

INTERMODAL MATERIÉL
AND
NAUTICAL/NUCLEAR ANALYSIS
IMANNA
LABORATORY INC.

CERTIFICATION TEST REPORT

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Rev. 09/16

CERTIFICATION TEST REPORT
21369-1A
NAVIGATION LIGHT TESTING
OF
STARBOARD SIDELIGHT
TO
USCG, ABYC, AND NMMA REQUIREMENTS
FOR
OZNIUM LLC

CUSTOMER:

OZNIUM LLC
140 Seminole Drive, Unit 4
Pagosa Springs, CO. 81147

**MANUFACTURER
OF TEST ARTICLE:** OZNIUM LLC

DATE: July 23, 2019

REPORT NO.: 21369-1A
IMANNA JOB NO.: 21369
CUSTOMER P.O. NO.: VERBAL
CONTRACT: N/A
PAGES IN REPORT: 11

STATE OF FLORIDA
COUNTY OF BREVARD

ROBERT L. WHITE, being duly sworn, deposes and says: The information contained in this report is the result of complete and carefully conducted tests and is to the best of his knowledge true and correct in all respects.

Robert L. White

SUBSCRIBED and sworn to before me this 23rd day of July, 2019

Jaimie Pugh



IMANNA shall have no liability for damages of any kind to person or property, including special or consequential damages resulting from IMANNA's providing the service covered by the report.

IMANNA LABORATORY, Inc.

TEST BY

Robert White
PROJ. MANAGER

1. TEST ARTICLE

A representative prototype sample of a two mile, 12 VDC, green, LED Navigational, Starboard Sidelight was received from Oznum LLC for test. The light is designed to be mounted above the sheer line on a boat deck.

2. PART NUMBER

Prototype – Black and Silver Models

3. REQUIREMENTS

The requirements for this effort are to test the light in accordance with the USCG COLREG 1972 (IMO) standards and verify conformance with the navigation light regulations of ABYC A-16:2016.

4. PROCEDURES

The procedure used in performing this test program is IMANNA Laboratory, Inc. Test Procedure NAV-LITE-1. This procedure details the requirements and procedures specified in the NMMA Certification Handbook under the section entitled Navigation Lights without additions or deletions. The procedure contains the detailed steps necessary to determine the compliance of the test specimen to the USCG IMO requirements.

5. TESTING SEQUENCE

- Receiving Inspection
- Functional Operation
- Chromaticity Test
- Luminous Intensity Tests
- Cut-off Angle Verification
- Weathertightness Test

6. RESULTS

The results of the tests performed are presented below by their order within the test sequence. These results reflect the data collected from the light as modified from the original configuration with the addition of a shield that narrowed the original cut-off angle of the starboard side of the light.

6.1 RECEIVING INSPECTION

One light sample was received for test. The light appeared to in good condition and ready for testing.

6.2 FUNCTIONAL OPERATION

The lights were mounted on a panel simulating a boat deck surface then operated and tested using a DC electrical power supply set at 12.84 VDC.

6.3 CHROMATICITY TEST

The chromaticity of the light emissions from the light lens was measured and found to be within the "Green Light" range as specified by the standards. The chromaticity chart is included in the appendix.

6.4 LUMINOUS INTENSITY TESTS

The luminous intensity of the light was measured to be above the 2 mile limit of 4.3 candelas in the critical areas.

6.5 CUT-OFF ANGLE VERIFICATION

The light intensity that was measured was graphed and included in the appendix. The graph also includes the minimum required cut-off angle of 4.3 candelas.

6.6 WEATHERTIGHTNESS TEST

Since the light will be installed above the sheer line, it was subjected to the Weathertightness Test. This test consisted of a continuous water spray using nozzles over the entire top and all exposed sides of the structure for 15 minutes at a rate of at least two inches (50mm) per hour, at an operating pressure of five psi (0.352 kilograms per square centimeter).

No water intrusion was present after the 15 minute duration and therefore the light meets the weathertightness test.

7.0 COMMENTS AND OBSERVATIONS

The results presented herein apply only to the test article as prepared and as tested on the date reported. All equipment used in the performance of these tests was calibrated to standards traceable to the N.I.S.T and/or verified at the time of the test using internationally recognized methods to validate the accuracy and repeatability of the values recorded or collected during the tests.

The data from these tests show that the sample meets the functional requirements of the standards listed above for sail and power driven vessels under 12 meters in length.

In order to be fully certified the light must also meet the label information requirements set forth by the USCG in 33 CFR 183.810 that state in part that a light must:

(3) Bear a permanent and indelible label that is visible without removing or disassembling the light and states the following:

- (i) "USCG Approval 33 CFR 183.810."
- (ii) "Meets ABYC A-16."
- (iii) "Tested by Imanna Lab., Inc." if tested by Imanna or other appropriate lab if not
- (iv) Name of manufacturer.
- (v) Number of model.
- (vi) Visibility of the light in nautical miles.
- (vii) Date on which the light was type-tested.
- (viii) Identification and specifications of the bulb used in the compliance test.

If a light is too small to attach the required label –

- (1) Place the information from the label in or on the package that contains the light: and
- (2) Mark the light "USCG" followed by the certified range of visibility in nautical miles. Once installed, this mark must be visible without removing the light.



Figure 1: View of tested lights (black and silver versions, left to right)

INSTRUMENTATION EQUIPMENT SHEET

Date: July 22, 2019

Job No.: 21369

Customer: Ozmium

Technician: White

Test Area: Light Measurement

Test Item Description: navigation light

INSTRUMENT	MFG	MODEL	RANGE	ACCURACY	CAL DATE	CAL DUE
Spectrometer	StellarNet	CXR-SR-50	350-1100nm	±5%	7-15-19	7-15-20
Flex Optometer	Gamma Scientific	S480	multi	±0.087%	12-18-18	12-18-19

Instrumentation Information Verified by:



APPENDIX SUPPORTING DATA

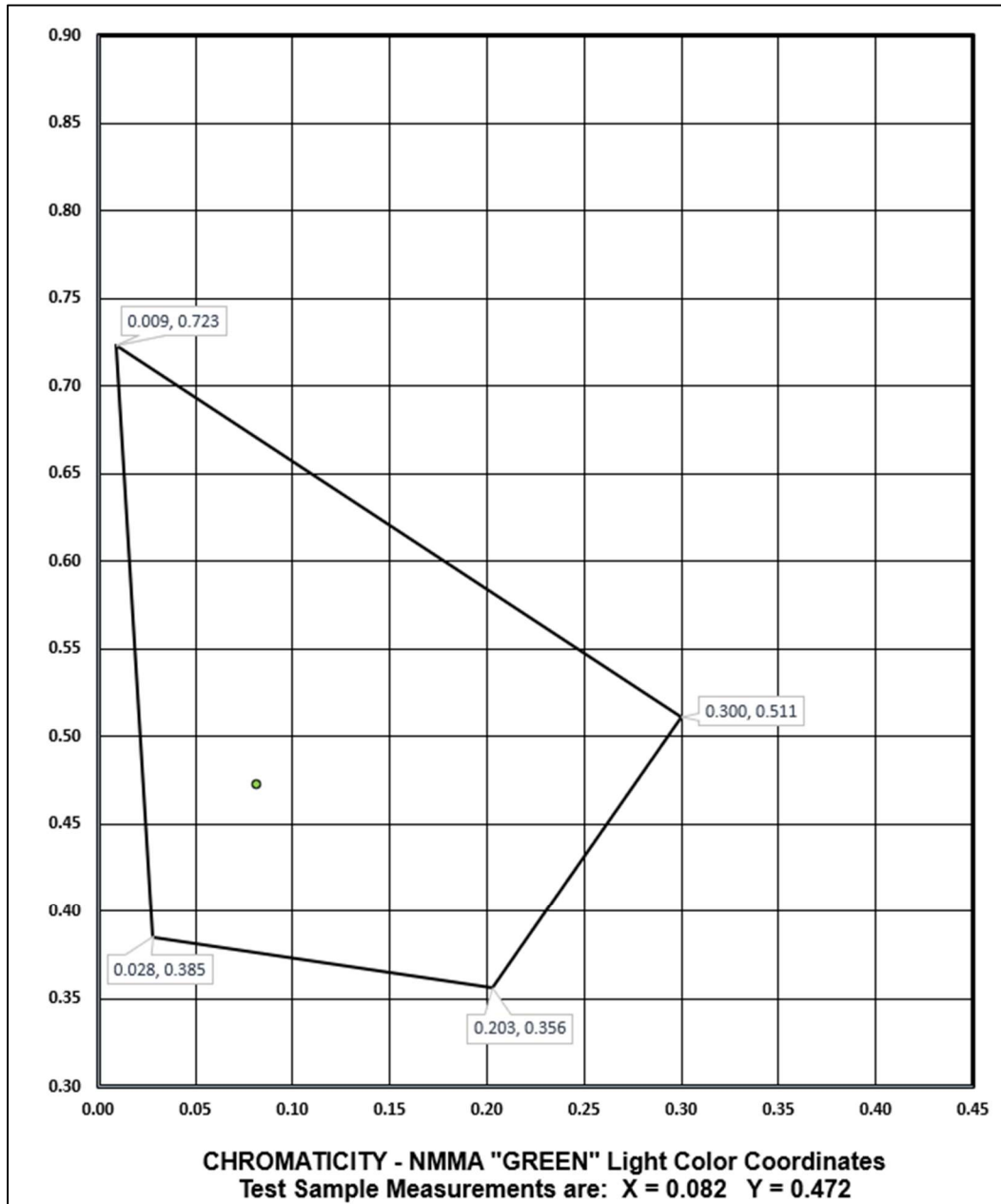


Figure 2: Chromaticity Plot / Green / Starboard Sidelight

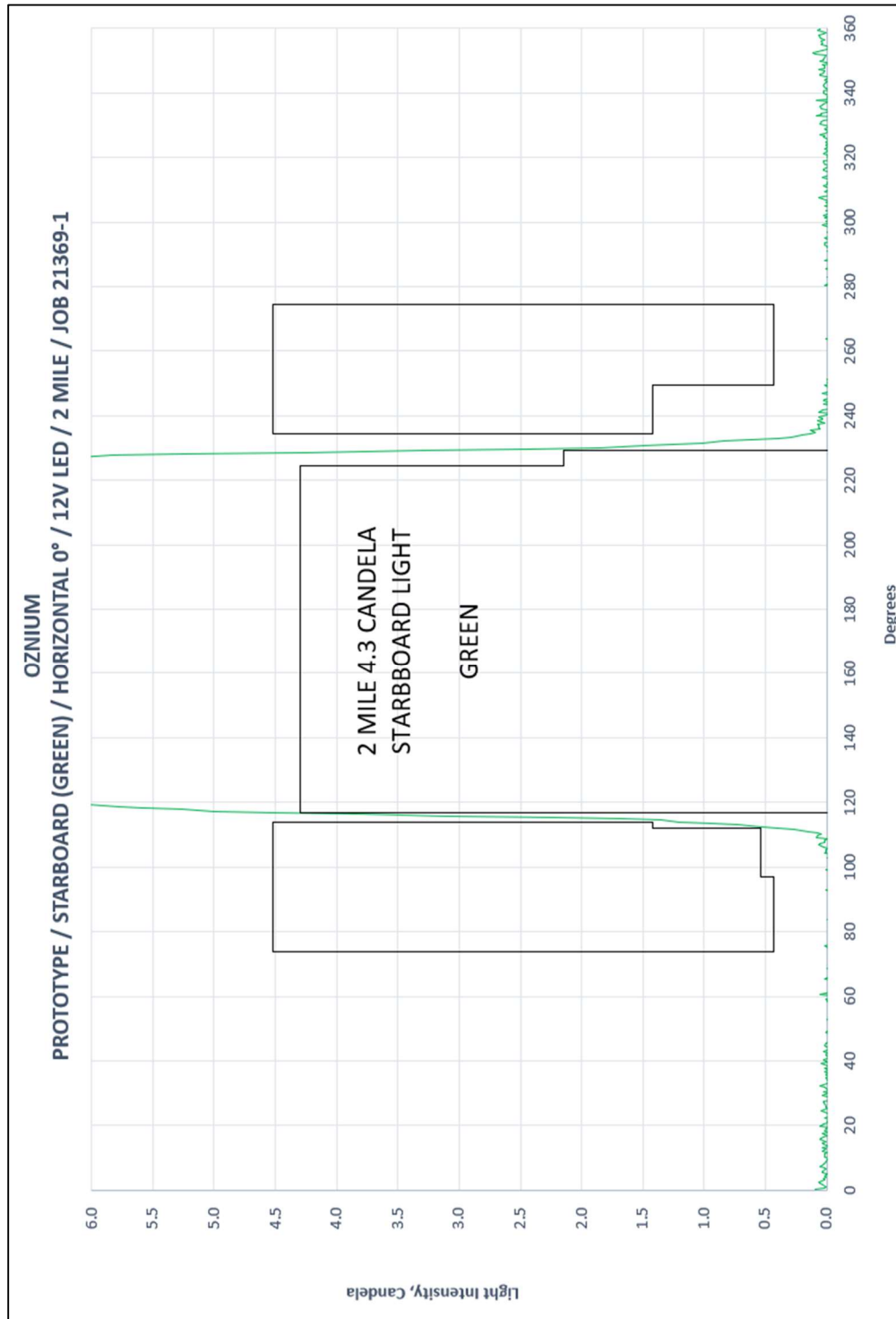


Figure 3: Horizontal Cut-Offs (Black Version)

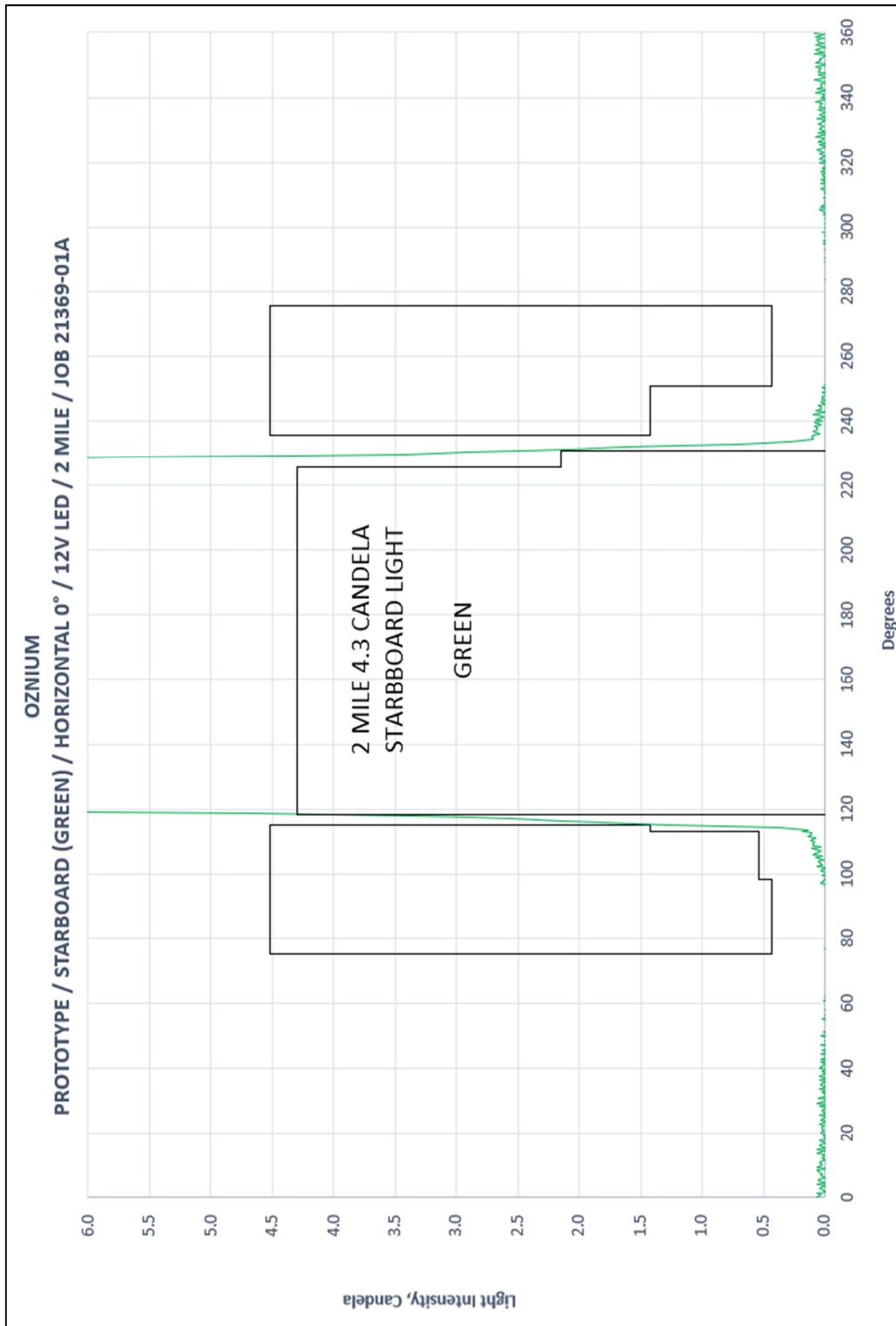


Figure 4: Horizontal Cut-Offs (Silver Version)

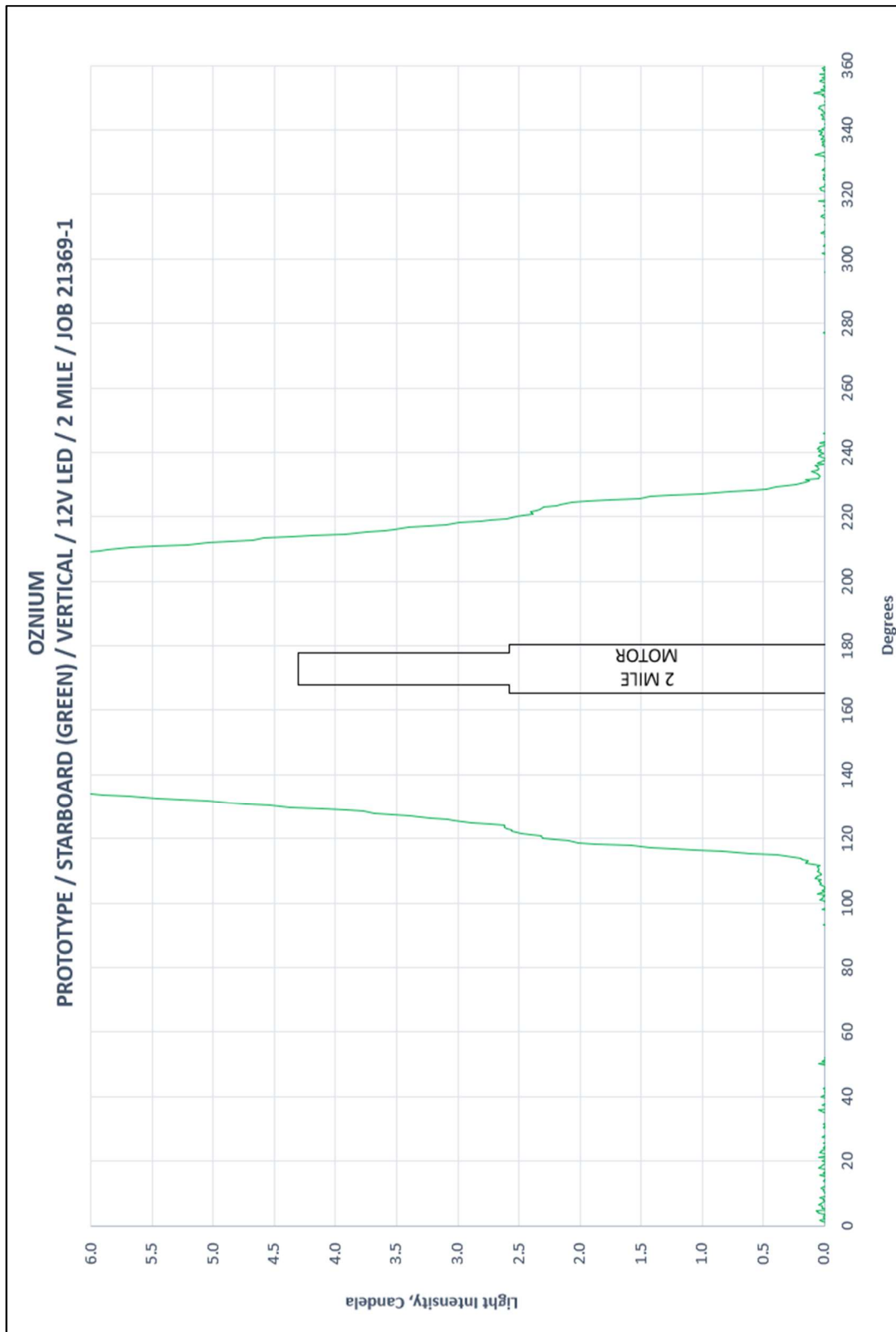


Figure 5: Vertical Cut-Offs

ERATTA SHEET FOR 21369-1 TO 21369-1A

During a review of the project, the report was modified to incorporate the silver version of the light. The silver version is mentioned as a part number, and the horizontal luminous intensity chart was also added to the report.

These changes were made, and the report was republished as 21369-1A.