SMS Reflectivity meas. of WHT Primary mirror 5 days after calima, on 23 July 2013
Strength of calima was ~20 ug/m3 for 10 days (TNG dust monitor)
Pushing down SMS head during all measurements

Lambda	0.67	micron	
Incident Angle	25	deg	<--SMS Summary characteristics
BW Limits	1	0.01	

First measurements on reference mirror, then 3-4 locations under Portholes 1 through 4

	Scattering at angles Θ,Φ			Reflect-ivity	user comm-ent	Rough-ness RMS(Å)	TIME	DATE
	Θs->	0	50					
datum #	Φs->	0	180					
1	ref	3.80E-03	1.42E-03	0.939		43.6	"09:47:23"	"07-23-1913"
2		3.81E-03	1.42E-03	0.938		43.7	"09:47:28"	"07-23-1913"
3		7.88E-03	2.63E-03	0.93		64	"09:47:35"	"07-23-1913"
4		7.89E-03	2.64E-03	0.931		64	"09:47:40"	"07-23-1913"
5		7.90E-03	2.63E-03	0.931		64	"09:47:46"	"07-23-1913"
6		7.29E-03	3.48E-03	0.928		59.6	"09:47:54"	"07-23-1913"
7		7.30E-03	3.48E-03	0.928		59.6	"09:47:59"	"07-23-1913"
8		5.06E-03	3.52E-03	0.927		49.1	"09:48:07"	"07-23-1913"
9		5.06E-03	3.53E-03	0.925		49.2	"09:48:13"	"07-23-1913"
10		6.57E-03	4.10E-03	0.935		55.8	"09:48:24"	"07-23-1913"
11		6.59E-03	4.11E-03	0.935		55.8	"09:48:29"	"07-23-1913"
12		3.02E-03	3.44E-03	0.933		38.1	"09:48:37"	"07-23-1913"

Reference measurements are repeatable, reach 94% threshold and show no trend. Validated.

13	location 1	7.55E-03	2.95E-03	0.834		64.9	"09:56:53"	"07-23-1913"
14		7.55E-03	2.95E-03	0.834		65	"09:56:58"	"07-23-1913"
15	2	7.05E-03	3.64E-03	0.835	solo	61.5	"09:57:08"	"07-23-1913"
16	3	5.16E-03	2.42E-03	0.847		52.6	"10:01:32"	"07-23-1913"
17		5.16E-03	2.42E-03	0.848		52.5	"10:01:36"	"07-23-1913"
18	4	7.30E-03	2.64E-03	0.844		64	"10:01:46"	"07-23-1913"
19	5	5.49E-03	2.76E-03	0.84		54.2	"10:09:18"	"07-23-1913"
20		5.48E-03	2.76E-03	0.839		54.2	"10:09:23"	"07-23-1913"
21	6	8.19E-03	3.85E-03	0.856		65.8	"10:10:57"	"07-23-1913"
22		8.21E-03	3.85E-03	0.855		66	"10:11:02"	"07-23-1913"
23	7	7.51E-03	2.61E-03	0.837		65.5	"10:11:18"	"07-23-1913"
24		7.50E-03	2.60E-03	0.836		65.5	"10:11:22"	"07-23-1913"
25	8	6.97E-03	2.31E-03	0.846		63.1	"10:11:37"	"07-23-1913"
26		6.99E-03	2.31E-03	0.847		63.1	"10:11:42"	"07-23-1913"
27	9	6.64E-03	2.25E-03	0.841		61.6	"10:12:01"	"07-23-1913"
28		6.63E-03	2.25E-03	0.841		61.5	"10:12:08"	"07-23-1913"
29	10	7.12E-03	3.38E-03	0.849		61.6	"10:13:13"	"07-23-1913"
30		7.13E-03	3.37E-03	0.848		61.7	"10:13:18"	"07-23-1913"
31	12	7.66E-03	2.80E-03	0.842		65.6	"10:13:27"	"07-23-1913"
32		7.66E-03	2.80E-03	0.841		65.6	"10:13:32"	"07-23-1913"

33	13	6.61E-03	2.54E-03	0.843		60.6	"10:13:43"	"07-23-1913"
34		6.61E-03	2.54E-03	0.847		60.4	"10:13:48"	"07-23-1913"
35	14	6.27E-03	2.53E-03	0.839		58.8	"10:14:12"	"07-23-1913"
36		6.27E-03	2.54E-03	0.841		58.8	"10:14:19"	"07-23-1913"
37	15	7.38E-03	2.61E-03	0.841		64.6	"10:15:15"	"07-23-1913"
38		7.42E-03	2.62E-03	0.839		64.9	"10:15:20"	"07-23-1913"
39	16	7.46E-03	2.79E-03	0.838		64.7	"10:15:35"	"07-23-1913"
40		7.45E-03	2.79E-03	0.83		65	"10:15:40"	"07-23-1913"
41	17	1.17E-02	5.46E-03	0.814	low-skip	80.7	"10:15:52"	"07-23-1913"
42		1.17E-02	5.46E-03	0.814	skip	80.6	"10:15:57"	"07-23-1913"
43	18	8.43E-03	2.69E-03	0.837	near	70.1	"10:16:06"	"07-23-1913"
44		8.42E-03	2.70E-03	0.833		70.3	"10:16:11"	"07-23-1913"
45	19	6.76E-03	2.93E-03	0.84	solo	60.7	"10:16:24"	"07-23-1913"
Averages		**7.03E-03**	**2.78E-03**	**0.842**		**62.4**		
std deviations		**0.001**	**0.001**	**0.009**		**6.020**		

1 low measurement (no.17) was skipped (probably a stain); all others are consistent.

46	Ref.	3.57E-03	2.24E-03	0.939	41	"10:21:13"	"07-23-1913"
47		3.57E-03	2.24E-03	0.94	41	"10:21:18"	"07-23-1913"
48		2.10E-03	1.33E-03	0.937	31.5	"10:21:28"	"07-23-1913"

Reference mirror again reaching threshold value of 94%. M1 data re-validated.

Conclusion:

Reflectivity is 1.3% lower than 1 month ago; or 0.5% lower than before the CO2 cleaning.

Cleaning should therefore be scheduled

SMS Reflectivity measurements AFTER CO2 cleaning of WHT primary mirror

datum #	Scattering at angles Θ,Φ Θs-> Φs->	0 0	50 180	Reflect-ivity	user comm-ent	Rough-ness RMS(Å)	TIME	DATE
49	Ref	1.76E-03	1.57E-03	0.944		28.7	13:01:09	07-25-1913
50		1.76E-03	1.57E-03	0.943		28.7	13:01:14	07-25-1913
51		6.11E-03	2.26E-03	0.93		55.7	13:01:21	07-25-1913
52		6.13E-03	2.26E-03	0.93		55.7	13:01:25	07-25-1913
53		3.72E-03	2.72E-03	0.94		41.8	13:01:31	07-25-1913
54		3.73E-03	2.72E-03	0.939		41.9	13:01:36	07-25-1913
55		6.90E-03	4.24E-03	0.929		57.4	13:01:42	07-25-1913
56		6.92E-03	4.24E-03	0.929		57.4	13:01:47	07-25-1913
57		8.41E-03	3.61E-03	0.946		63.8	13:01:53	07-25-1913
58		8.42E-03	3.62E-03	0.945		63.9	13:01:58	07-25-1913
59		4.38E-03	1.72E-03	0.935		46.7	13:02:05	07-25-1913
60		4.38E-03	1.72E-03	0.935		46.7	13:02:09	07-25-1913
61		3.46E-03	1.68E-03	0.941		40.7	13:02:16	07-25-1913

Primary mirror measurements, 4-5 locations at each porthole

62	location 1	5.88E-03	1.58E-03	0.848		59.8	13:19:12	07-25-1913
63		5.88E-03	1.57E-03	0.85		59.8	13:19:17	07-25-1913
64		5.88E-03	1.57E-03	0.848		59.8	13:19:24	07-25-1913
65	2	4.25E-03	8.86E-04	0.849		53.8	13:19:36	07-25-1913
66		4.24E-03	8.86E-04	0.848		53.8	13:19:41	07-25-1913
67	3	3.19E-03	1.03E-03	0.854		42.7	13:19:53	07-25-1913
68		3.19E-03	1.02E-03	0.855		42.6	13:19:58	07-25-1913
69	4	5.12E-03	1.67E-03	0.849		54.1	13:20:13	07-25-1913
70		5.11E-03	1.66E-03	0.848		54.1	13:20:17	07-25-1913
71	5	6.16E-03	1.21E-03	0.849		66	13:21:10	07-25-1913
72		6.16E-03	1.21E-03	0.849		66	13:21:15	07-25-1913
73	6	4.99E-03	1.41E-03	0.853		54.5	13:21:25	07-25-1913
74		4.98E-03	1.40E-03	0.853		54.4	13:21:29	07-25-1913
75	7	3.01E-03	6.11E-04	0.855		45.5	13:21:41	07-25-1913
76		3.01E-03	6.15E-04	0.858		45.3	13:21:45	07-25-1913
77		3.01E-03	6.13E-04	0.858		45.4	13:21:53	07-25-1913
78	8	5.10E-03	1.08E-03	0.85		58.6	13:22:05	07-25-1913
79		5.10E-03	1.09E-03	0.852		58.5	13:22:10	07-25-1913
80	9	4.16E-03	1.07E-03	0.862		50.3	13:22:55	07-25-1913
81		4.16E-03	1.07E-03	0.858		50.4	13:23:00	07-25-1913
82	10	4.15E-03	1.07E-03	0.854		50.5	13:23:07	07-25-1913
83		4.16E-03	1.07E-03	0.857		50.5	13:23:12	07-25-1913
84	11	8.42E-03	2.88E-03	0.845		69.1	13:23:24	07-25-1913
85		8.42E-03	2.88E-03	0.846		69.1	13:23:29	07-25-1913
86	12	4.00E-03	9.17E-04	0.863		50.6	13:23:39	07-25-1913
87		4.02E-03	9.25E-04	0.86		50.7	13:23:44	07-25-1913
88	13	3.76E-03	8.57E-04	0.858		49.2	13:23:54	07-25-1913
89		3.76E-03	8.57E-04	0.857		49.2	13:24:00	07-25-1913

90	14	6.90E-03	2.16E-03	0.841		63.5	13:24:56	07-25-1913
91		6.90E-03	2.15E-03	0.843		63.4	13:25:01	07-25-1913
92	15	5.30E-03	1.77E-03	0.852		54.8	13:25:11	07-25-1913
93		5.30E-03	1.77E-03	0.853		54.8	13:25:15	07-25-1913
94	16	6.72E-03	1.74E-03	0.855		64.1	13:25:27	07-25-1913
95		6.70E-03	1.74E-03	0.853		64.1	13:25:32	07-25-1913
96	17	5.61E-03	1.68E-03	0.848		57.4	13:25:42	07-25-1913
97		5.62E-03	1.68E-03	0.846		57.5	13:25:47	07-25-1913
98	18	3.49E-03	8.78E-04	0.855		46.5	13:25:56	07-25-1913
averages		**5.02E-03**	**1.36E-03**	**0.852**		**55.1**		
std dev		**1.42E-03**	**5.54E-04**	**0.005**		**7.3**		
std err				**0.001**				

99 Ref	4.31E-03	2.01E-03	0.94	45.6	13:32:30	07-25-1913
	4.32E-03	2.01E-03	0.941	45.6	13:32:35	07-25-1913
	5.41E-03	2.24E-03	0.936	51.7	13:32:42	07-25-1913
	5.42E-03	2.24E-03	0.937	51.7	13:32:47	07-25-1913
	6.54E-03	3.60E-03	0.937	55.8	13:32:53	07-25-1913
	6.56E-03	3.60E-03	0.936	55.9	13:32:58	07-25-1913
	7.27E-03	4.85E-03	0.937	58.5	13:33:04	07-25-1913
	7.28E-03	4.85E-03	0.935	58.7	13:33:09	07-25-1913
	4.57E-03	2.52E-03	0.931	46.8	13:33:15	07-25-1913
	4.58E-03	2.52E-03	0.93	46.9	13:33:20	07-25-1913
	3.75E-03	2.37E-03	0.931	42.2	13:33:28	07-25-1913

Conclusion: Reflectivity has increased by 1% after cleaning with CO2.
The 1.3% Reflectivity loss from recent calima has largely been recovered.
According to CT7, the primary mirror is 1-2% now less reflective than a clean but aged ING-aluminised mirror, 1% in red, 2% in blue.
Reflectivity variance < 0.5% (lower than usual) despite water stained appearance of surface.

Readings 101-123 between 12:58 and 13:07 with Tbatt=25.6 with 2 Gauge readings at end.

	Reflectivity						
	365nm	404nm	464nm	522nm	624nm	760nm	870nm
	76.0	87.2	91.1	90.4	88.2	87.0	91.4
	76.6	88.0	91.8	91.1	88.8	87.7	92.0
	76.4	88.0	91.9	90.9	88.5	87.5	91.9
	76.2	87.6	91.6	90.7	88.4	87.3	91.7
	76.7	88.2	92.1	91.2	88.9	87.7	91.9
	0.0	0.3	91.7	90.8	88.6	87.6	91.8
	75.9	87.4	91.5	90.6	88.4	87.4	91.6
	76.8	88.4	92.4	91.6	89.3	88.2	92.4
	76.2	87.8	91.8	91.1	88.8	87.7	92.0
	76.0	87.4	91.5	90.7	88.6	87.5	91.8
	76.6	88.3	92.5	91.5	89.2	88.2	92.5
	76.3	87.9	92.1	91.3	89.1	88.0	92.2
	75.8	87.4	91.4	90.7	88.5	87.4	91.7
	76.0	87.6	91.6	90.9	88.7	87.6	91.8
	76.7	88.5	92.4	91.7	89.4	88.2	92.4
	75.0	86.4	90.8	90.1	88.2	87.2	91.5
	76.0	87.6	91.7	90.9	88.7	87.7	91.8
	75.9	87.5	91.6	90.8	88.6	87.6	91.8
min	74.8	86.4	90.2	89.4	87.4	86.3	90.7
	75.7	87.3	91.3	90.6	88.4	87.2	91.4
	74.8	86.6	91.1	90.5	88.5	87.5	91.8
avg	76.1	87.6	91.7	90.9	88.7	87.6	91.9
std.dev	0.5	0.6	0.5	0.5	0.4	0.4	0.4
					3.5% above SMS		

Gauge readings

70.8	82.2	90.5	91.5	89.2	84.5	86.6	after above readings
70.7	82.1	90.4	91.4	89.1	84.5	86.5	"
71.3	82.7	90.6	91.7	89.5	84.7	86.8	before M1 readings

Coude	78.1	89.5	93.4	92.8	89.8	88.7	93.1 clean

Dust Index						
365nm	404nm	464nm	522nm	624nm	760nm	870nm
8.3	6.2	6.2	6.1	5.7	5.3	11.4
7.5	5.5	5.4	5.3	5	4.6	10.5
7.8	5.7	5.7	5.8	5.5	5	10.9
7.8	5.7	5.7	5.7	5.5	5	11.2
6.8	4.7	4.8	5	4.8	4.5	11.3
7.8	5.7	5.7	5.5	5.2	4.7	10.8
8.4	6.3	6.1	6	5.7	5	10.8
6.6	4.6	4.5	4.6	4.4	3.9	10
7.8	5.5	5.5	5.4	5.1	4.7	11
8.0	5.9	5.9	5.8	5.5	5.1	10.8
6.9	4.8	4.6	4.5	4.5	3.8	8.2

	7.7	5.5	5.4	5.3	4.9	4.5	10.6
	8.0	5.9	5.8	5.6	5.3	4.7	10.5
	7.5	5.5	5.6	5.3	5.3	4.9	9.4
	6.6	4.5	4.5	4.6	4.4	4	9.6
	8.3	6.1	5.9	5.7	5.4	5	11.2
	7.7	5.5	5.5	5.5	5.2	4.7	11.3
	7.8	5.7	5.6	5.5	5.2	4.7	10.9
	8.5	6.4	6.5	6.5	6.2	5.9	11.5
	7.8	5.7	5.7	5.8	5.5	5.2	11
	8.3	5.9	5.5	5.6	5.2	4.7	10.8
avg	7.7	5.6	5.5	5.5	5.2	4.8	10.7
stddev.	0.6	0.5	0.5	0.5	0.4	0.5	0.8
Coude	4.5	2.4	2.3	2.7	2.8	2.4	8.2