

Report Number: PL13015-001A
Model: HXB-C-xx-70L-M-35K-8-UL-xx-xxx W_HXB-GS30-OP
Date: 8/30/18

Cree Engineering Services Testing Laboratory (CESTL) Photometric Testing and Evaluation Report

Prepared For:

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Approved By:

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Product Information

Manufacturer	Cree Inc
Model Number (SKU)	HXB-C-xx-70L-M-35K-8-UL-xx-xxx W_HXB-GS30-OP
Serial Number	PL13015-001
LED Type	MHD-E

Product Description

Extruded aluminum enclosure with finned aluminum heat sink, gray polymeric housing, white polymeric reflector, and clear polymeric optical lens covering LEDs with White Glare Shield

Driver Information (Where Applicable)

Philips XI300C150V300BSR1

Length	Width	Height
18.5"	18.5"	26"

Sample

The following sample was submitted for evaluation



Key Photometric Data	Sphere Output	Goniophotometer	
Luminous Flux	59240.0	59137.0	lm
Efficacy	121.49	121.63	lm/W
Correlated Color Temperature (CCT)	3341		
Color Rendering Index (CRI)	82		
R ₉	9		
Duv	0.000688		
S/P Ratio*	1.44		
CIE Type	Direct		
Color Angular Uniformity	N/A		

	Sphere		Goniophotometer		
Electrical Measurements	120V	277V	120V	277V	
Input Wattage	487.60	480.80	486.20	480.50	W
Input Current	4.08	1.79	4.06	1.79	A
Input Voltage	120.04	276.98	120.03	277.08	V
Power Factor	0.996	0.970	0.997	0.970	
Off-State Power	0	0	0	0	W
Total Harmonic Distortion (Voltage)	0.21	0.10	0.15	0.10	%
Total Harmonic Distortion (Amperage)	6.24	7.47	5.25	6.17	%

Note: All photometric measurements taken at 120VAC.

Key Test Parameters	Sphere Output	Goniophotometer	
Stabilization Time	120	30	min
Total Operating Time (Stabilization + Test)	120	50	min
Ambient Temperature	24.5	24.6	°C

Spacing Criteria

Spacing Criterion (0 - 180)	1.28
Spacing Criterion (90 - 270)	1.28
Spacing Criterion (Diagonal)	1.36

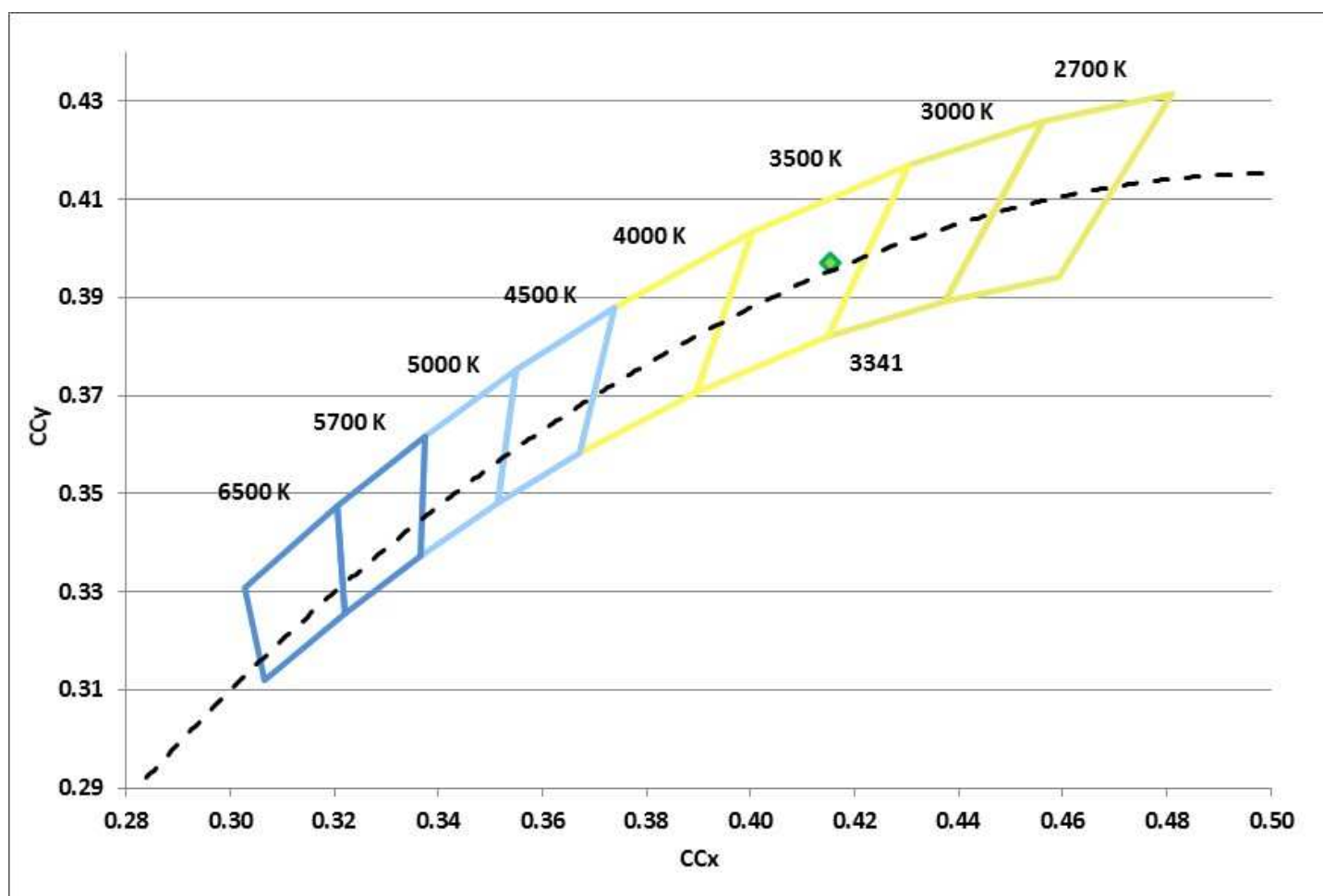
Chromaticity Coordinates

x	y	u	v	u'	v'	Duv
0.4153	0.3971	0.2396	0.3436	0.2396	0.5153	0.000688

Color Rendering Index Details

Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14
82	80	88	94	81	80	84	85	63	9	72	80	64	82	97

Chromaticity Diagram



Spectral Distribution

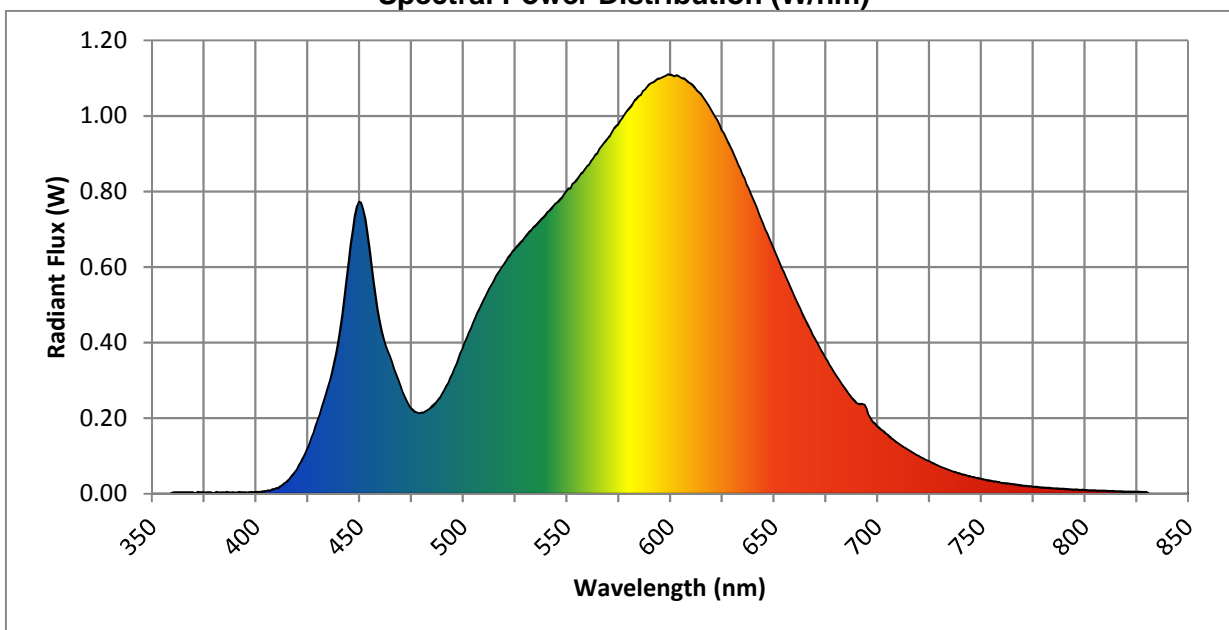
$\lambda(\text{nm})$	W/nm
360	0.002916
370	0.003345
380	0.001347
390	0.003088
400	0.004052
410	0.014431
420	0.064205
430	0.196026
440	0.399855
450	0.772463
460	0.454017
470	0.284864
480	0.214782
490	0.263618
500	0.384833
510	0.512432
520	0.607589

$\lambda(\text{nm})$	W/nm
530	0.679115
540	0.738366
550	0.800531
560	0.867166
570	0.941026
580	1.017550
590	1.083539
600	1.108828
610	1.086292
620	1.015328
630	0.909640
640	0.780921
650	0.650121
660	0.523702
670	0.410208
680	0.314901
690	0.240567

$\lambda(\text{nm})$	W/nm
700	0.179289
710	0.133823
720	0.100047
730	0.073152
740	0.053339
750	0.039540
760	0.028094
770	0.021736
780	0.016646
790	0.012568
800	0.009061
810	0.007451
820	0.005531
830	0.004465

Dominant Wavelength	581	nm
Peak Wavelength	599	nm

Spectral Power Distribution (W/nm)



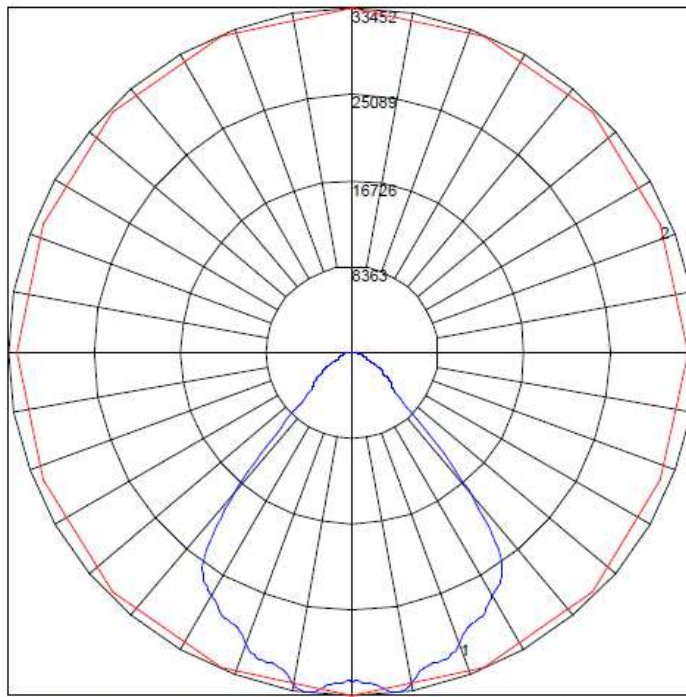
Zonal Lumen Summary

Zone	Lumens	% of Total	Zone	Lumens
0-20	12205.54	20.6	0-10	3131.11
0-30	26406.65	44.7	10-20	9074.43
0-40	43306.84	73.2	20-30	14201.1
0-60	56155.49	95	30-40	16900.19
0-80	58754.26	99.4	40-50	9287.93
0-90	59040.24	99.8	50-60	3560.73
10-90	55909.13	94.5	60-70	1769.69
20-40	31101.29	52.6	70-80	829.08
20-50	40389.21	68.3	80-90	285.98
40-70	14618.35	24.7	90-100	0
60-80	2598.77	4.4	100-110	0.15
70-80	829.08	1.4	110-120	1.49
80-90	285.98	0.5	120-130	3.75
90-110	0.15	0	130-140	12.21
90-120	1.64	0	140-150	21.17
90-130	5.39	0	150-160	25.95
90-150	38.76	0.1	160-170	21.67
90-180	96.73	0.2	170-180	10.33
110-180	96.57	0.2		
Total	59136.97 lm	100%		

Luminance Data (Cd./Sq.M)

Average in Degrees	Average 0-Deg	Average 45-Deg	Average 90-Deg
45	17012	37324	15753
55	9032	9076	9005
65	4324	4407	4297
75	2425	2299	2406
85	1068	1059	1063

Candela Plots



Maximum Candela = 33452.3 Located At Horizontal Angle = 90, Vertical Angle = 7.5
1 - Vertical Plane Through Horizontal Angles (90 - 270) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (7.5) (Through Max. Cd.)

Coefficients of Utilization

RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	112	108	105	102	109	106	103	101	102	100	98	98	96	95	95	93	92	90
2	104	98	93	89	102	97	92	88	93	89	86	90	87	84	87	85	82	80
3	98	89	83	78	95	88	82	78	85	80	76	83	78	75	80	77	74	72
4	91	82	75	69	89	80	74	69	78	72	68	76	71	67	74	70	66	65
5	85	75	67	62	83	74	67	62	72	66	61	70	65	61	68	64	60	58
6	79	69	61	56	78	68	61	56	66	60	55	64	59	55	63	58	54	53
7	74	63	56	51	73	62	55	50	61	55	50	60	54	50	58	53	49	48
8	70	58	51	46	68	58	51	46	56	50	46	55	50	45	54	49	45	44
9	66	54	47	42	64	53	47	42	52	46	42	51	46	42	50	45	42	40
10	62	50	43	39	61	50	43	39	49	43	39	48	42	38	47	42	38	37

Candela Tabulations

	0	22.5	45	67.5	90	112.5	135.0	157.5	180.0
0	32218.6	32218.6	32218.6	32218.6	32218.6	32218.6	32218.6	32218.6	32218.6
2.5	32560.4	32485.6	32327.4	32226	32174.3	32560.4	32485.6	32327.4	32226
5	32757.3	32691.8	32712	32672.6	32797	32757.3	32691.8	32712	32672.6
7.5	32724.3	32522.8	33075.5	33248.6	33452.3	32724.3	32522.8	33075.5	33248.6
10	32628.7	32477.2	33025.7	32948.2	32814.2	32628.7	32477.2	33025.7	32948.2
12.5	32335	32732	32730	32154.6	31590.9	32335	32732	32730	32154.6
15	31866.7	32523	32180.2	31553.5	31313.4	31866.7	32523	32180.2	31553.5
17.5	31174.8	32240.8	32126.2	31577.5	31119.7	31174.8	32240.8	32126.2	31577.5
20	30912.1	31962.5	32334.1	31385.8	30260.2	30912.1	31962.5	32334.1	31385.8
22.5	29791.5	31496.8	32507.5	30597.7	29100.5	29791.5	31496.8	32507.5	30597.7
25	29188.4	30790.5	32604.4	30353	28783.7	29188.4	30790.5	32604.4	30353
27.5	28653.1	30533.2	32597.8	30351.9	28185.2	28653.1	30533.2	32597.8	30351.9
30	27471.4	29950.4	32488.8	29658.7	27315.7	27471.4	29950.4	32488.8	29658.7
32.5	26568.3	29082.3	32075	28974.6	26677.7	26568.3	29082.3	32075	28974.6
35	24708.8	27150.7	31067.1	27514.8	25459.3	24708.8	27150.7	31067.1	27514.8
37.5	22420.2	24471	29311.8	25299.3	22319.2	22420.2	24471	29311.8	25299.3
40	17659.2	20828.6	26035.4	21130	17553.2	17659.2	20828.6	26035.4	21130
42.5	12513	15225	22966.9	15692.8	12279.1	12513	15225	22966.9	15692.8
45	8054.6	10172.2	17671.5	10027.9	7458.4	8054.6	10172.2	17671.5	10027.9
47.5	5715.1	6647.2	12247.6	6178.4	5496.7	5715.1	6647.2	12247.6	6178.4
50	4958.5	4864.2	8002.4	4862	4973.4	4958.5	4864.2	8002.4	4862
52.5	4499.7	4304.9	5103.9	4368.4	4482.4	4499.7	4304.9	5103.9	4368.4
55	3941.5	3821	3960.6	3837.6	3929.6	3941.5	3821	3960.6	3837.6
57.5	3381.7	3319	3350	3304.6	3378.2	3381.7	3319	3350	3304.6
60	2872.2	2891.1	2870	2812.7	2855.6	2872.2	2891.1	2870	2812.7
62.5	2317.5	2311.8	2306.9	2318	2264.4	2317.5	2311.8	2306.9	2318
65	1669.2	1697.5	1701.4	1712.6	1658.7	1669.2	1697.5	1701.4	1712.6
67.5	1243	1246.7	1237.7	1242.9	1253.7	1243	1246.7	1237.7	1242.9
70	1108.5	1071.3	1044.1	1073.7	1106.7	1108.5	1071.3	1044.1	1073.7
72.5	912.4	900.9	884.1	902.9	913.7	912.4	900.9	884.1	902.9
75	785.8	761.4	744.7	759.2	779.5	785.8	761.4	744.7	759.2
77.5	687.4	670	657.8	668.1	680.4	687.4	670	657.8	668.1
80	564.3	552.9	545	552.1	558.1	564.3	552.9	545	552.1
82.5	421.6	415.1	412.4	416.1	418.7	421.6	415.1	412.4	416.1
85	269.1	265.4	267	268.2	268	269.1	265.4	267	268.2
87.5	106.2	103.8	107.3	108	106.7	106.2	103.8	107.3	108
90	0	0	0	0	0	0	0	0	0

Candela Tabulations(Continued)

	0	22.5	45	67.5	90	112.5	135.0	157.5	180.0
92.5	0	0	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0
105	0.3	0	0	0	0	0.3	0	0	0
107.5	2.3	0	0	0	0.5	2.3	0	0	0
110	1.8	0	0	0	0.5	1.8	0	0	0
112.5	4.5	0	0	0	1.9	4.5	0	0	0
115	7.1	0	0.1	0	4.5	7.1	0	0.1	0
117.5	9.4	0	0.9	0	6.7	9.4	0	0.9	0
120	12	0	1.3	0.5	8.4	12	0	1.3	0.5
122.5	14.2	0	0	0	10.5	14.2	0	0	0
125	15.4	0	0	0	10.7	15.4	0	0	0
127.5	17.7	1.2	2.1	1.5	12.9	17.7	1.2	2.1	1.5
130	20.7	4.7	5.7	4.9	16.3	20.7	4.7	5.7	4.9
132.5	24.3	8.3	8.6	8.1	19.9	24.3	8.3	8.6	8.1
135	27.8	12.6	12.7	12.4	24.3	27.8	12.6	12.7	12.4
137.5	31.9	16.7	16.8	16.1	28.7	31.9	16.7	16.8	16.1
140	36	20.8	20.8	20.5	33.2	36	20.8	20.8	20.5
142.5	39.8	25.8	25.1	24.8	37.6	39.8	25.8	25.1	24.8
145	43.9	32.2	29.2	30.2	43.1	43.9	32.2	29.2	30.2
147.5	48.4	38.8	33.6	38.4	47.8	48.4	38.8	33.6	38.4
150	52.9	45.6	37.5	45.5	52.4	52.9	45.6	37.5	45.5
152.5	57.8	53.1	42	52.2	57.2	57.8	53.1	42	52.2
155	62.3	59.1	47.2	59.3	62	62.3	59.1	47.2	59.3
157.5	66.6	65.4	52.2	64.8	66.3	66.6	65.4	52.2	64.8
160	68.9	72.6	61.3	70.1	69	68.9	72.6	61.3	70.1
162.5	69.2	78.2	69.2	74.8	70.4	69.2	78.2	69.2	74.8
165	68.3	83.9	75.3	77.5	71.5	68.3	83.9	75.3	77.5
167.5	74.6	86	79.7	82.2	76.5	74.6	86	79.7	82.2
170	82.9	96.1	94.3	94.1	84.4	82.9	96.1	94.3	94.1
172.5	106.6	109.7	109.6	109.3	106.9	106.6	109.7	109.6	109.3
175	118.6	117.2	111.9	116.6	118.4	118.6	117.2	111.9	116.6
177.5	118.9	115.6	109.8	114.8	119.4	118.9	115.6	109.8	114.8
180	113.7	113.7	113.7	113.7	113.7	113.7	113.7	113.7	113.7

Integrating Sphere Equipment List

Description	Manufacturer	Model	Serial Number
3M Sphere	Labsphere	CSTM-CSLMS-3M98-HDS	82456
CCD Array Spectrometer	Otsuka	MC-9801	98010165
Programmable AC Source	Chroma	61603	616030000761
Single Channel Power Analyzer	Xitron	2801	28011110008
Aux Lamp Power Supply	Labsphere	LPS-100-0833	1027119144

*Goniophotometer Equipment List (Cree Durham Technology Center, NVLAP Lab Code 500070-0)

Description	Manufacturer	Model	Serial Number
AC Power Source	Adaptive	FC200	2300230
DC Power Source	Sorensen	XHR 150-7	1424A01504
DC Power Source	GW	GPR-30H 10D	EF810483
Type C Goniophotometer	LSI / UL	6440T	6440TE0192T
Spectroradiometer	Gooch & Housego	770VIS/NIR	11414155
Power Meter	Yokogawa	WT210	91L220953

Test Methods Used:

Title	Description
ANSI C82.77:2002	Harmonic Emission Limits- Related Power Quality Reqt's for Lighting Equipment
CIE Pub. 13.3:1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. 15:2004	Colorimetry
IES LM-58:1994	Spectroradiometric Measurements
IES LM-79:2008	Electrical and Photometric Measurements of Solid-State Lighting Products

Reference Standard Used:

Equipment	Description
3m Sphere	Tungsten Halogen Omni-Directional 75W Calibration Lamp, Serial Number F132
*Type C Goniophotometer and Spectrometer (Cree Durham Technology Center, NVLAP Lab Code 500070-0)	Tungsten Halogen Omni-Directional 500W Calibration Flux Lamp, Serial Number 97A. For color calibration of spectroradiometer, Serial Numbers 12C066, 12C067, 12C068.

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*Items marked with a single asterisk are not covered by the NVLAP accreditation.

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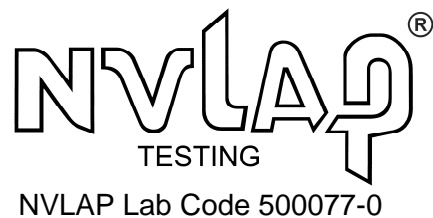
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Additional Comments:

The photos below are intended to show the orientation and fixturing/set-up of the units under test. These are critical to understanding the results of the test given the sensitivity of many products and measurement systems to orientation and set-up considerations, and also for reproducing the conditions of the test.





Document Revision History:

Each subsequent revision of this report replaces the preceding report.

Date	Rev	DCN #	Change at the time of this test	By	Approval
8/30/18	A	DMS	Origination	A. Gressel	B. Kuebler