge. Slide a straightedge along the top of the pan until the aggregate is absolutely flush with the top edge of the pan.

Note 1: Caution - Do not compact the sample.

4.4.5 Determine the mass of the blank sample to the nearest gram and record to the nearest 10 grams. Use this mass for all calibration and plant mix test samples for that particular JMF.
Note 2: The mass of the blank sample may not be sufficient to completely fill the calibration and plant mix test sample pans for all mixes. The asphalt cement may act as a lubricant allowing additional consolidation of the aggregate particles. An adjusted blank sample mass may be determined by preparing a calibration sample using these procedures and using the mass of this sample as the blank sample mass for this and all remaining samples for that particular JMF.

4.4.6 Preparation of the five calibration samples for the pan calibration will require each of the five mixtures to be prepared in duplicate 4000 g batches to provide sufficient material to fill the pans.

4.4.7 Using the flat bottom scoop, weigh up, into separate duplicate pans for each test specimen, a sufficient quantity of oven-dried sample of the selected aggregates, so that the total mass will result in 4000 g with the specified AC content.

4.4.8 Use the pans accompanying the nuclear gauge. Weigh each pan and mark the pans with the tare weight to the nearest 0.1 g.

4.4.9 Place the aggregates in an oven maintained at a temperature not exceeding 30°C above the temperature that will yield a viscosity of $170 \pm 20$ mm$^2$/s for the asphalt used. Heating time shall be a minimum of 16 hours, normally overnight.

4.4.10 Preheat the mixing bowl in the same oven as the aggregate. Preheat the metal trowel and spatula on the hot plate.

4.4.11 Heat the asphalt to a temperature which will give a viscosity of $170 \pm 20$ mm$^2$/s (Mixing Temperature). Refer to the temperature/viscosity chart for the particular asphalt cement in use. The asphalt cement should not be held at mixing temperatures for more than 2 hours. Suitable shields, baffle plates or sand pads shall be used on the surface of the hot plate to prevent localized overheating.

4.4.12 When the asphalt cement has reached the desired temperature, remove the container of aggregate from the oven (for one 4000 g batch only), and quickly place it in the mixing bowl that has been previously buttered and tared. Using the mixer, dry mix the aggregate for 15 seconds.

4.4.13 After dry mixing, form a crater in the centre of the aggregate in the bowl, quickly add in the required amount of asphalt cement, and mix 45 seconds or until the aggregate is coated. Do not mix longer than 1.5 minutes.

4.4.14 At the end of the wet mixing cycle, using the pre-heated spatula, scrape as much of the mix as possible from the mixing paddle and scraper blade.

4.4.15 Spread the mixture into a tray using a back and forth motion. Scrape all the loose mixture in the bowl into the tray. Cover the top of the tray (e.g. plywood cover).

4.4.16 Repeat steps 4.4.10 to 4.4.14.

4.4.17 Combine the duplicate mix with the mix in the tray and stir to produce a uniform blend.

4.4.18 For all mixes with a permeability of $K/L = 10^{-10}$ cm$^2$ or greater (i.e. DFC, HDBC, OFC, OGDL, etc.), the calibration bituminous mix for the pan calibrations must be left in the tray and
allowed to cool overnight to room temperature. On the following work day, reheat the calibration mixes in the trays to 150°C before placing in the pans.

4.4.19 Fill the sample pan in three layers. After placing each layer in the sample pan, using a scoop or spatula, distribute the layer of material evenly in the pan to reduce voids and segregation. Place the sample pan on the scales and add or remove material until the mass equals the mass of the blank aggregate sample or other predetermined mass within ±1 g.

4.4.20 Level the mixture on the top of the sample pan, spreading the mixture out to the edge of the pan.

4.4.21 Place wax paper over the pan to prevent the asphalt from sticking to the plate. The asphalt mix may be compressed with a piece of flat plywood or flat metal plate to ensure that the asphalt is level with the top of the pan. (This is accomplished by laying the leveling plate on top of the sample and then standing on it and using a twisting motion while standing on it to screed it off even with the top of the pan). Sight across the top of the sample pan to ensure that the mixture does not protrude above the pan.

Note 3: Do not compact with a press or compaction tool.

4.4.22 Reweigh the sample pan with sample and if necessary adjust the mass to within ±1 g of the target by adding fines from the leftover mix in the tray.

4.4.23 Repeat steps 4.4.7 to 4.4.21 for each of the remaining calibration samples.

4.5 PREPARATION OF MARSHALL BRIQUETTE SAMPLES

4.5.1 The gauge calibration shall be performed using two compacted specimens at five known asphalt contents.

4.5.2 Dry aggregate to constant mass at 110°C and separate the aggregates by dry sieving into the desired size fractions.

4.5.3 Arrange the individually sized coarse aggregate(s) and fine aggregate(s) in bags or in suitable containers on a bench, in order of decreasing sieve sizes. See weigh card for the particular mix.

4.5.4 Preparation of the five sets of calibration briquettes will require each of the five mixtures to be prepared in 4000 g batches to provide sufficient material in order to prepare three Marshall briquettes. The mass of each briquette shall be determined to the nearest 0.1 g and recorded. The two briquettes with mass approximating each other the closest shall be selected and used to calibrate the nuclear gauge to the known % AC.

4.5.5 Using the flat-bottom scoop, weigh up a sufficient quantity of oven-dried sample of the selected aggregates, so that the total mass will result in 4000 g with the specified AC content.

4.5.6 Repeat steps 4.4.9 to 4.4.14.

4.5.7 Spread the mixture into a tray using a back and forth motion. Scrape all the loose mixture in the bowl into the tray.
**Note 4:** For all mixtures with AC content equal to the JMF + 0.5% or lower, allow the material in the tray to cool overnight to room temperature. For the mixture with AC content equal to the JMF +1.0%, reheat the mixture the following day to 150°C and allow to cool overnight to room temperature a second time.

**Note 5** As an option, the briquette calibrations may be prepared using only the mixes prepared with an AC content of JMF mixes 1.0% to JMF plus 0.5% thereby foregoing the mix with an AC content of JMF + 1.0%. Electing this option will eliminate the requirement for a second reheat of the mix with an AC content greater than the JMF plus 0.5%.

4.5.8 After the cooling period(s), place all trays in the oven and heat to a temperature of 150°C (approximately 2 hours).

4.5.9 Scoop out and place in a heated compaction mold enough mixture that will result in a compacted specimen 63.5±1.25 mm in height (approximately 1200-1300 g). Alternatively, if for field samples the laboratory doing the AC testing for the associated contract has established a predetermined or historical mass for the respective HL mix for compacting field samples, then the calibration briquettes shall be prepared to that same mass.

4.5.10 Compaction procedure for the briquettes shall be in accordance with LS-261. It is recommended that all briquettes (both calibration and field) associated with testing with the nuclear AC gauge be prepared using mechanical compaction to reduce time and improve consistency.

5. **GAUGE START-UP AND STANDARDIZATION**

5.1 The nuclear AC gauge should be set up on a level sturdy surface in a location with a minimum clearance of 1 metre from any large standing object and at least 2 metres from any object containing moisture. Do not store samples of hot mix asphalt or asphalt cement within 2 metres of the gauge location.

5.2 The gauge must be installed at least 10 metres from any other nuclear gauge.

5.3 To begin a gauge calibration sequence complete the following steps (refer to the gauge operation manual for specific instructions to accomplish each step in the start-up, standardization and calibration procedures).

5.3.1 Turn the gauge on and set the measure time to 16 minutes and take a Background count: for pan calibration, the chamber must be empty; for briquette sample calibration, the plug fixture (without asphalt briquettes) must be placed in the chamber before taking the Background count.

5.3.2 Compare the new Background count to the previous 4 Background counts. If the new count is not within 1% of the average of the previous 4 counts, inspect the gauge surroundings, remove any large source of hydrogen (water, asphalt cement, etc.) and repeat the Background count.

5.3.3 Record the new Background count on the calibration data sheet.
6. ASPHALT MIXTURE CALIBRATION

6.1 PAN SAMPLES

6.1.1 Set the measure time to 16 minutes and initiate a new calibration by pressing the CALIB key. Press the key sequence for “New Calibration” following the manufacturer’s instructions and enter “5” as the number of samples for the calibration.

6.1.2 Enter the % AC, place the prepared sample pan in the chamber, close the chamber door and press the “START/ENTER” key to begin the count.

6.1.3 At the end of the count, record the count, remove the pan sample, place the second pan in the chamber and start a new count.

6.1.4 Repeat step 6.1.3 for the remaining 4 pan samples.

6.1.5 At the completion of measuring all specimens, the gauge display will show the Fit Coefficient. The Calibration Constants and the % Difference for each data point should be reviewed and recorded or printed out.

6.1.6 Calculate and record the incremental differences and the mean of the incremental differences amongst the five calibration counts.

6.1.7 The Calibration shall be accepted if:

1) The fit coefficient is greater than 0.995.

2) No incremental difference varies from the mean of the incremental differences by more than 15%.

6.1.8 If the calibration is not accepted, review the results to identify the outlier sample(s). If a recount does not correct the discrepancy, prepare new replacement samples until an acceptable fit is achieved.

6.1.9 The calibration is then stored in the unit.

6.2 BRIQUETTE SAMPLES

6.2.1 Set the measure time to 4 minutes and initiate a new calibration by pressing the CALIB key. Press the key sequence for “New Calibration” following the manufacturer’s instructions and enter “5” as the number of samples for this calibration. Where the control console is so programmed, enter to the nearest 0.1 g the total mass of the set of the two calibration briquettes. Enter the % AC.

6.2.2 Place the two selected compacted briquettes corresponding to this % AC in the plug fixture, and place a keel or chalk mark (arrow) on one face of each briquette for reference and orientation. Place the plug fixture in the chamber, close the chamber door and press the “START/ENTER” key to begin the measure count.

6.2.3 At the end of the count, record the count, rotate the asphalt briquettes in the plug fixture 180°, replace the plug fixture in the chamber and start a new count.

6.2.4 At the end of the count, record the count, remove the asphalt briquettes, turnover and repeat steps 6.2.2 to 6.2.3.
6.2.5 After the four minute readings for the set of briquettes are completed, record the average count.

6.2.6 Repeat steps 6.2.1 to 6.2.5 for the remaining four sets of calibration briquettes.

6.2.7 At the completion of measuring all specimens, the gauge display will show the Fit Coefficient. The Calibration Constants and the % Difference for each data point should be reviewed and recorded or printed out.

6.2.8 Calculate and record the incremental difference and the mean of the incremental differences amongst the five calibration counts.

6.2.9 The Calibration shall be accepted if:
1) The fit coefficient is greater than 0.995
2) No incremental difference varies from the mean of the incremental differences by more than 20%.

6.2.10 If the calibration is not accepted, review the results to identify the outlier sample(s). If a recount does not correct the discrepancy, prepare new replacement samples until an acceptable fit is achieved.

6.2.11 The calibration is then stored in the unit.

7. TESTING OF PRODUCTION MIXTURE (FIELD SAMPLES)

7.1 PREPARING PAN SAMPLES

7.1.1 The field sample shall be a minimum of 8.0 kg and be obtained according to approved methods.

7.1.2 In order to be consistent, any material received in the laboratory from the paving site in a hot condition, i.e. >50°C, shall be allowed to cool to room temperature. Fans are permitted.

7.1.3 Warm the entire sample until it can be separated without causing any breakdown of the aggregates.

7.1.4 Spread the mixture in a tray and heat in an oven (microwave not permitted) to a temperature of 150°C ±2°C.

7.1.5 After heating, stir the mixture with a trowel to ensure it is uniform and begin to transfer the mixture from the tray to the pan. The total mass of the mixture transferred to the pan shall be within ±1 g of the mass of the mixture selected for the corresponding calibration pan samples.

7.1.6 Fill the sample pan in three layers. After placing each layer in the sample pan, using a scoop or spatula, distribute the layer of material evenly in the pan to reduce voids and segregation. Do not pack the material with a press or compaction tool. Place the sample pan on the scales and add or remove material until the desired sample mass is obtained.

7.1.7 Level the mixture on the top of the sample pan, spreading the mixture out to the edges of the pan. Place a piece of wax paper over the asphalt and press down on the asphalt with a piece of flat
plywood or flat metal plate. (This is accomplished by laying the leveling plate on top of the sample and then standing on it, and using a twisting motion while still standing on it.) Sight across the top of the sample pan to ensure that the mixture does not protrude above the pan.

7.1.8 Place the full sample pan on the scale and obtain the mass of the mixture. Record the value. It should equal the mass of the calibration sample reference mass ±1 g.

7.1.9 Repeat Steps 7.1.1 to 7.1.8 for each sample.

7.1.10 After the measurements with the nuclear gauge are completed, the asphalt can be removed from the sample pan by placing the filled pan in an oven set to a temperature of 180°C. Leave the pan in the oven for a period of 10 to 15 minutes (at a lower temperature, a longer time may be required). Turn the pan upside down and lightly tap on the bottom. Do not dent the bottom of the pan.

7.2 TAKING A MEASUREMENT (PAN SAMPLES)

7.2.1 Ensure that the background count is current.

7.2.2 Place the sample pan into the sample chamber and close the door.

7.2.3 Select the correct calibration.

7.2.4 Perform a 4 minute count according to the operator’s manual. Optionally a longer time period may be selected but it is not required.

7.2.5 After the count time has elapsed, the results will be displayed on the screen. Where equipped, a printed copy may also be obtained.

7.2.6 Transfer results to the appropriate forms.

7.2.7 Repeat Steps 7.2.2 to 7.2.6 for each sample.

7.3 PREPARING BRIQUETTE SAMPLES

7.3.1 Prepare 3 briquettes for each sample of asphaltic concrete.

7.3.2 The field sample shall have a minimum mass of 4000 g and be obtained according to approved methods.

7.3.3 In order to be consistent, any material received in the laboratory from the paving site in a hot condition, i.e. >50°C, shall be allowed to cool to room temperature. Fans are permitted.

7.3.4 Warm the entire sample until it can be quartered down without causing any breakdown of the aggregates.

7.3.5 Obtain from the sample by the splitting/quartering method, sufficient material in order to prepare three Marshall briquettes.

7.3.6 Spread the mixture in a pan and heat in an oven (microwave not permitted) to a temperature of 150°C ±2°C.

7.3.7 Scoop out and place in a heated compaction mold the same mass (±1g) of mixture that was used when preparing the corresponding calibration briquettes.

7.3.8 Compaction procedure for the briquettes shall be in accordance with LS-261. It is recommended that all briquettes (both calibration and field) associated with testing with the nuclear
AC gauge be prepared using mechanical compaction to reduce time and improve consistency. If the field briquettes are compacted on a different mechanical hammer than the corresponding calibration briquettes, an “equivalency factor” should be established in order that the compactive effort for the type of mix being compacted is the same for both units.

7.3.9 After compaction, allow the briquettes to cool until warm to touch (approximately 40°C). Fans may be used. Cooling by submerging in water is not permitted.

7.3.10 Remove the specimens from the molds by means of an extrusion jack or other compression device. The mass of each briquette shall be determined to the nearest 0.1 g. Record the mass of each briquette. For each set of three briquettes, the two briquettes with mass approximating each other the closest shall be used to determine the AC content in the gauge. Place the briquettes on a smooth level surface until ready for testing.

7.4 TAKING A MEASUREMENT (BRIQUETTE SAMPLES)

7.4.1 Ensure that the background count is current.

7.4.2 Using a piece of keel or chalk, make a mark on the top and bottom edge of each briquette. This mark will be used as a reference when the briquettes are rotated in the fixture.

7.4.3 Place the sample briquettes (2 required) into the Sample Plug Fixture. Place the fixture into the sample chamber and close the door.

7.4.4 Select the correct calibration.

7.4.5 Perform a 4 minute count according to the operator’s manual. After the first count, rotate the briquettes 180° and take a second 4 minute count.

7.4.6 After the second count, turn the briquettes over and take a third 4 minute count. After the third count, rotate the briquettes 180° and take a fourth and final 4 minute count.

7.4.7 After the count time has elapsed, the results will be displayed on the screen. Where equipped a printed copy may also be obtained.

7.4.8 Transfer the results to the appropriate forms.

7.4.9 Repeat steps 7.4.2 to 7.4.8 for each sample.

8. CROSS CALIBRATION

8.1 Operations involving testing the AC content using the nuclear gauge permit the calibrations to be carried out in a laboratory independent of the location of the laboratory testing the field contract samples. This can be accomplished by employing the procedures of Cross Calibration and JMF Transfer Calibration. A master gauge is located at the main or Regional laboratory while other nuclear gauges are located in field laboratories.

8.2 Prepare five calibration samples according to Section 4 to obtain an initial relational curve (or correlation) between the master and field gauges. The five calibration samples must be prepared
such that they all can be measured on both gauges on the same day. (It is recommended that a pan calibration be prepared).

8.3 Starting with the master gauge press CALIB to perform a new calibration. Take a new Background count and record the value.

Note 6: The gauge which is currently active and measurements are being taken on must be a minimum of 10 m away from any and all other nuclear gauges while the calibration measurements are being taken.

8.4 Run each sample in the master gauge in the normal calibration mode (16 minutes). Record the counts obtained on each of the samples. The coefficient of fit should be at least 0.995 or better.

8.5 On the field gauge, select CROSS CALIBRATION (Refer to gauge manual). Perform a Background count and record the value.

8.6 Using the same five calibration samples, perform a Cross Calibration on the “Field” gauge.
1) input the number of samples
2) measure the samples (16 minute counts)
3) keypad input “Master” gauge background count
4) keypad input the five sample counts taken with the “Master” gauge.

The master gauge and the field gauge are now cross calibrated.

8.7 Repeat steps 8.5 to 8.6 for each “Field” gauge. If this is not done on the same day, repeat steps 8.3 and 8.4 first.

9. CALIBRATION TRANSFER

9.1 After the cross calibration is complete, calibrations performed on the “master” gauge can be transferred to the “field” gauge(s) without additional “field” gauge calibration.

9.2 Perform a calibration on the “master” gauge. Record the sample weights, the “master” gauge background count and calibration constants A1, A2 and A3

9.3 Input the calibration information (Step 9.2) from the “Master” gauge into the “Field” gauge. The “Field” gauge is now ready to measure unknown field asphalt samples produced from the related job mix formula.

10. GENERAL NOTES AND PRECAUTIONS

10.1 Perform background counts at least once per day and whenever there is a change in the environment around the gauge. Any hydrogen sources such as water, asphalt samples, people etc. should be kept at least 2 m away from the gauge. If the gauge environment has not changed, the daily background count should not vary by more than ± 0.5%.

10.2 During operation of the nuclear asphalt content gauge, the gauge must be located at least 10 m from any other nuclear gauge.
10.3 The room where the gauge is to be located should be well ventilated and should not experience abrupt temperature changes or humidity changes.

10.4 To ensure measurement consistency, mark the sample pans so they are inserted into the chamber the same way each time the pan is used.

10.5 The presence of moisture in the asphalt sample and its effect on the readings taken with the nuclear AC gauge can be considered non-existent for the following reasons:

(a) Historical records reported by Mobile lab foremen indicate the moisture content determined from field samples of hot mix asphalt to be generally 0.05% or less.

(b) Spreading out the sample in the tray and reheating to 150°C to allow placement in the pan or the manufacture of Marshall briquettes removes the remaining moisture.

10.6 The reheating of the asphalt samples for the calibration briquettes is essential in order for the calibration briquettes to match the characteristics (i.e. mass loss during briquette fabrication as well as void characteristics) of the briquettes fabricated from the field samples of the respective mix.

10.7 For the calibration pan samples, the incremental difference in counts between successive 0.5% AC increments should not vary by more than 15% of the mean of the increment values over the range of the calibration. If the above criteria is not satisfied, review the readings and repeat the counts for any suspected specimens. If the criteria remains unsatisfied, prepare new calibration samples for any suspected specimens and repeat the calibration.

10.8 The effect of changes in gradation of the aggregates and changes in proportions of coarse and fine aggregates on the % AC measured with the nuclear gauge are negligible provided the gradations and proportions are within the acceptable tolerances that are specified by the MTO for the respective mix type.

10.9 Users of this equipment must become familiar with possible safety hazards and with all applicable regulations concerning the handling and use of radioactive materials. Effective user instructions together with routine safety procedures are a required part of the operation of this apparatus.

10.10 A new calibration curve shall be developed whenever there is a change in the source of asphalt or aggregates; or a change in the job mix formula resulting in a change in the proportions of the coarse and fine aggregates where the fine and coarse aggregates differ petrographically.

10.11 When preparing calibration samples for mixes containing recycled asphalt pavement (RAP) materials, determine the AC content of the RAP material from extractions on three random 1 kg samples taken from the same sample of the RAP material being utilized to prepare the calibration samples. Since the extractions generally do not recover all the asphalt cement contained in the RAP, the resultant % AC in the RAP should be increased to properly define the % AC in the calibration samples. For each 10% RAP fraction in the JMF, increase the predetermined % AC by 0.05%. (E.g. If the extraction of the RAP samples indicate that the RAP has an AC content of 4.18%
and the JMF specifies 30% RAP, the % AC assigned to the 30% RAP fraction of the calibration samples shall be \(4.18 + \left(\frac{30}{10} \times 0.05\right) = 4.33\%\).

10.12 Do not reheat prefabricated calibration or production samples at high temperatures for long periods of time. (If reheating is necessary, use a low heat setting).

10.13 Do not use damaged (severely bent or cracked) sample pans.

10.14 Do not move the gauge to a new location without taking a new background count.

10.15 Do not place large sources of liquids near the gauge after taking the background count.