

LED Technology Haulage and Loading 2017

Joseph Lord
North American Sales Manager – Mining &
Energy

PHOENIX[®]
DURABILITY X DESIGN[™]
A division of The Phoenix Company[™]

1892 **125** 2017
— THE —
PHOENIX[®] **COMPANY**[™]

TOPICS FOR TODAY

LED

Human eye and how we see light

Application in mining

Lighting questions we need to start thinking about

SO
WHERE
HAVE
WE
BEEN?



PHOENIX[®]
DURABILITY X DESIGN™
A division of The Phoenix Company™

1892 **125** 2017
— THE —
PHOENIX COMPANY™

LED IS A SYSTEM – RIGHT?



LED Array

+



Heatsink

+



Driver

LED'S ARE THE ANSWER!

Life of 100,000 hours!

Shock & vibration
proof!

Best light ever &
replace all with LED!



THEN REALITY SETS IN...

Failures

Trial & Error

Sales Promises

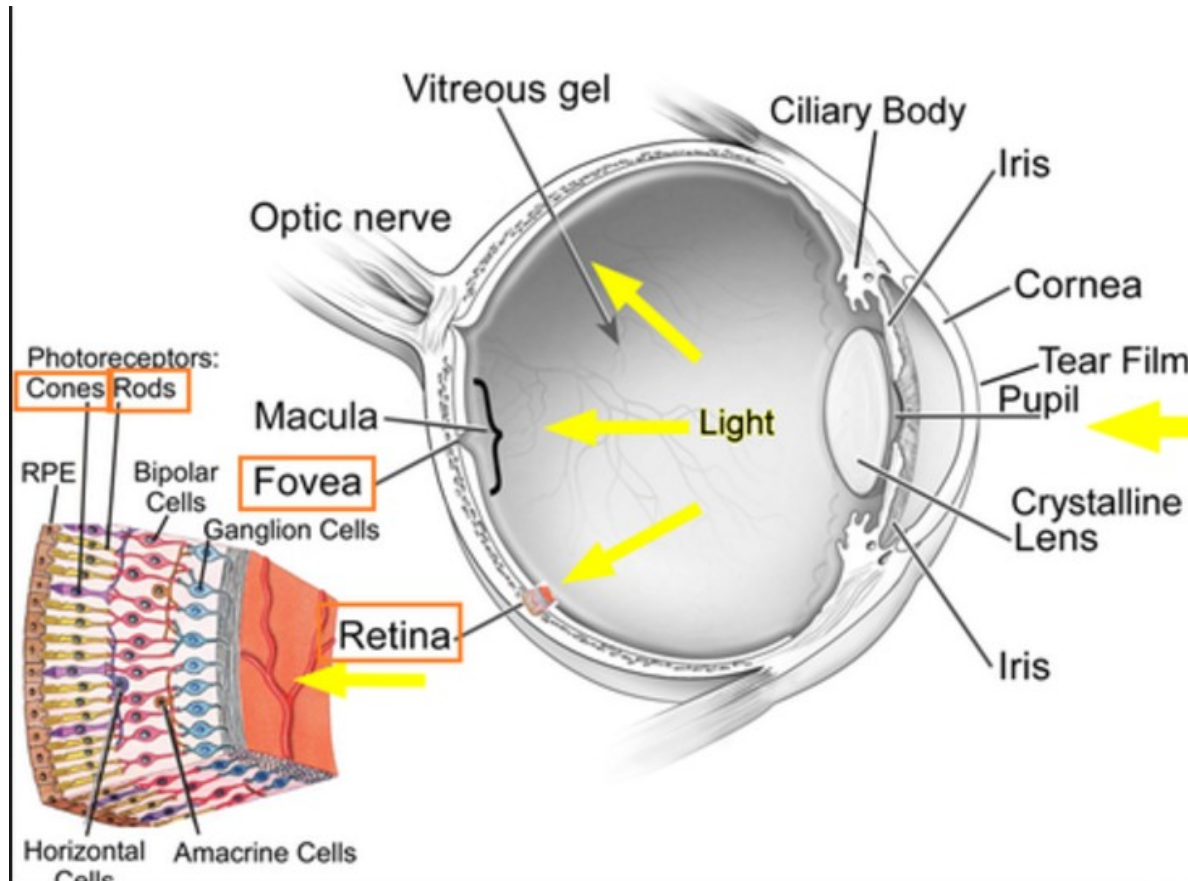


SO NOW WHERE DO WE GO?

PHOENIX[®]
DURABILITY X DESIGN™
A division of The Phoenix Company™

1892 **125** 2017
— THE —
PHOENIX[®] COMPANY™

IT ALL STARTS WITH THE EYES



IT ALL STARTS WITH THE EYES but let's make it simple

Rods (120,000,000) – Night Vision & Scotopic

Cones (6,000,000) - Bright Light & Photopic

Mesotopic (S & P combined, S/P Ratio)

Photopic VS Scotopic lumen output

- Photopic Lumens
 - Represents the relative sensitivity of the eye under intense lighting
 - I.E. Outdoor sunlight
- Scotopic Lumens
 - Represents the relative sensitivity of the eye under typical lighting conditions and controls pupil size
 - I.E. Darkness

LUMENS & RATIOS

Light Source	Photopic Lum/Watt	S/P Ratio	Scotopic Lum/Watt
5000-6000k LED	90	2.00	180
4100k T5 Fluorescent	90	1.62	145
Clear Metal Halide	85	1.49	126
5000k Triphosphor Fluorescent	70	1.58	111
4000k Multi-Vapor Metal Halide	85	1.26	107
6500k Daylight Fluorescent	55	1.72	95
3500k Triphosphor Fluorescent	69	1.24	85
Vitalite Fluorescent	46	1.71	79
5000k 90 CRI Fluorescent	46	1.70	78
2900k Warm White Fluorescent	65	0.98	64
Low-Pressure Sodium	165	0.38	63
50watt High-Pressure Sodium	65	0.76	49
Deluxe Mercury Vapor	40	0.86	34
35watt High-Pressure Sodium	55	0.57	31
Tungsten Halogen	22	1.32	29
Standard Incandescent	15	1.26	19

Scotopic lumens aren't read by standard light meter

Lower foot candles but better light?

Color Quality for outdoor lighting

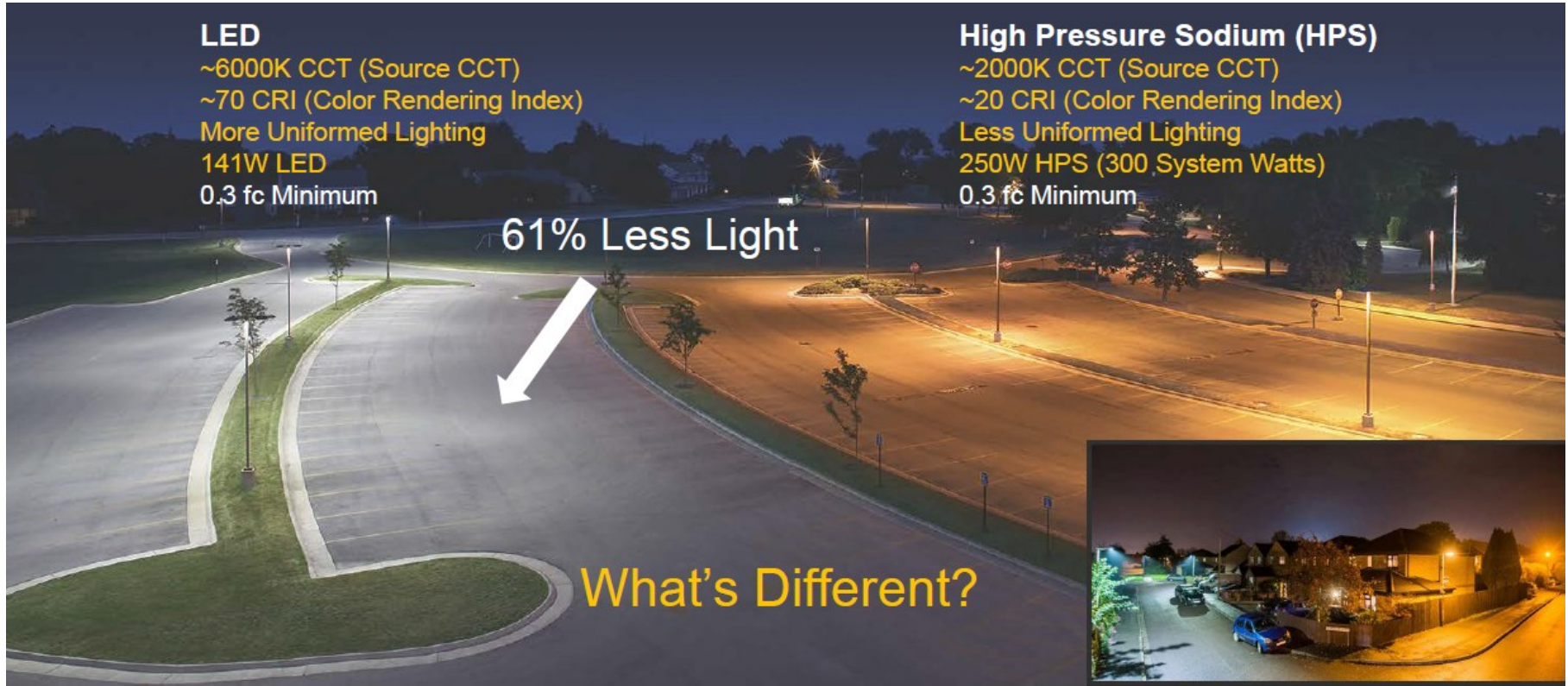


Source: Cree Lighting

PHOENIX[®]
DURABILITY X DESIGN™
A division of The Phoenix Company™

1892 **125** 2017
— THE —
PHOENIX COMPANY™

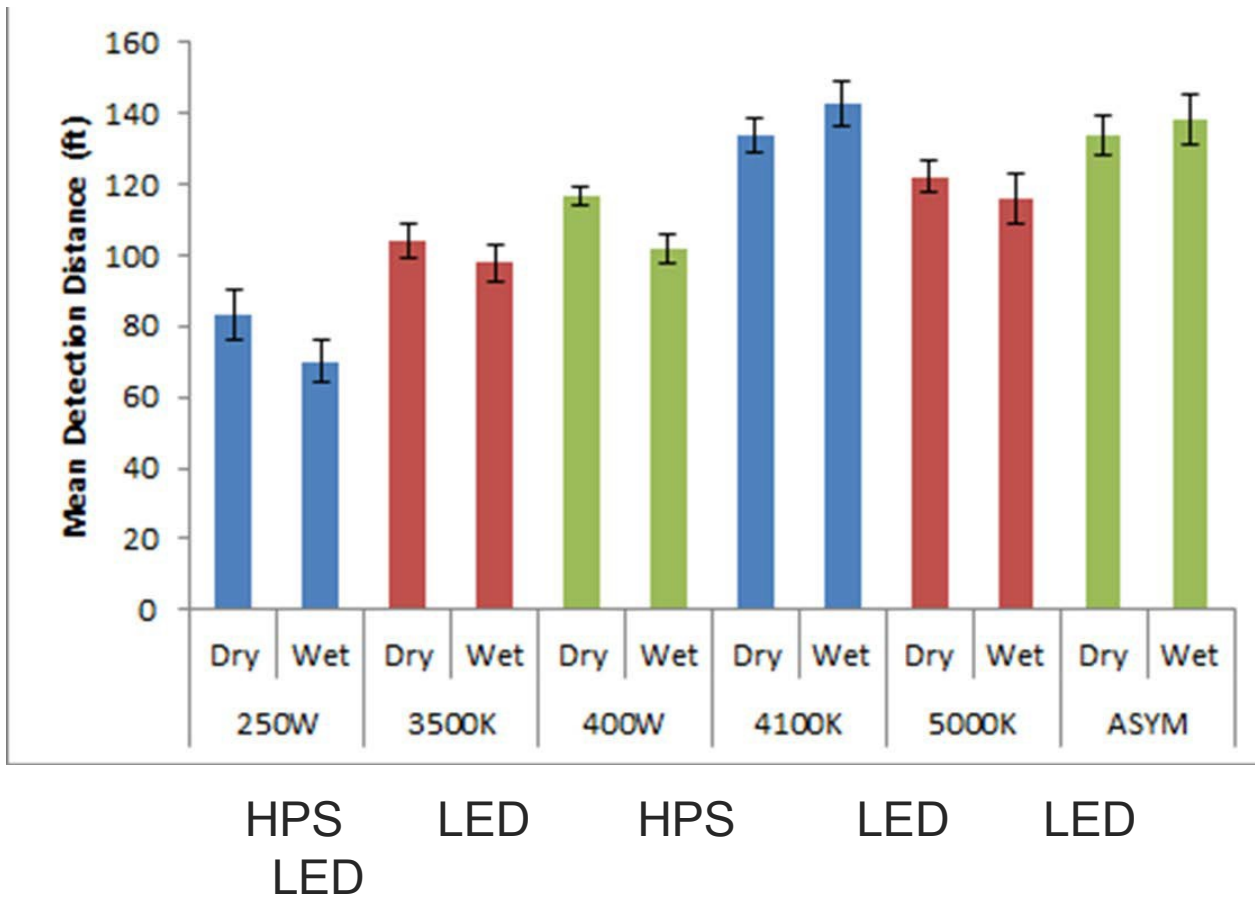
Color Quality for outdoor lighting



Source: Cree Lighting

PHOENIX[®]
DURABILITY X DESIGN™
A division of The Phoenix Company™

1892 **125** 2017
— THE —
PHOENIX COMPANY™



Provided by Strategies and Light

GLARE

GLARE BOMB!

GLARE

REDUCED

GLARE

NO GLARE **



GLARE = BEAM (and Field) & LUMENS

LED – Beam and field are much closer

If you stand in the beam you will get burned

LUMENS – Higher lumens from the same or smaller size source

Incandescent = 800 lumens

HID = 2700 lumens

LED = 4600 lumens

WHAT QUESTIONS FOR HAULAGE & LOADING?

OPTICAL CONTROL?



Appropriate wattage + better optics = less glare and more efficiency

WF, FL, WS, SP, NS, VS



PHOENIX[®]
DURABILITY X DESIGN™
A division of The Phoenix Company™

1892 **125** 2017
— THE —
PHOENIX COMPANY™

WHAT WATTAGE SHOULD BE USED?

2006 = 131 LPW 2016 = 303 LPW

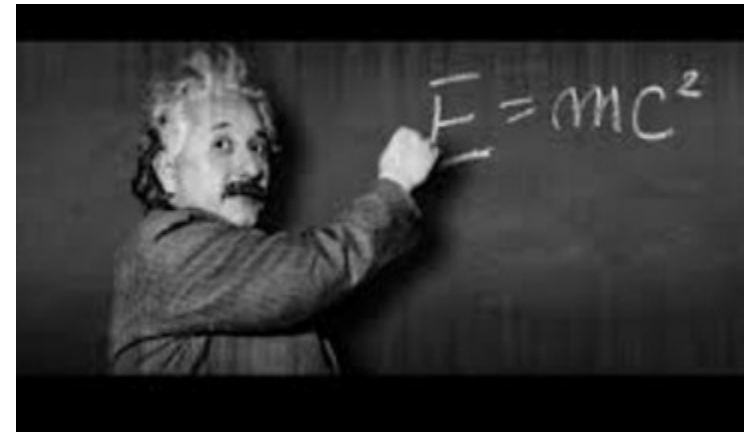
Realistically = 120-205 LPW

Scotopic lumens?

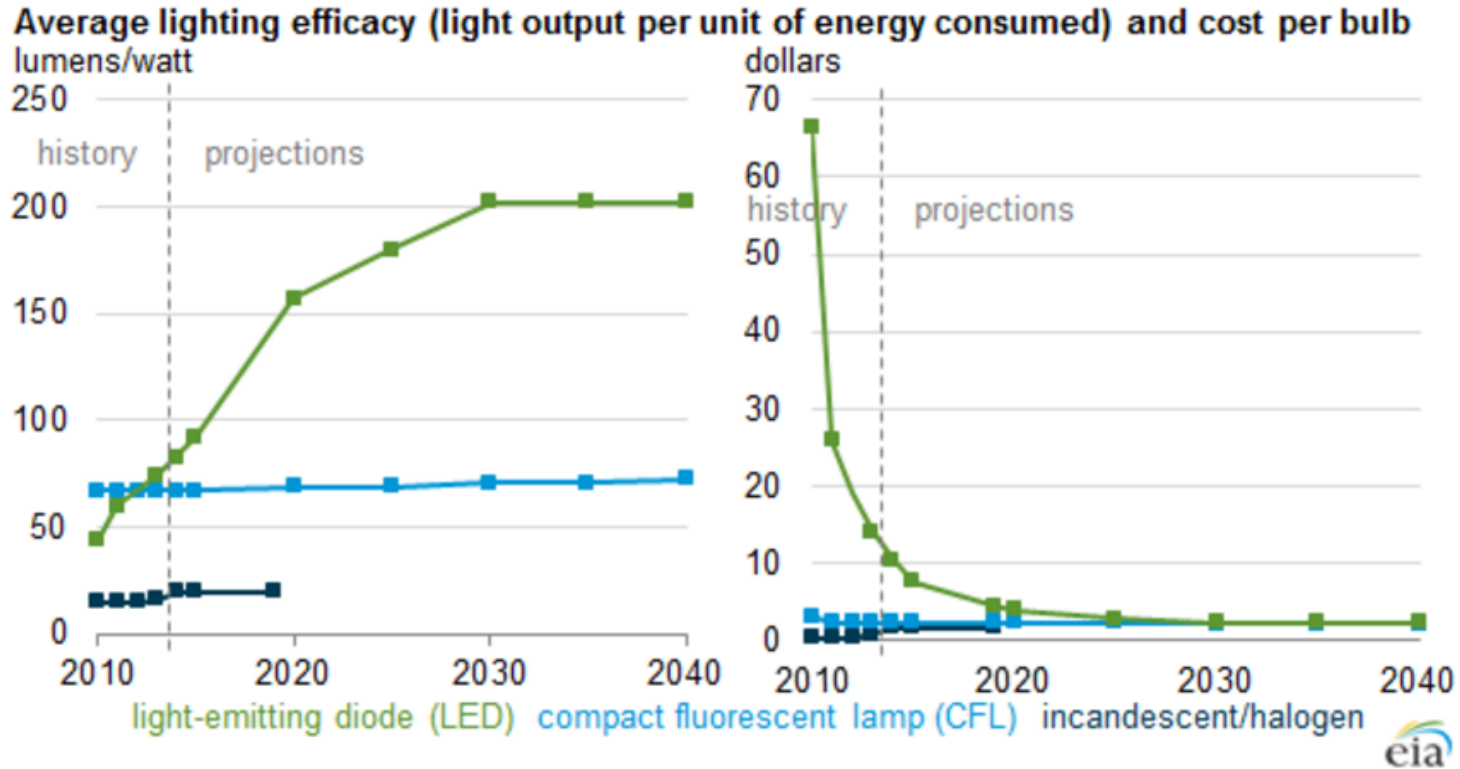
GOOD RULE OF THUMB

HIGH WATTAGE = 3:1

LOW WATTAGE = 2:1



WHAT WATTAGE SHOULD BE USED?



CAN WE TRUST LED SYSTEM RELIABILITY?

LED failure = 84% (Solder failure)

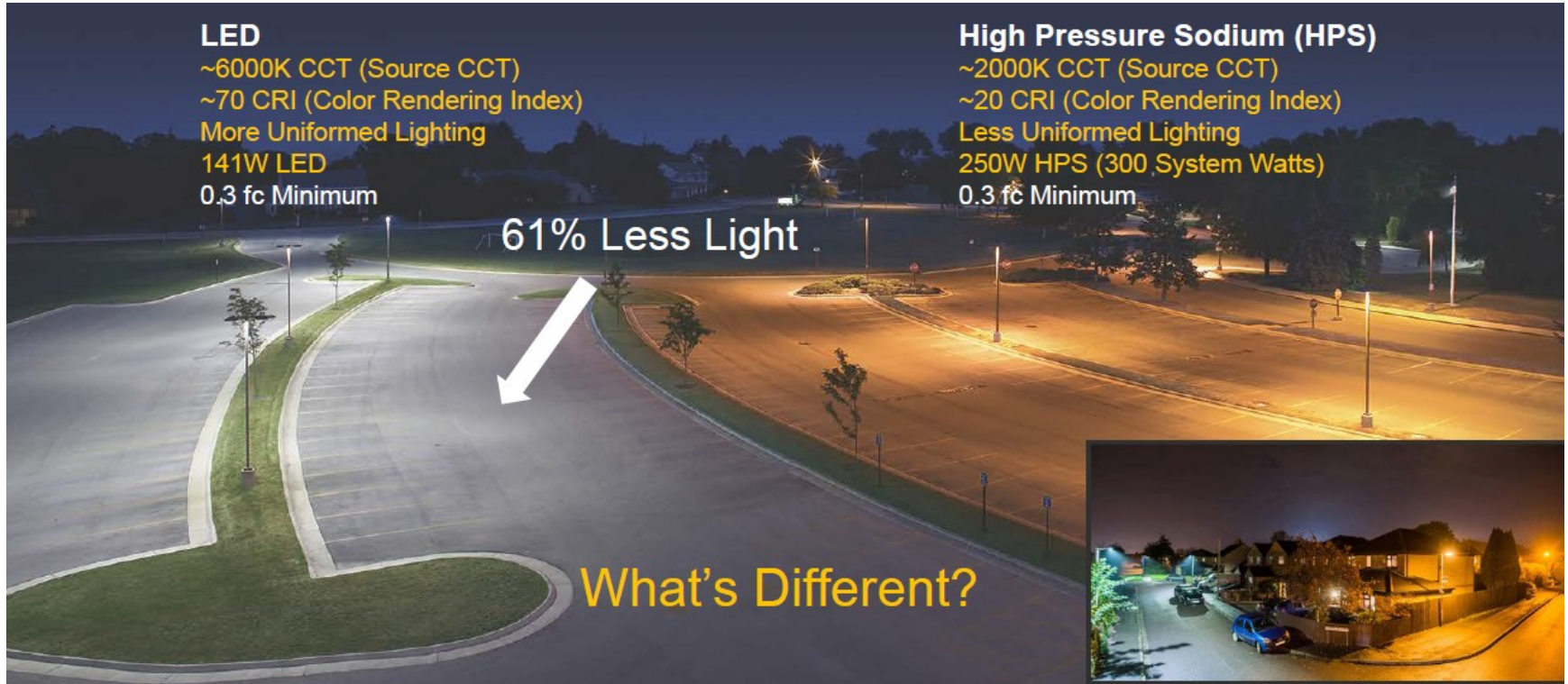
Driver failure = 16%

Failure rate correlated to change in temp

LESS THAN .005% FAILURE RATE

Appropriate fixtures in correct application

WHY USE CURRENT (OLD) LIGHT LEVELS SPECS?



PUTTING IT ALL TOGETHER

LED REMAINS YOUR BEST VALUE

LED STILL HAS THE LONGEST PROJECTED AND
ACTUAL LIFE

DETERMINE THE RIGHT FIXTURE FOR THE RIGHT
APPLICATION

PUSH THE MANUFACTURERS FOR A BETTER
SOLUTION

Thank you

Joseph Lord

North American Sales Manager –
Mining & Energy

jlord@phoenixlighting.com

m

414-702-6827

PHOENIX[®]
DURABILITY X DESIGN™

A division of The Phoenix Company™

1892 **125** 2017
— THE —
PHOENIX COMPANY™