

# **APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS**

**To:**

**MATERIALS SAFETY LICENSING BRANCH  
DIVISION OF MATERIAL SAFETY, STATE, TRIBAL AND RULEMAKING  
PROGRAMS OFFICE OF NUCLEAR MATERIALS SAFETY AND  
SAFEGUARDS  
U.S. NUCLEAR REGULATORY COMMISSION  
WASHINGTON, DC 20555-0001**

**From:**                    **Zujia ("Justin") Xu  
General Manager  
Cultilux**

Initial Submission Date: December 5th, 2017  
Re Submission Date: August 20th, 2018



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(10-2017)  
10 CFR 30, 32,  
33, 34, 35, 36,  
37, 39, and 40



APPLICATION FOR MATERIALS LICENSE

Estimated burden per response to comply with this mandatory collection request: 4.3 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [InfoCollects.Resource@nrc.gov](mailto:InfoCollects.Resource@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

INSTRUCTIONS: SEE THE CURRENT VOLUMES OF THE NUREG-1556 TECHNICAL REPORT SERIES ("CONSOLIDATED GUIDANCE ABOUT MATERIALS LICENSES") FOR DETAILED INSTRUCTIONS FOR COMPLETING THIS FORM: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1556/>. SEND TWO COPIES OF THE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

MATERIALS SAFETY LICENSING BRANCH  
DIVISION OF MATERIAL SAFETY, STATE, TRIBAL AND RULEMAKING PROGRAMS  
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS  
U.S. NUCLEAR REGULATORY COMMISSION  
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA,

SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM  
DIVISION OF NUCLEAR MATERIALS SAFETY  
U.S. NUCLEAR REGULATORY COMMISSION, REGION I  
2100 RENAISSANCE BOULEVARD, SUITE 100  
KING OF PRUSSIA, PA 19406-2713

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING BRANCH  
U.S. NUCLEAR REGULATORY COMMISSION, REGION III  
2443 WARRENVILLE ROAD, SUITE 210  
LISLE, IL 60532-4352

IF YOU ARE LOCATED IN:

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MISSISSIPPI, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING,

SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING BRANCH  
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV  
1600 E. LAMAR BOULEVARD  
ARLINGTON, TX 76011-4511

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR (Check appropriate item)

- A. NEW LICENSE
- B. AMENDMENT TO LICENSE NUMBER \_\_\_\_\_
- C. RENEWAL OF LICENSE NUMBER \_\_\_\_\_

2. NAME AND MAILING ADDRESS OF APPLICANT (Include zip code)

Zujia Xu  
Cultilux  
325 Funston Street, New Orleans, Louisiana 70123

3. ADDRESS WHERE LICENSED MATERIALS WILL BE USED OR POSSESSED

Cultilux  
325 Funston Street  
New Orleans, Louisiana 70123

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Zujia ("Justin") Xu

BUSINESS TELEPHONE NUMBER  
504-667-6931

BUSINESS CELLULAR TELEPHONE NUMBER  
504-430-9982

BUSINESS E-MAIL ADDRESS  
justinxu72@gmail.com

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL

a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSE FEES (Fees required only for new applications, with few exceptions\*)

(See 10 CFR 170 and Section 170.31)

\*Amendments/Renewals that increase the scope of the existing license to a new or higher fee category will require a fee.

FEE CATEGORY

31

AMOUNT ENCLOSED \$

9,400.00

PER THE DEBT COLLECTION IMPROVEMENT ACT OF 1996 (PUBLIC LAW 104-134), YOU ARE REQUIRED TO PROVIDE YOUR TAXPAYER IDENTIFICATION NUMBER. PROVIDE THIS INFORMATION BY COMPLETING NRC FORM 531: <https://www.nrc.gov/reading-rm/doc-collections/forms/nrc531info.html>.

13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 37, 39, AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER -- TYPED/PRINTED NAME AND TITLE

Zujia ("Justin") Xu, Radiation Safety Officer (General Manager)

SIGNATURE

DATE

8/20/2018

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			\$		
APPROVED BY				DATE	



#### **Item 5. RADIOACTIVE MATERIAL**

a. Element and mass number

Krypton-85

b. chemical and/or physical form

Krypton-85 in the physical form of a gas containing Argon and Krypton. Its chemical form is a noble (i.e. non-reactive) gas.

c. maximum amount which will be possessed at any one time

There are 3 different wattages of ceramic metal halide bulbs in the facility, listed as follows.

Model: SpectraX 1000W Ceramic Metal Halide, 10KBq (or 0.00027 mCurie)

Model: SpectraX 600W Ceramic Metal Halide, 7.4 KBq (or 0.0002 mCurie)

Model: SpectraX 315W Ceramic Metal Halide, 4.8 KBq (or 0.00013 mCurie)

Cultilux plans to store max quantity of 2000 pieces of each model. Therefore, the maximum quantity of Kr-85 possessed at one time will be 44.4 MBq (or 0.0012 Curie or 1.2 mCurie)

Based on 10 CFR 30.15(a)(8)(iv), the max Kr-85 in one electron tubes is 30 mCurie. The amount of Kr-85 in all of Cultilux ceramic metal halide models are well under this value.

All ceramic metal halide models will be precisely recorded. The date and quantity of received, the date and quantity of shipping out, receivers names and addresses will be all recorded in our database system for NRC further inspections.

#### **Item 6. PURPOSE FOR WHICH LICENSED MATERIAL WILL BE USED**

The Krypton-85 (Kr-85) gas is used inside of arc tubes for ceramic metal halide bulbs. These bulbs are used in general lighting, whenever there is a need for high brightness bulbs providing artificial white lights.

The ceramic metal halide bulbs are distributed commercially for use of general lighting to produce artificial sun-like lights.

#### **Item 7. INDIVIDUAL RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE.**

Even Item 7 is not applicable to an exempt distribution license, NUREG-1556, Volume 8, it is addressed to meet the requirement of a possession license already issued by Louisiana Department of Environmental Quality.



Mr. Zujia Xu is assigned as the Radiation Safety Officer (RSO) at this time. He is responsible for providing technical guidance and assistance on all emergencies involving or potentially involving radioactivity or radiation exposures. Any people who have chance to contact this bulb, including sales person, warehouse shipping and receiving persons, resellers and end users will be educated by RSO the quantity of Kr-85 contained in each bulb.

RSO is responsible to compose a safety manual and a training program. Personnel training is conducted as is commensurate with the individual's duties regarding radioactive materials as required by 10 CFR 19.

#### **Item 8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.**

Even Item 8 is not applicable to an exempt distribution license, NUREG-1556, Volume 8, it is addressed to meet the requirement of a possession license already issued by Louisiana Department of Environmental Quality.

All of the warehouse, sales and personnel who may access ceramic metal halides will be trained by RSO, Mr. Zujia Xu. A full copy of Radiation Safety Program will be presented to each person.

#### **Item 9. FACILITIES AND EQUIPMENT.**

Even Item 9 is not applicable to an exempt distribution license, NUREG-1556, Volume 8, it is addressed to meet the requirement of a possession license already issued by Louisiana Department of Environmental Quality.

The ceramic metal halide bulbs are properly received, stored, and transferred at the following location 325 Funston street, New Orleans, Louisiana, 70123. There is no special equipment needed to handle the products.

#### **Item 10. RADIATION SAFETY PROGRAM.**

Even Item 10 is not applicable to an exempt distribution license, NUREG-1556, Volume 8, it is addressed to meet the requirement of a possession license already issued by Louisiana Department of Environmental Quality.

##### **10.1. Policy**

Cultilux Policy Towards Exposure to Radiation

It is the policy of Cultilux that the release of radioactive material and the exposure of people to ionizing radiation be kept As Low As Reasonably Achievable (ALARA). The ALARA policy is based on the following three principles:

a. Exposures of personnel to radiation or the release of radioactive material to the environment may not exceed the limits in the federal and state regulations.



b. Unplanned exposure of personnel or uncontrolled releases to the environment that could exceed 10% of permissible limits will be investigated to determine whether the exposures or releases were ALARA and whether action is required to limit future exposures or releases.

c. Exposures and releases that do not exceed 10% of the permissible limits are low enough that no further consideration of ALARA is necessary.

## **10.2. Radiation Safety Officer (RSO)**

The corporate Radiation Safety Officer (RSO) is responsible for ensuring the safe use of radioactive material at Cultilux location. The RSO is responsible for managing the radiation safety program; identifying radiation safety problems; initiating, recommending, or providing corrective actions; verifying implantation of corrective actions; and ensuring compliance with all applicable regulations.

the responsibilities of the RSO include, but are not limited to, the following:

- \* Read, be familiar with, and comply with all sections of these Rules and Procedures.
- \* Ensure that all personnel complete all required radiation safety training.
- \* Arrange for proper storage and disposal of radioactive material waste.
- \* Maintain copies of inventory records of radioactive materials
- \* Arrange for termination of licenses when no longer required
- \* Coordinate with warehouse personnel to ensure:
  - personnel exposure to radioactive material as low as reasonably achievable.
  - all persons using radioactive material have completed all required radiation safety training.
  - that notification be given to the RSO immediately in the event of any radiological emergency, fire, contamination, flood, etc. and must provide all possible assistance with regard to prevention of hazards from radiation exposure
  - all current records of the radioactive materials are maintained at the facility.
  - proper storage of all radioactive materials
  - classification of radioactive waste, as required by these rules prior to the collection of the waste for disposal.

- prompt response to requests for an itemized inventory of the facility's storage of radioactive material
- immediate initiation of cleanup of any broken sources and dispose of radioactive waste in an approved manner.
- that storage of sources, the area and containers for waste are properly labeled.

### **10.3. Sources and source Material (Krypton 85)**

Krypton-85 is a radioactive gas found in the atmosphere and produced by nuclear explosions, nuclear power plants, volcanoes and earthquakes. Krypton-85 is odorless, colorless and tasteless and emits low level radiation levels of both gamma and beta rays. Krypton-85 is usually produced in gas mixtures with argon or xenon to improve the ionization in light bulbs by reducing their starting voltage.

Krypton-85 decays by beta into rubidium-85, with a half life of 10.756 years and a maximum decay energy of 0.687 MeV.

The subject of this license is an arc tube. The tube is within the glass of products specifically exempted from certain licensing requirements.

The arc tube is designed to function to produce high power artificial white light for general lighting. Each 315W ceramic metal halide bulb contains approximately 4.8KBq of Kr-85. Each 600W ceramic metal halide bulb contains approximately 7.4KBq of Kr-85. Each 1000W ceramic metal halide bulb contains approximately 10KBq of Kr-85. The outer envelope of the electron tube consists of ceramic glass which is fused to close each end to form a cylinder. The arc tube will not operate if the seal is imperfect or the glass envelope is cracked or otherwise compromised.

The license encompasses possession, temporary storage and distribution of the ceramic metal halide bulbs which contain the arc tubes.

The inventory of lamps varies as incoming and outgoing orders are filled. The facility's total inventory will never exceed 44.4 MBq (or 0.0012 Curie or 1.2 mCurie).

### **10.4. Waste Storage**

The only waste generated by Cultilux is defective lamps that may be occasionally returned by servicers and lamps damaged at Cultilux during handling. The defective lamps are stored in a labeled container. When a lamp is placed in the container, a log is filled out documenting the date and number of lamps deposited. The number of discarded lamps are taken into consideration when determining the total number of lamps and the possession limits of the license.



### Radioactive Waste Drum Deposit

Date	Quantity of Lamps	Descriptions	Print / Sign

### 10.5. Waste Disposal

Defective lamps are stored in a labeled container. The number of discarded lamps are taken into consideration when determining the total number of lamps and the possession limits of the license.

The lamps will require disposal when:

- the container is near capacity or
- the total number of lamps in the facility (including inventory and defective lamps) is approaching the possession limits or
- the possession license is terminated

If disposal is necessary, the RSO will contact a licensed waste management company to make arrangements for proper disposal.

### 11. WASTE MANAGEMENT.

Even Item 11 is not applicable to an exempt distribution license, NUREG-1556, Volume 8, it is addressed to meet the requirement of a possession license already issued by Louisiana Department of Environmental Quality.

Cultilux recommends all ceramic metal halide lamps be recycled. We will use recyclers listed at [www.lamprecycle.org](http://www.lamprecycle.org). If lamps are broken, ventilate area where breakage occurred. Clean-up with mercury vacuum cleaner or other suitable means that avoids dust. Take usual precautions for collection of broken glass. Place materials in closed containers to avoid generating dust. It is the responsibility of the waste generator to ensure proper classification and disposal of waste products.



**LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY**  
**OFFICE OF ENVIRONMENTAL COMPLIANCE**  
**RADIATION LICENSING**  
**P.O. BOX 4312**  
**BATON ROUGE, LOUISIANA 70821-4312**

## RADIOACTIVE MATERIAL LICENSE

Pursuant to the Louisiana Environmental Quality Act (Louisiana Revised Statutes 30:2101 et seq.) and the Louisiana Radiation Regulations, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess and transfer radioactive material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in the Louisiana Revised Statutes 30:2105 of the Louisiana Nuclear Energy and Radiation Control Law, and is subject to all applicable rules, regulations, and orders of the Department now or hereinafter in effect, including the Louisiana Radiation Regulations (LAC 33:XV) and to any condition specified in the license.

LICENSEE AllReach Greenhouse Lighting dba CultiLux 1013 Harimaw CT East Metairie, Louisiana 70001  Attention: Zujia Xu Radiation Safety Officer	LICENSE NUMBER	LA-13679-L01	EXPIRATION DATE	January 31, 2023
	PREVIOUS AMENDMENTS ARE VOID AMENDMENT NUMBER	Initial	AI NUMBER	209856
	THIS LICENSE ISSUED PURSUANT TO AND IN ACCORDANCE WITH Initial Application			
	SIGNED BY:	Zujia Xu	DATE:	December 5, 2017

RADIOISOTOPE ELEMENT	MASS NO.	MAXIMUM NUMBER OF SOURCES	MAXIMUM ACTIVITY OR QUANTITY PER SOURCE*	SEALED SOURCE IDENTIFICATION CHEMICAL FORM—PHYSICAL STATE	STORAGE CONTAINER OR EXPOSURE DEVICE	AUTHORIZED USE
Kr	85	Total	1.6 mCi	CultiLux Models Spectra X100 and Spectra X315		Light Bulbs for General Lighting

1. Radioactive material shall be stored and distributed from:

AllReach Greenhouse Lighting      AI No. 209856  
 dba CultiLux  
 1013 Harimaw CT East  
 Metairie, Louisiana 70001

2. The Radiation Safety Officer for this license is Zujia Xu.

3. The licensee shall report to the Department quarterly transfer reports.

4. Except as specifically provided otherwise by the license, the licensee shall distribute and use radioactive material described in this license in accordance with LAC 33:XV and statements, representations and procedures contained in the licensee's radioactive material license application (complete submission) dated December 5, 2017, and in all subsequent correspondence. The regulations in LAC 33:XV shall take precedence unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than these regulations.

LI:KWB

\*pCi-picrocurie, µCi-Microcurie, mCi-Millicurie, Ci-Curie

Lourdes Iturralde  
Assistant Secretary

DATE

2-2-18

Page 1 of 1 Page(s)



**Chemical and physical form and maximum quantity of byproduct material in each product**

Krypton-85 in the physical form of a gas containing Argon and Krypton. Its chemical form is a noble (i.e. non-reactive) gas.

There are 3 different wattages of ceramic metal halide bulbs in the facility, listed as follows.

Model: SpectraX 1000W Ceramic Metal Halide, 10KBq (or 0.00027 mCurie)

Model: SpectraX 600W Ceramic Metal Halide, 7.4 KBq (or 0.0002 mCurie)

Model: SpectraX 315W Ceramic Metal Halide, 4.8 KBq (or 0.00013 mCurie)

The company will store max quantity of 2000 pieces of each model. Therefore, the maximum quantity of Kr-85 possessed at one time will be 44.4 MBq (or 0.0012 Curie or 1.2 mCurie)

Based on 10 CFR 30.15(a)(8)(iv), the max Kr-85 in one electron tubes is 30 mCurie. The amount of Kr-85 in all of Cultilux ceramic metal halide models are well under this value.

**Details of design, construction, packaging and labeling of product**

**A1. 1000W Ceramic Metal Halide, Series: 1000W XPS**

Manufacture: Zhejiang XGY Lighting, P.R. China

Max Lamp Wattage: 1000W

Radioactive Source: Arc Tube

Radioactive Content: Krypton-85

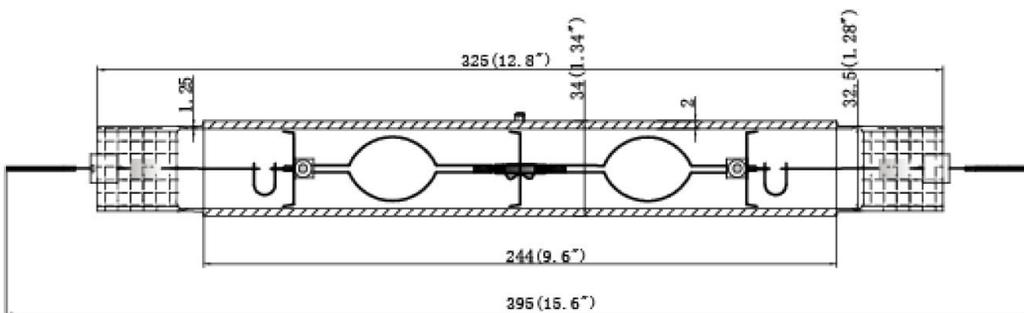
Source Containment: Sealed in Arc Tube

Labeling: The individual lamp container is labeled in accordance with 10 CFR 32.15(d), with Cultilux name and website.



**Krypton 85 Sealed in Arc Tubes**

**Dimensions**



**Lamp Contains KR-85  
 USNRC License xxx**

Warning : This product cannot be incorporated in any food, beverage, cosmetic, drug, or other commodity or product designed for ingestion or inhalation by, or application to, a human being.

54x54x419mm

Enlarge

Enlarge

Warning : This product cannot be incorporated in any food, beverage, cosmetic, drug, or other commodity or product designed for ingestion or inhalation by, or application to, a human being.

Lamp Contains KR-85  
 USNRC License XXX

A2. 600W Mogul Base Ceramic Metal Halide, Series: 600W XPS

Manufacture: Zhejiang XGY Lighting, P.R. China

Max Lamp Wattage: 600W

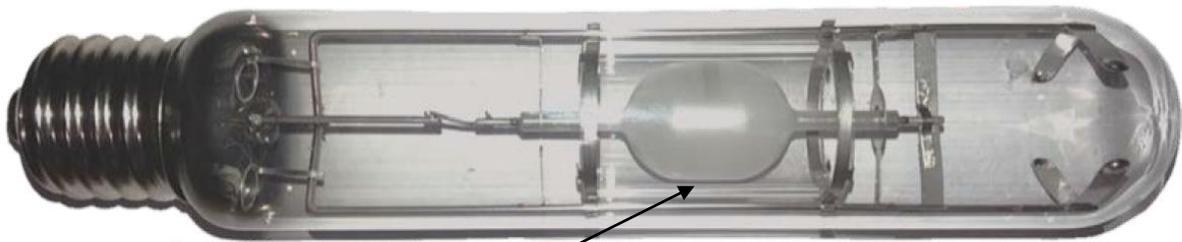
Radioactive Source: Arc Tube

Radioactive Content: Krypton-85

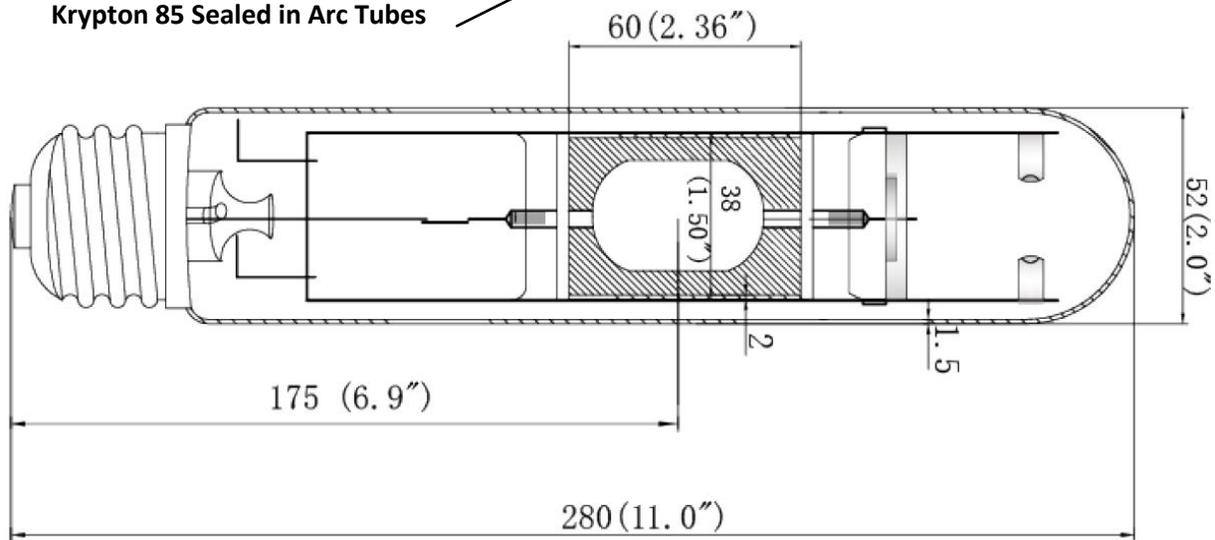
Maximum Activity per Lamp: 7.4 KBq (or 0.0002 mCurie)

Source Containment: Sealed in Arc Tube

Labeling: The individual lamp container is labeled in accordance with 10 CFR 32.15(d) , with Cultilux name and website.



Krypton 85 Sealed in Arc Tubes



Lamp Contains KR-85  
 USNRC License xxx

Warning : This product cannot be incorporated in any food, beverage, cosmetic, drug, or other commodity or product designed for ingestion or inhalation by, or application to, a human being.

Enlarge

Warning : This product cannot be incorporated in any food, beverage, cosmetic, drug, or other commodity or product designed for ingestion or inhalation by, or application to, a human being.

Enlarge

Lamp Contains KR-85  
 USNRC License xxx

54x54x419mm

A3 600W Double End Ceramic Metal Halide, Series: 600W XPS/DE

Manufacture: Zhejiang XGY Lighting, P.R. China

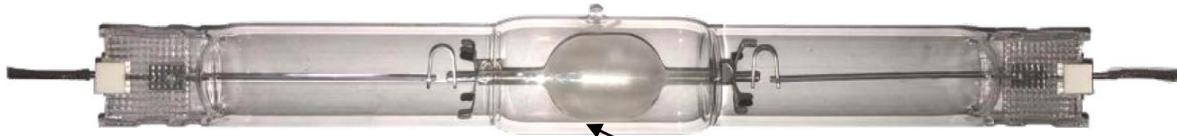
Max Lamp Wattage: 600W

Radioactive Source: Arc Tube

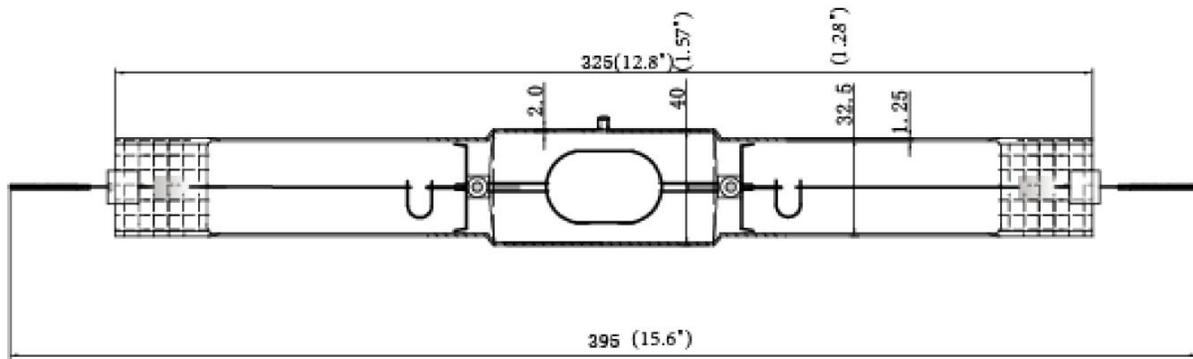
Radioactive Content: Krypton-85

Source Containment: Sealed in Arc Tube

Labeling: The individual lamp container is labeled in accordance with 10 CFR 32.15(d), , with Cultilux name and website.

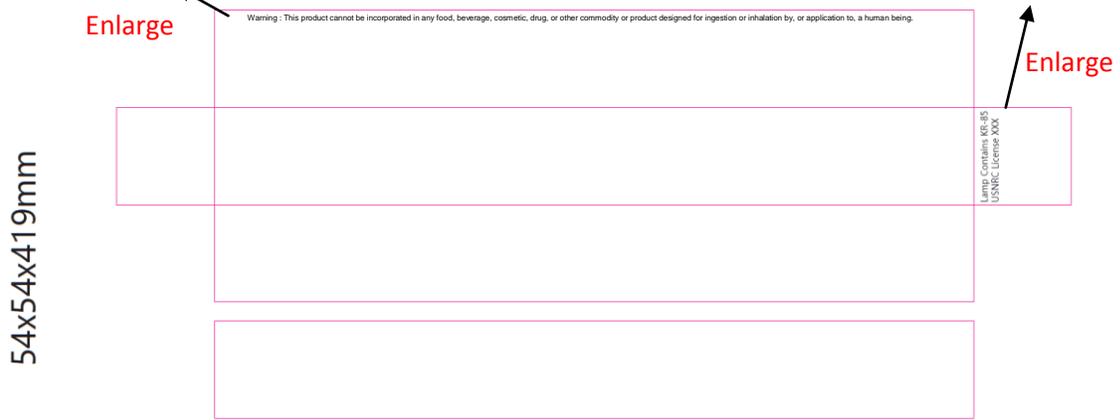


## Dimensions



Warning : This product cannot be incorporated in any food, beverage, cosmetic, drug, or other commodity or product designed for ingestion or inhalation by, or application to, a human being.

**Lamp Contains KR-85  
 USNRC License xxx**



A4. 315W Ceramic Metal Halide, Series: 315W XPS

Manufacture: Zhejiang XGY Lighting, P.R. China

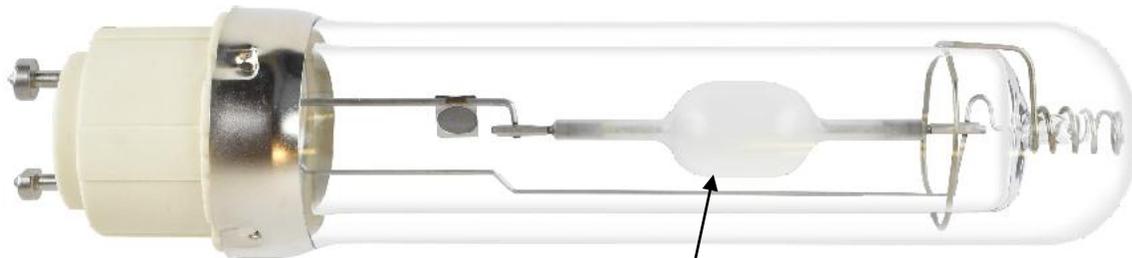
Max Lamp Wattage: 315W

Radioactive Source: Arc Tube

Radioactive Content: Krypton-85

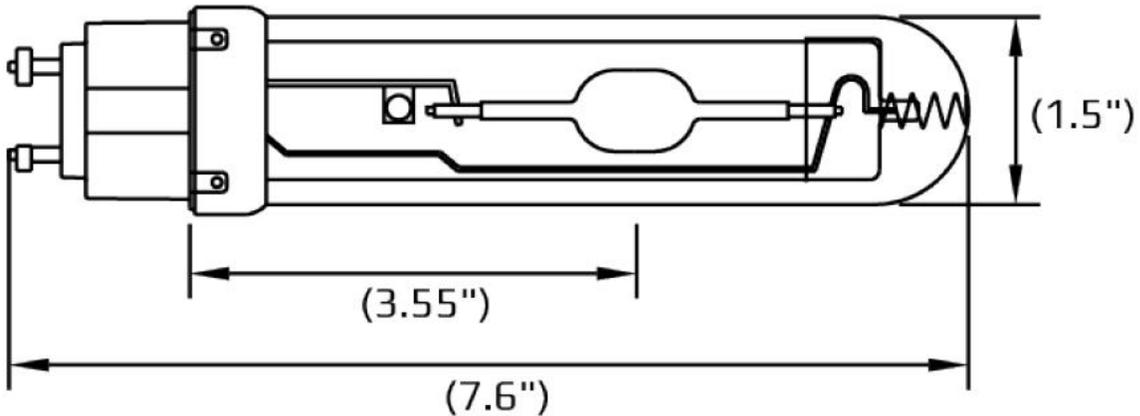
Source Containment: Sealed in Arc Tube

Labeling: The individual lamp container is labeled in accordance with 10 CFR 32.15(d) , with Cultilux name and website.



Krypton 85 Sealed in Arc Tubes

Dimensions



Warning : This product cannot be incorporated in any food, beverage, cosmetic, drug, or other commodity or product designed for ingestion or inhalation by, or application to, a human being.

Lamp Contains KR-85  
 USNRC License xxx

54x54x419mm

Enlarge

Warning - This product cannot be incorporated in any food, beverage, cosmetic, drug, or other commodity or product designed for ingestion or inhalation by, or application to, a human being.

Lamp Contains KR-85  
 USNRC License xxx

Enlarge

**Method of containment or binding of byproduct material in product**

This picture shows a typical ceramic Poly Crystalline Alumina (PCA) or so called arc tube that houses Kr-85. A powder ceramic PCA is burned in an oven with over 1000 °C flame for hours to become a solid and very hard to break rigid electronic arc tube. Kr-85, as a format of gas, is concealed in a PCA with electrodes on both side. Electrodes contact the inner surface of thin tubes at PCA both ends extremely tight to prevent any Kr-85 leakage.

## Procedures for prototype testing to demonstrate that the material will not become detached from the product or that byproduct material will not be released under severe conditions

### I. CMH Bulbs Low and High Temperature Test

#### 1. Test instrument

A. High temperature equipment which can generate accurate high ambient temperature.



#### B. Radiant tester



## 2. Test Methods and Steps

Step 1. Place the test lights into the high temperature box.



315W CMH



600W/E39 CMH



600W/DE CMH



1000W/DE CMH

Step 2. Record the radiation value.



315W CMH



600W/E39 CMH



600W/DE CMH



1000W/DE CMH

Step 3. Turn on the high temperature box, set a temperature at 150 °C, and light the lamp for 1 hours.



Step 4. Wait for the temperature to rise to 150 °C degree to record the radiation value outside the door.



Step 5. Repeat the step 1 to step 4 but set the temperature to be -20°C

## II. CMH Bulb Drop Test

### 1. Test instruments

Radiant Tester



### 2. Test Method and Steps

Step 1 Record the radiation value of all models of CMH bulbs



315W CMH

600W/E39 CMH

600W/DE CMH

1000W/DE CMH

Step 2. Prepare a whole box of bulbs and record the radiation values.



48 Pcs of  
315W CMH  
0.191  $\mu\text{Sv}/\text{Hr}$



50 Pcs of  
600W/E39 CMH  
0.191  $\mu\text{Sv}/\text{Hr}$



15 Pcs of  
600W/E39 CMH  
0.191  $\mu$ Sv/Hr



15 Pcs of  
1000W/E39 CMH  
0.191  $\mu$ Sv/Hr

Step 3. Drop boxes of bulbs to a concrete ground from 1.2 meters (4 feet) high.



Step 4. Record radiation value of boxes bulbs



48 Pcs of  
315W CMH  
0.185  $\mu\text{Sv}/\text{Hr}$



50 Pcs of  
600W/E39 CMH  
0.191  $\mu\text{Sv}/\text{Hr}$



15 Pcs of  
600W/E39 CMH  
0.191  $\mu\text{Sv}/\text{Hr}$

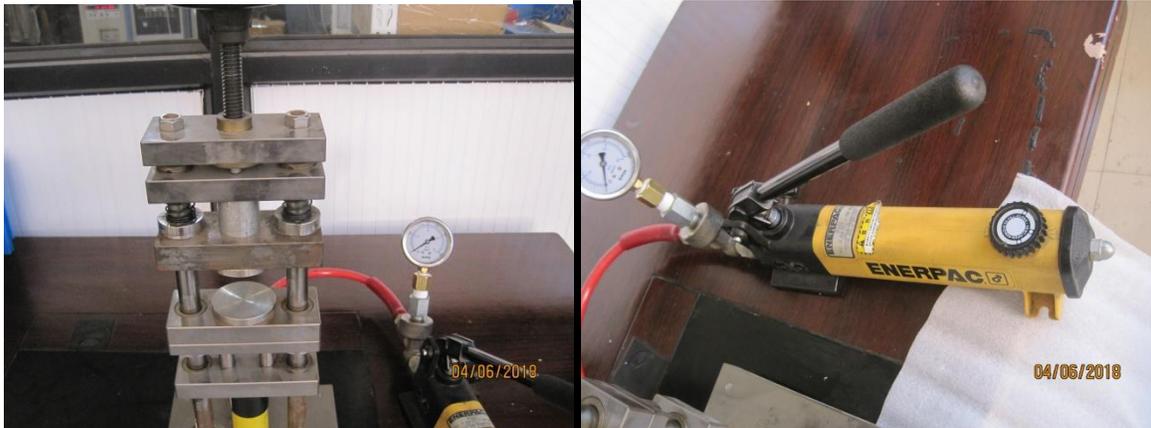


15 Pcs of  
1000W/E39 CMH  
0.185  $\mu\text{Sv}/\text{Hr}$

### III. CMH Bulb Pressure Tests

#### 1. Testing instruments

##### A. Hydraulic pressure gauge



##### B. Radiant tester



## 2. Test Method and Steps

Step 1: Take CMH bulbs out of package and place them in plastic boxes. Place the radiation equipment on the bulb. Take photos and record radiation values.



315W CMH



600W/E39 CMH



600W/DE CMH



1000W/DE CMH

Step 2. Adjust the pressure equipment hydraulic gauge to 0 scale and take photos



Step 3. Place bulbs horizontally on the test pressure equipment.



Step 4. Gradually increase the pressure to start testing. Take photos and record pressure value



Step 5. After the bulbs are broken by the pressure equipment, the radiation values are recorded.



Step 6. Remove the broken bulbs from the pressure equipment, adjust the pressure test equipment back to 0.

Step 7. Measure the radiation value of CMH 315W, 500W and 600W arc tubes respective and get the values from 0.125 μSv/Hr to 0.191 μSv/Hr.



Step 8. Increase the pressure till the arc tubes were broken.

Arc Tube Model	Breaking Pressure	Max Radiation Rate After Broken	Time from Max Radiation to Normal
315 W	6 MPa	13.42 $\mu\text{Sv}/\text{Hr}$	27 secs
500 W	11 Mpa	16.52 $\mu\text{Sv}/\text{Hr}$	29 secs
600 W	13 Mpa	18.11 $\mu\text{Sv}/\text{Hr}$	31 secs

All of the arc tubes were broken when pressure increased. 315W arc tube was broken when pressure was 6 MPa, the max radiation reading was 13.42  $\mu\text{Sv}/\text{Hr}$  when it's broken. After 27 seconds, the reading decreased to 0.191  $\mu\text{Sv}/\text{Hr}$ . 500W arc tube was broken when pressure was 11 MPa, the max radiation reading was 16.52  $\mu\text{Sv}/\text{Hr}$  when it's broken. After 29 seconds, the reading decreased to 0.191  $\mu\text{Sv}/\text{Hr}$ . 600W arc tube was broken when pressure was 13 MPa, the max radiation reading was 18.11  $\mu\text{Sv}/\text{Hr}$  when it's broken. After 31 seconds, the reading decreased to 0.191  $\mu\text{Sv}/\text{Hr}$ .



## Results of prototype testing

### I. Conclusions from CMH Bulbs Low and High Temperature Test

All of CMH models do not show Kr-85 leakage at the ambient temperature of 150°C and -20°C.

### II. Conclusions from CMH Bulbs Drop Test

There were no obvious changes of radiation readings after all of CMH bulbs with existing package fall to a concrete ground from at least 4FT high, which indicates no leakage of Kr-85.

### III. Conclusions from CMH Bulbs Destructive Pressure Tests

There is no Kr-85 leakage when the outside glass tubes are broken. The meter recorded about 100 times of more radiation value when arc tubes were broken under severe forces. The 315W, 500W and 600W arc tubes broke at the pressure of 6Mpa, 11Mpa, and 13MPa respectively. After arc tubes were broken, it took up to 31 seconds for Kr-85 readings decrease to normal level.



**Quality control procedures to be followed in the fabrication and the quality control standards the product will be required to meet (10 CFR 32.15)**

1. Quality Control at manufacture facility

1.1 An automatic process of injection Kr-85 into variety wattage arc tubes is digitally controlled. If the consumption of Kr-85 is not balanced with the quantity of arc tubes produced, detail inspections will be taken place. This procedure will avoid over or under injections.

1.2 A 0.3% destructive sampling testing is constantly taken place during arc tube production. The testing ensures the strength of arc tube and make sure no leakage of Kr-85.

1.3 Every ceramic metal halide lamp is lit before shipped out of the factory. If the amount of Kr-85 in arc tubes is not properly injected or leakage of Kr-85 occurs, lamps will not be turned on.

2. Quality Control at Cultilux facility

2.1 Receiving persons will inspect every incoming package visually and audibly. If they find any broken boxes or hear shattered sound when shipment arrive, they will open boxes to inspect bulbs. Any defective bulbs will be set aside and prevented to be shipped out.

2.2 Normal ceramic metal halide bulbs are stored on shelves with proper labels in a restricted area to avoid any un-predicable damages.

2.3 Shipping persons will inspect every outgoing package visually and audibly. The products with packing boxes are placed into a shipping box with proper cushion to avoid possible damage during the shipment.

## The radiation level and method of measurement

The following portable radiant tester was used to measure the radiation level of ceramic metal halide bulbs.



Here are the results of measurement when the tester was placed side by side with bulbs, pictures shown in the testing section, page 18 - 20.

Individual 315W CMH: 0.185  $\mu\text{Sv}/\text{Hr}$  (or 0.0001621 rem per year)

Master Case 315W CMH (48 pcs): 0.191  $\mu\text{Sv}/\text{Hr}$  (or 0.0001673 rem per year)

Individual 600W CMH: 0.185  $\mu\text{Sv}/\text{Hr}$  (or 0.0001621 rem per year)

Master Case 600W CMH (50 pcs): 0.191  $\mu\text{Sv}/\text{Hr}$  (or 0.0001673 rem per year)

Individual 1000W CMH: 0.185  $\mu\text{Sv}/\text{Hr}$  (or 0.0001621 rem per year)

Master Case 1000W CMH (15 pcs): 0.191  $\mu\text{Sv}/\text{Hr}$  (or 0.0001673 rem per year)

Based on 10 CFR 32.23, 32.24, the dose of column I is 0.001 rem per year.



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**Product or material is not likely to be incorporated in any food; beverage; cosmetic; drug; or other commodity or product designed for ingestion or inhalation by, or application to, a human being**

This statement will be print on individual package for each model. The detail design is depicted in previous labeling section, page 10 - 13.