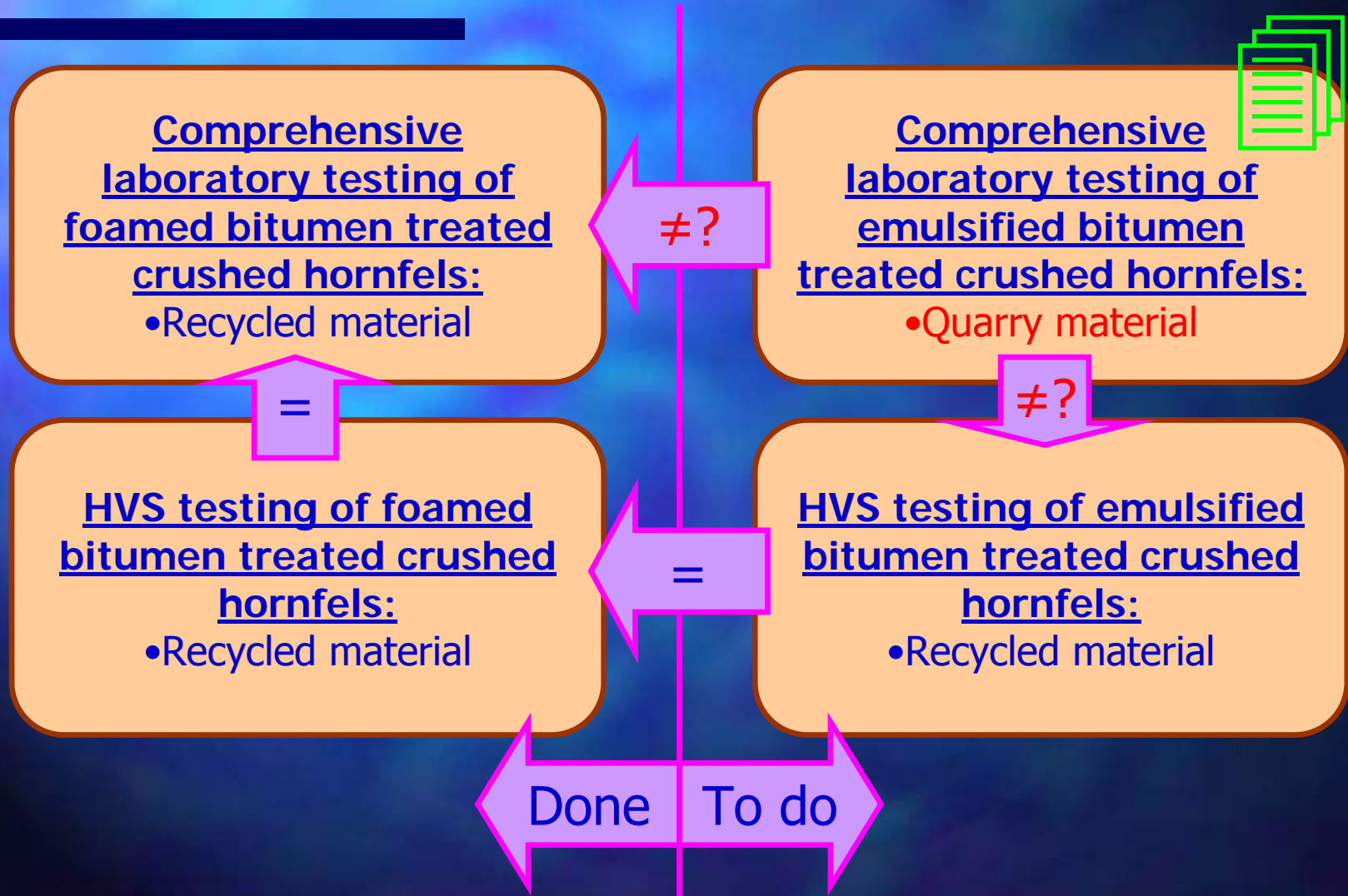


HVS testing of emulsified bitumen treated, recycled crushed hornfels in the Western Cape

HVS Steering Committee
Meeting

27 November 2003

Process to date



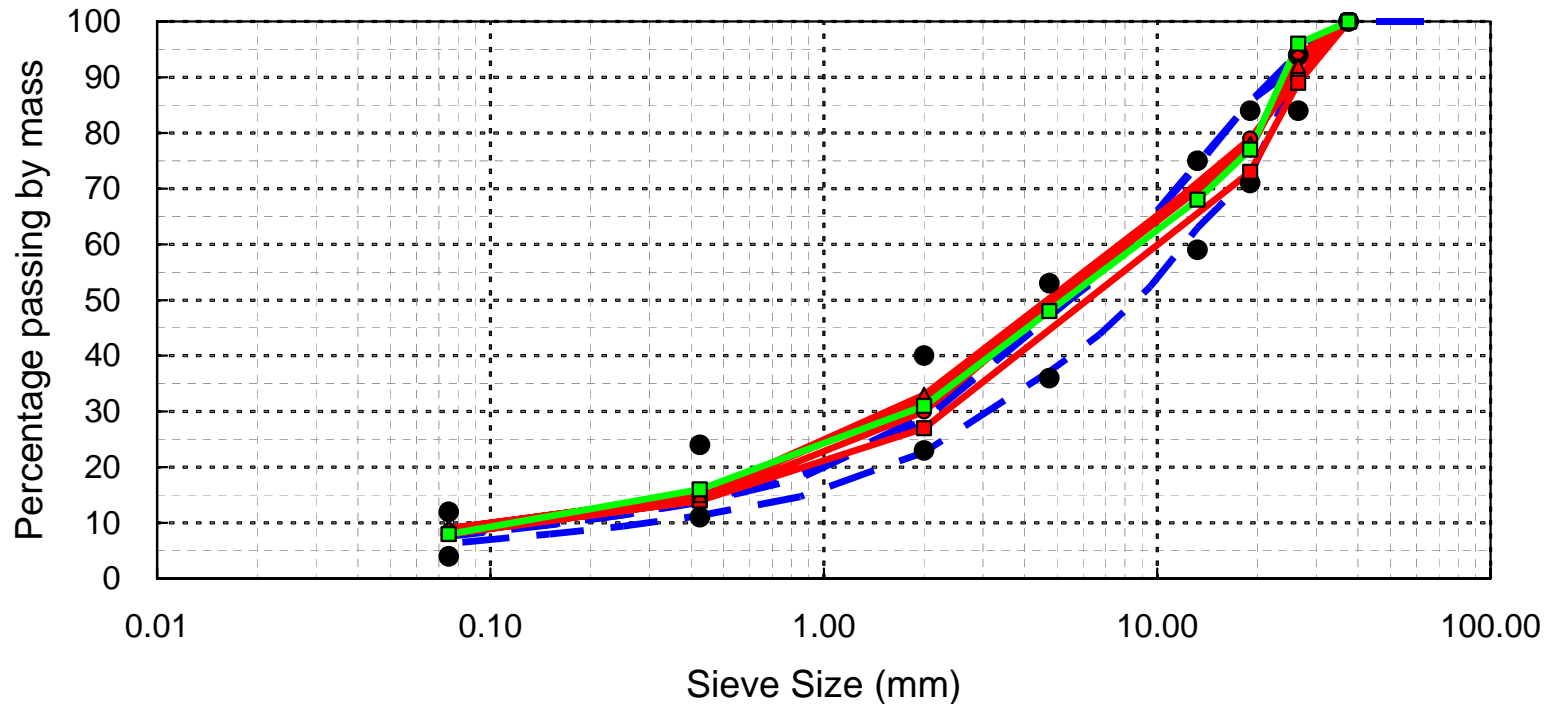
Questions

- Is the quarry material equivalent to the recycled material in terms of:
 - Grading of untreated material?
 - Atterberg limits of untreated material?
 - Engineering properties of untreated and treated material?
 - Mechanical properties of the treated material?

Grading:

Old crushed stone base vs. Quarry

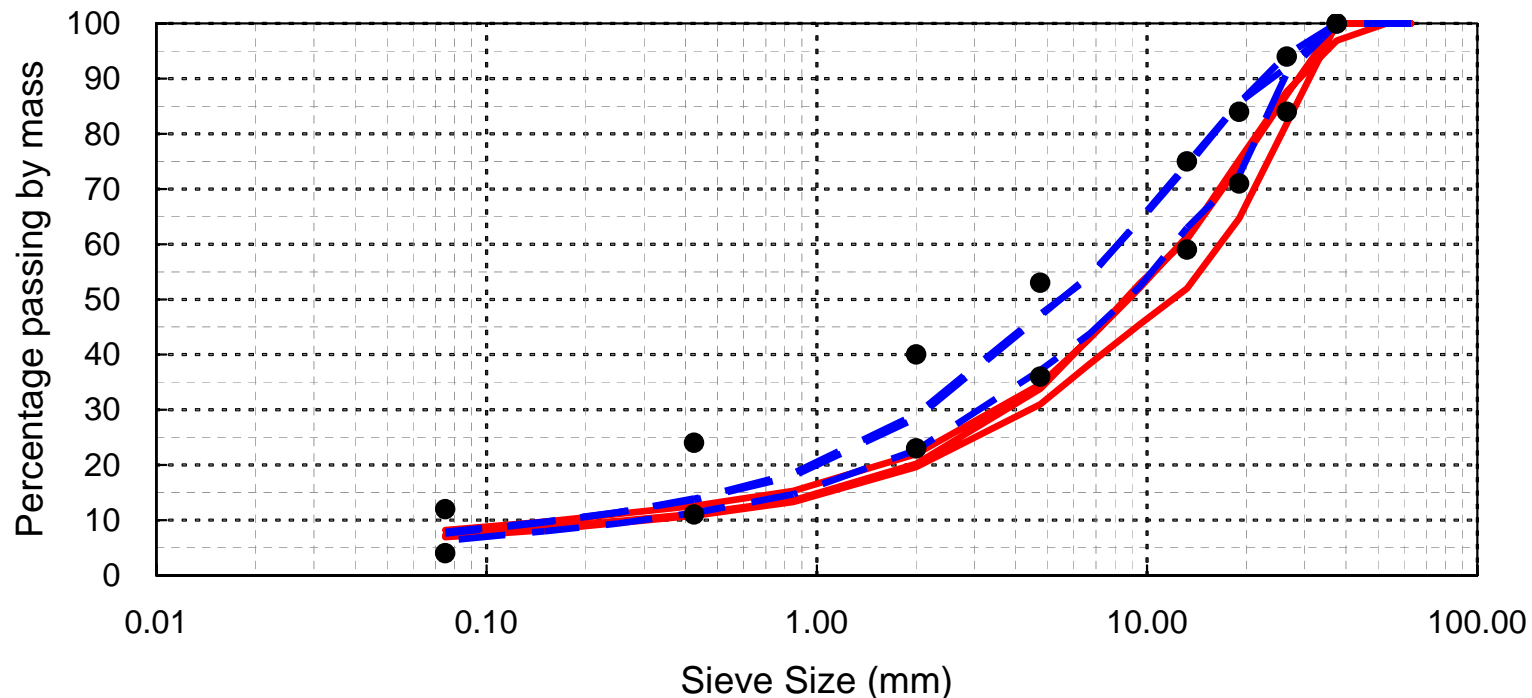
Grading of crushed hornfels from the Western Cape
Quarry vs old crushed stone base



- G1, G2 and G3 material
- Quarry #1
- Quarry #2
- Quarry #3
- CSB #1
- CSB #2
- CSB #3
- CSB #4
- CSB #5

Grading: Recycled material vs. Quarry

Grading of crushed hornfels from the Western Cape
Quarry vs milled material



- G1, G2 and G3 material
- Post milled #1
- Post milled #2
- Post milled #3
- Quarry #1
- Quarry #2
- Quarry #3

Atterberg limits:

Recycled material vs. Quarry

Stage	Lab	Layer	Chainage					
			9,3	14,0	14,46	14,49	14,62	16,0
Design	Umhlaba	B		3				4
		SB		3				3
	J&G	UB			2		2	
		LB			3		3	
		SB			2		4	
Milled	CSIR	DISR	7 (x2)					
Post-HVS	PAWC	B				4		
		SB				8		
Quarry								SP

Texas Ball Mill:

Recycled material vs. Quarry

Material	Process	PI	< 0,425	FP
Recycled	Untested	7,6	17,1	130
	Balls and water	10,3	22,4	230
	Balls and no water	8,2	18,1	148
	Water only	10,2	17,2	175
Quarry	Untested	2,5	13,5	34
	Balls and water	3,1	15,4	48
	Balls and no water	2,6	15,7	41
	Water only	3,9	14,6	57

Way forward

- Grading coarser for recycled material
 - Surfacing mixed in
- PI higher for recycled material
 - XRD – not from hornfels
 - Mixed in from top
 - Mixed in from subbase
- How big is the problem?
 - Prepared UCS, ITS and beams from
 - ET recycled and quarry
 - FT quarry
- Comprehensive lab project will still provide valuable material and design models calibration data
 - Direct comparison may be lost