
IDAHO
TRANSPORTATION DEPARTMENT

Non-nuclear Asphalt Density Gauge

Where we're at

- 2011 allowed Non-nuclear density gauges for QA

How did we get here?

- Ageing Fleet of nuclear gauges
- $$$$$$$

How did we get here?

Test Strip Data					
Core Number	Core Density	Trans Tech PQI 301	Troxler 4640B	CPN MC3-DRP	Troxler 3440
1	144.2	144.5	148.4	148.6	148.4
2	152.1	152.8	154.5	155.4	154.1
3	153.2	150.4	156.8	157.8	155.1
4	154.3	154.6	153.8	156.0	156.0
5	155.5	156.5	155.9	158.4	157.8
6	153.4	153.2	154.0	159.2	155.5
7	149.5	150.2	152.4	151.8	150.5
8	153.9	152.0	154.7	156.1	154.7
9	150.0	149.9	153.5	154.0	151.8
10	152.1	151.6	155.3	155.0	154.4

Core Correlations

- PQI 301 - 0.930
- 4640B - 0.881
- MC3 - 0.922
- 3440 – 0.965

TransTech PQI Electronic Density Gauge

Pavement Quality Indicator™

The alternative density gauge.

Benefits of the electronic gauge

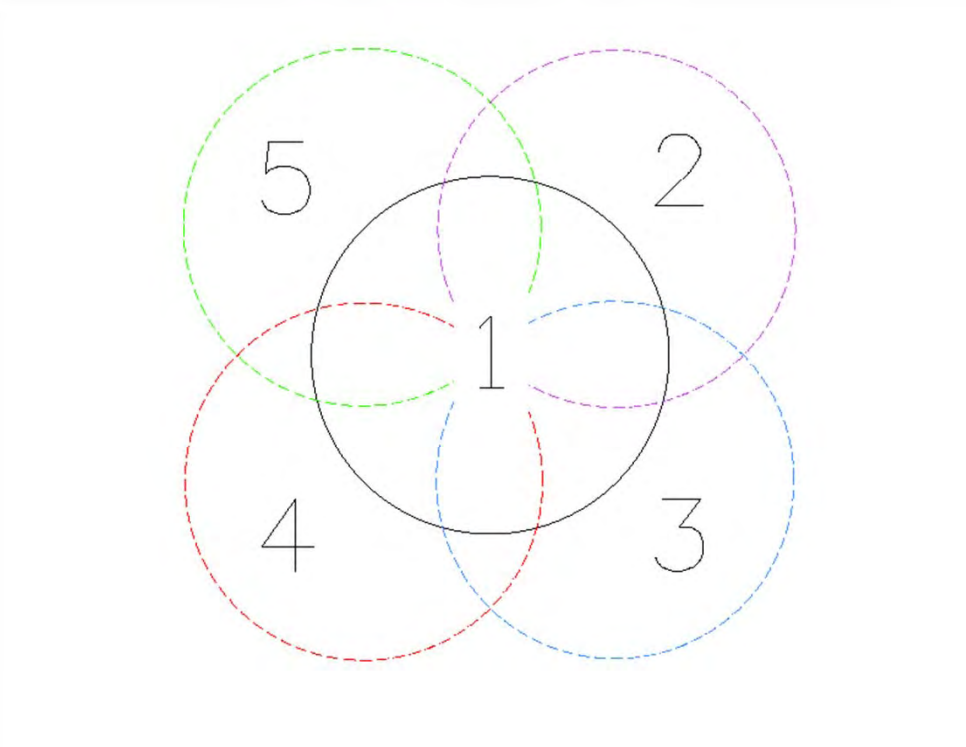
- Lightweight
- Easy to use
- Its fast
- No need for a nuke badge
- No need for special travel papers
- No need for extra training (nuclear safety training)
- Time from out of the case to testing plantmix is minimal
- Did I mention its FAST?

Drawbacks of the electronic gauge

- Needs 5 shots per test spot
- Needs a 6 inch core to correlate as opposed to the usual 4 inch core

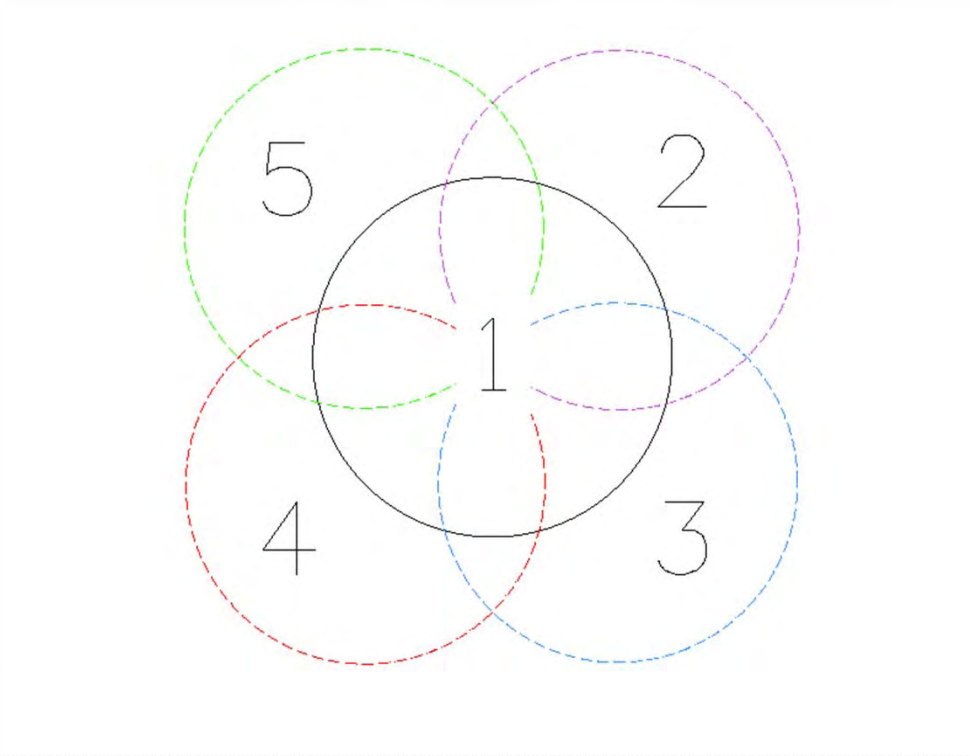
Using the PQI electronic density gauge

- Correlation: takes the same number of cores as the nuke, just needs 5 shots per core



Using the PQI electronic density gauge

- Production: Takes the same number of shots for each test site as correlation



5 SHOTS PER TEST SITE??

No worries! At 3 second per shot, you will be done with all 5 shots, even with writing the numbers down, before the nuke will get 1 shot done!

Special considerations when using the electronic gauge

- No need to use sand under the gauge. Just sweep off the loose rocks
- As it does not use sand, it must be the first gauge to test the site if other gauges are nuclear
- There cannot be standing water under the foot
- You should not be touching the gauge while taking the shot
- For those used to nuclear gauge offsets, PQI offsets will seem huge. Its normal for an offset of over 22

Nuclear Gauge Correlation

Plant Mix Pavement Device Correlation

ITD 0820 (Rev. 05-26-11)
itd.idaho.gov

Type of Test ☑ Nuclear - WAQTC TM-8 Requires 2 Readings ☐ HMA (ESCD) - AASHTO TP 68 Requires 5 Readings

Lab Number

Key Number	Project Number	Project Name	Location
11635	A011(635)	JCT I-15 Ave & Oak St	Pocatello

Contract Number	Contract Item Number	Contract Item Description	Date
7492	S405-20A	Superpave HMA PAV CL SP-4	40750

Gauge Make	Model	Serial Number	Test Strip Number	Plant Mix Lift
Troxler	3450	867	Density Test Strip	Top

Use all cores from the test strip to correlate the gauges, even if there is more than one asphalt content test section.

Core Number	Station/ Milepost	Offset	First Reading	Second Reading	Third Reading Required only for AASHTO TP 68	Fourth Reading Required only for AASHTO TP 68	Fifth Reading Required only for AASHTO TP 68	(1) Average Uncorrected Density	(2) Core Bulk Density (from laboratory testing)	(3) Calculated Differences [(2) - (1)]	Recalculate Differences of Remaining Cores as Necessary	Recalculate Differences of Remaining Cores as Necessary
1	130	3	143.6	145.4	N/A	N/A	N/A	144.5	147.5	3		
2	240	6	143.3	141.9	N/A	N/A	N/A	142.6	143.5	0.9		
3	340	4	144.5	142.6	N/A	N/A	N/A	143.6	146.1	2.5		
4	450	5	142.6	142.8	N/A	N/A	N/A	142.7	146.8	4.1		
5	670	7	143.9	143.3	N/A	N/A	N/A	143.6	145.2	1.6		
6	720	9	142.2	142.3	N/A	N/A	N/A	142.3	141.0	-1.3		
7	845	5	143.5	142.9	N/A	N/A	N/A	143.2	146.5	3.3		

Instructions for Standard Deviation (See WAQTC TM8 or AASHTO TP 68 Procedures)

Standard deviation must be equal to or less than 2.5 pounds per cubic foot. If greater than 2.5 pounds per cubic foot, eliminate the core with the largest difference and retype the remaining calculated differences in the next column. Continue to evaluate, eliminating the next largest core and retype the remaining difference in the last column until the standard deviation is equal to or less than 2.5 pounds per cubic foot. Additional cores must be obtained when less than 5 cores are remaining.

Average	2.0		
Standard Deviation	1.8		
Standard Deviation is equal to or less than 2.5 pounds per cubic foot?	Yes ☑ No ☐	Yes ☐ No ☐	Yes ☐ No ☐

Remarks

Correlation Factor (Applies only to this gauge and plant mix lift)	Tester Recording Wet Densities	WAQTC Number
2.0	Cesar Garcia	22346

Calculated By	Date	WAQTC Number	Checked By	Date	WAQTC Number
P. Archibald	07/26/2011	20865			

Electronic Gauge Correlation

Plant Mix Pavement Device Correlation

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Contract Number	Contract Item Number	Contract Item Description	Date
7492	S405-20A	Superpave HMA PAV CL SP-4	40750

Gauge Make	Model	Serial Number	Test Strip Number	Plant Mix Lift
PQI	301	626821	Density Test Strip	Top

Use all cores from the test strip to correlate the gauges, even if there is more than one asphalt content test section.

Core Number	Station/ Milepost	Offset	First Reading	Second Reading	Third Reading Required only for AASHTO TP 68	Fourth Reading Required only for AASHTO TP 68	Fifth Reading Required only for AASHTO TP 68	(1) Average Uncorrected Density	(2) Core Bulk Density (from laboratory testing)	(3) Calculated Differences [(2) - (1)]	Recalculate Differences of Remaining Cores as Necessary	Recalculate Differences of Remaining Cores as Necessary
1	130	3	117.1	117.7	118.1	117.9	117.2	117.6	147.5	29.9		
2	240	6	117.5	117.0	117.8	117.0	117.5	117.4	143.5	26.1		
3	340	4	118.0	117.6	118.3	118.1	118.4	118.1	146.1	28.0		
4	450	5	117.4	117.6	117.5	114.3	117.5	116.9	146.8	29.9		
5	670	7	117.3	117.7	117.4	117.1	116.6	117.2	145.2	28.0		
6	720	9	117.1	117.0	117.1	117.4	117.8	117.3	141.0	23.7		
7	845	5	117.7	117.5	117.8	118.5	118.2	117.9	146.5	28.6		

Instructions for Standard Deviation (See WAQTC TM8 or AASHTO TP 68 Procedures)

Standard deviation must be equal to or less than 2.5 pounds per cubic foot. If greater than 2.5 pounds per cubic foot, eliminate the core with the largest difference and retype the remaining calculated differences in the next column. Continue to evaluate, eliminating the next largest core and retype the remaining difference in the last column until the standard deviation is equal to or less than 2.5 pounds per cubic foot. Additional cores must be obtained when less than 5 cores are remaining.

Average	27.7		
Standard Deviation	2.2		
Standard Deviation is equal to or less than 2.5 pounds per cubic foot?	Yes ☑ No ☐	Yes ☐ No ☐	Yes ☐ No ☐

Remarks

Correlation Factor (Applies only to this gauge and plant mix lift)	Tester Recording Wet Densities	WAQTC Number
27.7	Dale Wheeler	21979

Calculated By	Date	WAQTC Number	Checked By	Date	WAQTC Number
P. Archibald	07/26/2011	20865			

The PQI in action