PaveScan Calibration w / Cores

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Sweden & Norway: April 2-3, 2019

Calibration Essentials

1. Be fussy and precise
2. Strive for $R^2 \geq 0.95$
3. Collect enough PaveScan data to get full range of compaction variation
4. Select 21 Core Locations with PaveScan
5. Collect time readings
6. Collect distance readings
7. Wait until mat is cool before drilling cores. (If possible drill calibration cores the next day)
8. Use vacuum drying and sealing methods for determination of Bulk Density

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Statistics

Lateral Offset	Sensor Position	Serial #	Start Dist	End Dist	Median	Average	Min	Max
1	Left	60	844+00.00	838+00.00	93.2307	92.9579	87.0431	99.334
3	Center	61	844+00.00	838+00.00	95.4564	95.2444	90.0574	101.737
5	Right	63	844+00.00	838+00.00	94.8236	94.3258	89.3303	99.3309
7	Right	63	838+00.00	844+00.00	95.5651	94.8967	89.3076	99.4359
9	Center	61	838+00.00	844+00.00	94.9635	94.8956	85.7457	100.383
11	Left	60	838+00.00	844+00.00	93.6697	93.8789	89.137	98.7664

Maximum Dielectric for 600 feet

Lateral Offset	Sensor Position	Serial #	Start Dist	End Dist	Median	Average	Min	Max
3	Center	61	844+00.00	838+00.00	5.21607	5.1903	4.59799	5.89253
9	Center	61	838+00.00	844+00.00	5.16111	5.15111	4.07718	5.75024
7	Right	63	838+00.00	844+00.00	5.22815	5.15026	4.50925	5.64966
1	Left	60	844+00.00	838+00.00	4.96562	4.93171	4.23659	5.63876
5	Right	63	844+00.00	838+00.00	5.14547	5.08722	4.51195	5.63844
11	Left	60	838+00.00	844+00.00	5.01548	5.03676	4.48894	5.57794

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Range of Relative Permittivity

Max – Min = Range

5.8925 - 4.0772 = 1.815

1.815 > 0.80 So Range of values is Good

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Core Locations Sorted by Distance

Lateral Offset	Sensor Position	Serial #	Distance	Dielectric
11	Left	60	838+02.70	5.02
1	Left	60	838+35.10	5.03
9	Center	61	838+87.50	5.13
5	Right	63	840+23.20	5.10
1	Left	60	840+88.60	4.50
1	Left	60	841+11.10	4.47
1	Left	60	841+51.90	4.49
5	Right	63	841+98.20	4.52
3	Center	61	842+64.70	5.61
9	Center	61	842+84.00	5.56
5	Right	63	842+89.60	5.49
3	Center	61	843+18.80	5.51

Field Book

Core #	Station	Distance	Range	Dielectric	Sensor #	Position	Offset
	83800.0	=start station					
1	83802.7	2.7	Mid	5.02	60	Left	11
2	83835.1	32.4	Mid	5.03	60	Left	1
3	83887.5	52.4	Mid	5.13	61	Center	9
4	84023.2	135.7	Mid	5.10	63	Right	5
5	84088.6	65.4	Low	4.5	60	Left	1
6	84111.1	22.5	Low	4.47	60	Left	1
7	84151.9	40.8	Low	4.49	60	Left	1
8	84198.2	46.3	Low	4.52	63	Right	5
9	84264.7	66.5	High	5.61	61	Center	3
10	84284.0	19.3	High	5.56	61	Center	9
11	84289.6	5.6	High	5.49	63	Right	5
12	84318.8	29.2	High	5.51	61	Center	3

Field Book

Core #	Station	Distance	**Now collect core dielectric readings:**			
	83800.0	=start	Time file#	Time Rdg	Dist. file#	Dist. Rdg
1	83802.7	2.7				
2	83835.1	32.4				
3	83887.5	52.4				
4	84023.2	135.7				
5	84088.6	65.4				
6	84111.1	22.5				
7	84151.9	40.8				
8	84198.2	46.3				
9	84264.7	66.5				
10	84284.0	19.3				
11	84289.6	5.6				
12	84318.8	29.2				

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Contractor QC

Allow contractor to collect QC data at core locations.

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Maximum Specific Gravity (MSG)

- Collect a representative sample of loose asphalt mix from the calibration area for determination of MSG
- Run duplicate tests
- Test results should agree within single operator precision
- Run additional tests until precision is met

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Duplicate MSG Testing

Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

AASHTO T 209 (ASTM D2041)

Duplicate MSG Tests

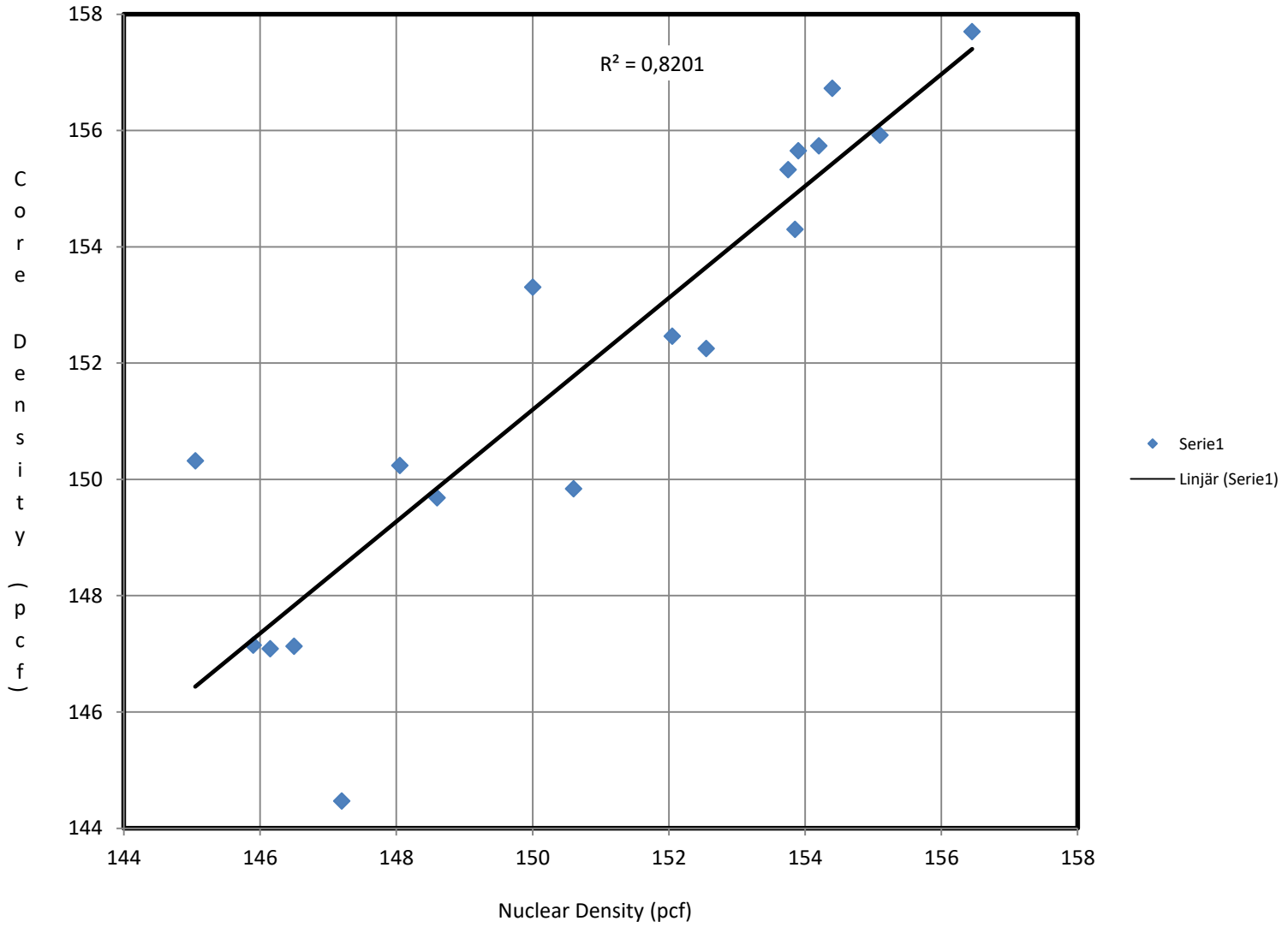
Type of mix:	**Size of Sample:**	**No. of Samples:**
Begin Test Date:	**Tech:**	**Finish Date:**

Calculations: Weighing in Water		**Data:**		
		Split 1	**Split 2**	**Average**
A	Mass of oven dry sample in air or Mass of wet sample (i.e. from field sample) Requires %M below	1852.3 g	1821.3 g	
B	Submerged weight of empty bowl or flask in water at 25 ± 1^0 C	5000.0 g	5000.0 g	
C	Submerged weight of bowl or flask with sample in water at 25 ± 1° C	6105.1 g	6085.1 g	
C-B	Submerged weight of sample in water at 25 ± 1° C	1105.1 g	1085.1 g	
A-(C-B)	Weight of water displaced by sample	747.2 g	736.2 g	
G_{mm} = A/[A-(C-B)]	Maximum theoretical specific gravity	2.479	2.474	**2.477**
Eng = G_{mm}(62.245)	Unit weight (pcf)	154.3	154.0	**154.2**
SI = G_{mm}(997.1)	Unit weight (kcm)	2472	2467	**2470**

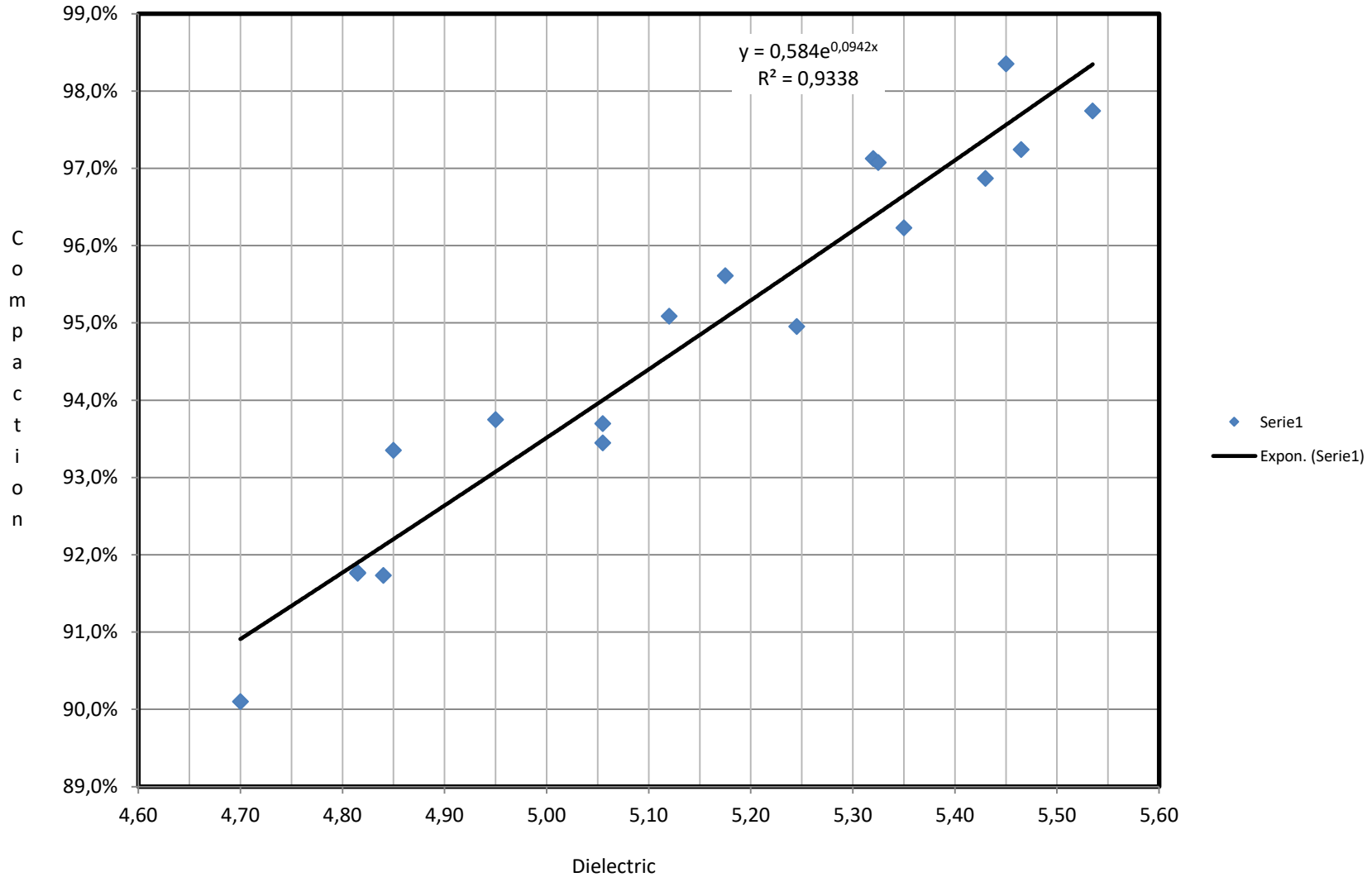
Field Book

Core dielectric readings:				**Core test values:**
Time file#	Time Rdg	Dist. file#	Dist. Rdg	% Compaction, %Void, or SpG

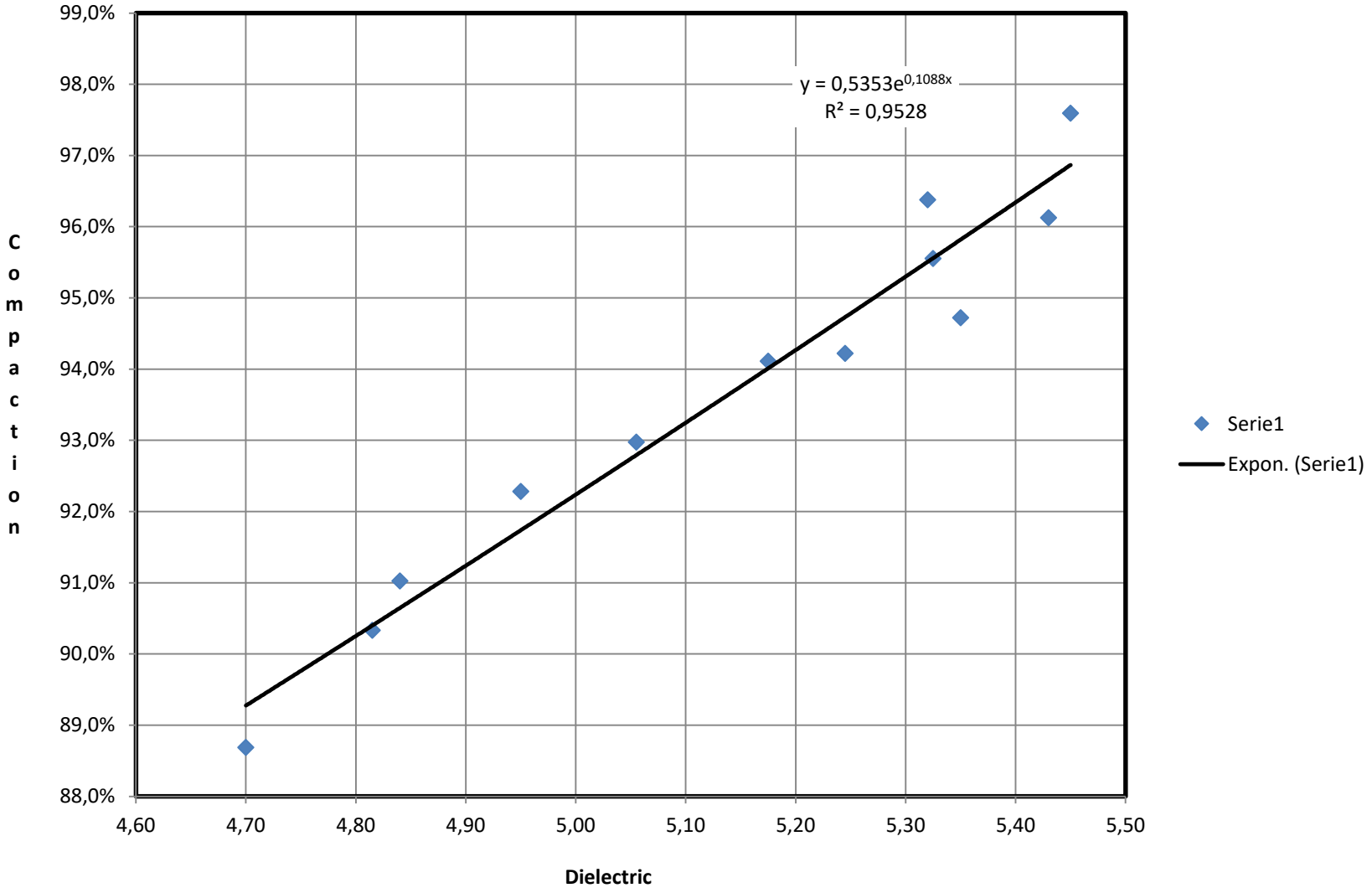
Calibration: Cores vs Nuke, $R^2 = 0.82$



Calibration: Cores vs RDM, $R^2 = 0.93$



Calibration w/Cores after 1 Day of Traffic
Cores vs RDM $R^2 = 0.95$



QUESTIONS?

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