



**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-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to 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 APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW. \*AMENDMENTS/RENEWALS THAT INCREASE THE SCOPE OF THE EXISTING LICENSE TO A NEW OR HIGHER FEE CATEGORY WILL REQUIRE A FEE.**

**APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:**

OFFICE OF FEDERAL & STATE MATERIALS AND ENVIRONMENTAL MANAGEMENT PROGRAMS  
DIVISION OF MATERIALS SAFETY AND STATE AGREEMENTS  
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

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)

XL TECHNOLOGIES, INC.  
1501 NORMAN DRIVE  
DARIEN, IL 60561

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

ZACK LI

BUSINESS TELEPHONE NUMBER

(630) 435-5469

BUSINESS CELLULAR TELEPHONE NUMBER

(630) 452-6019

BUSINESS EMAIL ADDRESS

zackli@xlti.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 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)

FEE CATEGORY

Exe. Distribution

AMOUNT ENCLOSED \$

6,700.00

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, 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

ZACK LI, PRESIDENT

SIGNATURE

*Zack Li*

DATE

4/1/2014

**FOR NRC USE ONLY**

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



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(See 10 CFR 170 and Section 170.31)

FEE CATEGORY **Exe. Distribution** AMOUNT ENCLOSED \$ **6,700.00**

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CERTIFYING OFFICER – TYPED/PRINTED NAME AND TITLE

ZACK LI, PRESIDENT

SIGNATURE

DATE

**FOR NRC USE ONLY**

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APPROVED BY			\$	DATE	

## Attachment to NRC Form 313 for XL Technologies (April 1, 2014)

Scope: XL Technologies, Inc. is to import pre-packaged thoriated (less than 4% ThO<sub>2</sub>) tungsten electrodes from China, transport the electrodes directly to a warehousing facility in Elk Grove Village, IL for short and medium-term storage, and then distribute the electrodes directly to our customers in the United States as they are sold. We ship the pre-packaged electrodes in boxes and we do not fabricate or alter them in any way. As a result, we do not believe there is any waste created during our possession. The products meet AWS A5.12 standards and there are no special requirements for special radiation programs or special waste management programs. A SMDS is included in each package.

Below are details as required in NRC Form 313. The next pages are typical packaging conditions and MSDS for our pre-packaged thoriated tungsten electrodes.

### 5. Radioactive material:

- a. Element and mass number: Thorium, Th, 90
- b. Chemical and/or physical form: ThO<sub>2</sub>, dispersed/alloyed (2%) in tungsten
- c. Maximum amount which will be possessed at any one time: 110lbs as ThO<sub>2</sub>

### 6. Purpose(s) for which licensed material will be used:

Tungsten electrodes will be used in arc welding, plasma cutting industries

### 7. Individual(s) responsible for radiation safety program and their training experience:

Zack Li, Trained by our manufacturing plant

### 8. Training for individuals working in or frequenting restricted areas:

This material is safe in electrode form. We import pre-packaged product and do not fabricate/ alter it in any way, so minimal training from the manufacturer is required. A SMDS is included in each package.

### 9. Facilities and equipment:

Warehouse shelves for storage

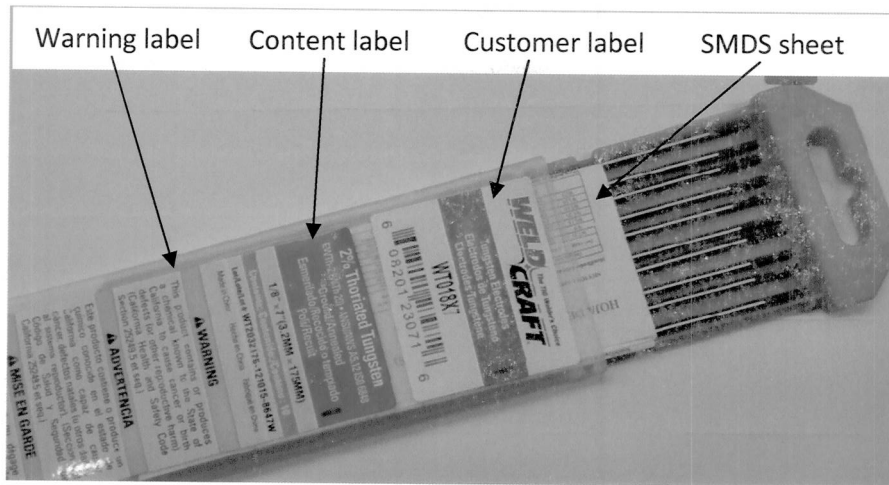
### 10. Radiation safety programs:

This material is safe in the electrode form (though dust may potentially be hazardous if fabricating which we do not perform during our entire possession). No special radiation programs are needed. A SMDS is included in each package.

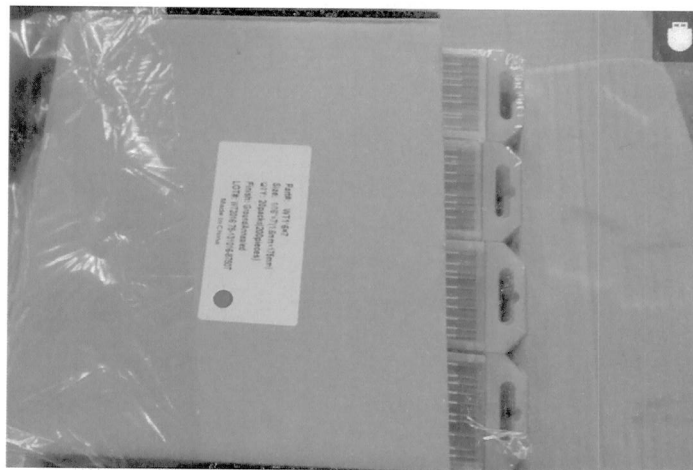
### 11. Waste management:

This material is safe in the electrode form (though dust may potentially be hazardous if fabricating which we do not perform during our entire possession). No special waste management is needed. A SMDS is included in each package.

## Appendix 1: Typical packaging condition (Pre-packaged overseas) of 2% thoriated tungsten electrodes



Picture 1. Typical pre-packaged 2% thoriated tungsten electrodes, 10 pieces in a plastic box. The box has customer name label, content label, and radiation warning label. A MSDS is included in each box.



Picture 2. Typical 2% pre-packaged thoriated tungsten electrodes, 20 plastic boxes in a carton box. The box has a content label with a red dot designating 2% thoriated tungsten



Picture 3. Typical pre-packaged 2% thoriated tungsten electrodes, 3 or 6 cartons in a larger carton depending on the diameter of the electrode

**Appendix 2: Typical MSDS for 2% thoriated tungsten electrodes**

(Next page)

# MATERIAL SAFETY DATA SHEET (MSDS)

## Tungsten Electrodes

Conforms to OSHA Hazard Communication Standard 29CFR 1910.1200  
Standard Must Be Consulted for Specific Requirements

XL TECHNOLOGIES, INC.  
1501 NORMAN DRIVE, DARIEN, IL 60561  
630-435-5469

EMERGENCY PHONE NUMBERS  
BUSINESS HRS: 630-435-5469  
CHEMTEC: 800-424-9300

### SECTION I – PRODUCT IDENTIFICATION

**Trade Name:** Tungsten Electrodes for Welding  
**Chemical Name/Class:** Tungsten; Element  
**Product Use:** Welding; Metal-working Operations  
**Classification:** AWS A5.12  
**Data of Preparation:** Revised on October 4, 2011

### SECTION II - HAZARDOUS INGREDIENTS

**Important:** This section covers the materials from which the product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered under Section V. Thorium dioxide is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 372.

Designation		Chemical Composition Impurities ≤ 0.1%		Tip Color
ISO 6848	AWS A5.12	Oxide Additive, %	Tungsten, %	
WT20	EWTh-2	ThO <sub>2</sub> : 1.70-2.20	≥ 97.30	Red
WP	EWP	-----	≥ 99.95	Green
WL15	EWLa-1.5	LaO <sub>2</sub> : 1.30-1.70	≥ 97.80	Gold
WC20	EWCe-2	CeO <sub>2</sub> : 1.80-2.20	≥ 97.30	Gray
WL10	EWLa-1	LaO <sub>2</sub> : 0.80-1.20	≥ 98.30	Black
WL20	EWLa-2	LaO <sub>2</sub> : 1.80-2.20	≥ 97.30	Sky-blue
WZ3	EWZr-1	ZrO <sub>2</sub> : 0.15-0.50	≥ 99.10	Brown
	EWG	LaO <sub>2</sub> & CeO <sub>2</sub> : 1.80-2.20	≥ 97.30	Aqua

\*The term "HAZARDOUS MATERIALS" should be interpreted as a term required and defined in OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200 however the use of this term does not necessarily imply the existence of any hazard.

### SECTION III - PHYSICAL DATA

Melting Point: Approximately 3400°C  
Boiling Point: Approximately 5900°C  
Solubility in Water: Insoluble  
Specific Gravity (H<sub>2</sub>O=1): Approximately 19.3  
Radioactive Isotope: Th-232

Color: Silver-gray  
Odor: odorless  
Vapor. Press: N/A at 25°C  
Vapor. Density: N/A

### SECTION IV – FIRE AND EXPLOSION HAZARD DATA

Non-Flammable: Welding arc and sparks can ignite combustibles. See Z-49.1 referenced in Section VI.

### SECTION V - REACTIVITY DATA

#### Hazardous Decomposition Products

Welding fumes and gases cannot be classified simply. The composition and quantity of these fumes and gases are dependent upon the metal being welded, the procedures followed and the electrodes used.

Workers should be aware that the composition and quantity of fumes and gases to which they may be exposed, are influenced by: coatings which may be present on the metal being welded (such as paint, plating, or galvanizing), the number of welders in operation and the volume of the work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing procedure). When the electrode is consumed, the fumes and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. The composition of these fumes and gases are the concerning matter and not the composition of the electrode itself.

Decomposition products include those originating from the volatilization, reaction, or oxidation of the ingredients shown in Section II, plus those from the base metal, coating and the other factors noted above.

Gaseous reaction products may include carbon monoxide and carbon dioxide.

Ozone and nitrogen oxides may be formed by the radiation from the arc.

One method of determining the composition and quantity of the fumes and gases to which the workers are exposed is to take an air sample from inside the welder's helmet while worn or within the worker's breathing zone. See ANSI/AWS F1.1 publication available from the American Welding Society 550 N.W. LeJeune Road, Miami, Florida 33126.

#### SECTION VI – HEALTH HAZARD DATA

Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL). American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV[R]).

INGREDIENT	CAS No.	OSHA PEL	ACGIH TWA	ACGIH STEL
Tungsten (W)	7440-33-7	-	5 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>
Thorium Dioxide	1314-20-1	-	-	-
Cerium Dioxide	1345-13-7	-	-	-
Lanthanum Dioxide	1312-81-8	-	-	-
Zirconium Oxide	1314-23-4	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>
Yttrium Oxide	1314-36-9	1 mg/m <sup>3</sup>	1 mg/m <sup>3</sup>	-

**Threshold Limit Value:** The ACGIH recommended general limit for welding fume NOC (Not otherwise classified) is 5 mg/m<sup>3</sup>. ACGIH-1985 preface states: "The TLC-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations." See section V for specific fume constituents, which may modify this TLV.

#### Common Entry Is by Inhalation.

**Effects of Overexposure:** Inhalation of welding fumes and gases can be dangerous to your health. Short-term (acute) overexposure to welding fumes may result in discomfort such as dizziness, nausea, or dryness or irritation of nose, throat, or eyes. Although the inhalation of Tungsten has the potential for causing transient or permanent lung damage, it is generally considered to exhibit a low degree of toxicity.

Thorium is a naturally occurring radioactive element. Its primary hazard lies in inhalation of dust/fumes. Normal handling of these electrodes is not expected to result in any significant radiation exposure. Considerable experience in refining and use of thorium has not revealed any adverse effects from industrial exposure. Long-term (chronic) over-exposure to welding fumes can lead to siderosis (iron deposits in lung) and is believed to affect pulmonary function.

Arc Rays can injure eyes and burn skin.

Electric shock can kill.

See Section VIII.

**Emergency and First Aid Procedures:** Call for medical assistance. Use first aid procedures recommended by the American Red Cross. If breathing is difficult – give oxygen. If not breathing-use CPR (cardiopulmonary resuscitation).

**Carcinogenicity:** Thorium dioxide has been identified as a carcinogen by NTP, IARC and others. Evidence for its ability to cause cancer has come solely from its internal medical use.

#### SECTION VII - HANDLING AND STORAGE

**Work Practices and Hygiene Practices:** After the end of work shift, hands and other exposed skin should be thoroughly washed. Do not eat or drink during use of these products. Use ventilation and other engineering controls to minimize potential exposure to fumes during welding operations or to dusts if tips of electrodes are ground. Follow good house-keeping practices to ensure powders or dusts from grinding operations do not accumulate, which can be highly flammable and can pose special health hazards if from thorium-containing electrodes. Tungsten-Thorium Oxide alloys are generally safe to handle during use and almost all normal conditions and environments. **Special precautions must be taken during the grinding or machining of tips of electrodes that contain Thorium Oxide to avoid the generation and subsequent inhalation of dusts from these operations. Any dusts generated during these operations may be considered as "Source Material", as defined by the Nuclear Regulatory Commission, and therefore be subject to the requirements of 10 CFR, Parts 20 and 40.** Routine wet mopping or vacuuming with an explosion-proof vacuum, fitted with a HEPA filter may be considered to reduce accumulation of dusts.

**Storage and Handling Practices:** All employees who handle these materials should be trained to handle it safely. Avoid breathing dusts or powders generated during grinding of electrode tips. Open packages and containers of these products slowly, on a stable surface. Packages and containers of these products must be properly labeled.

## SECTION VIII – EXPOSURE CONTROLS / PERSONAL PROTECTION

Read and understand the manufacturer's instructions and precautionary label on this product. See American Standard Z49.1 Safety in Welding and Cutting, published by the AMERICAN WELDING SOCIETY, 550 N.W. Lejeune Road, Miami, Florida 33126 and OSHA Publication 2206 (29 CFR 1910), U.S. Government Printing Office, Washington D.C. 20402 for more details on the following topics.

**Ventilation:** Use plenty of ventilation and/or local exhaust at the arc, to keep the fumes and gases below the threshold limit value within the worker's breathing zone and the general work area. Welders should be advised to keep their head out of the fumes.

**Respiratory Protection:** Use respirable fume respirator or air supplied respirator when welding in a confined space or general work area where local exhaust and/or ventilation does not keep exposure below the threshold limit value.

**Eye Protection:** Wear a helmet or face shield with a filter lens shade number 12-14 or darker. Shield other workers by providing screens and flash goggles.

**Protective Clothing:** Wear approved head, hand and body protection, which help to prevent injury from radiation, sparks and electrical shock. See ANSI Z-49.1. This would include wearing welder's gloves and a protective face shield and may include arm protectors, apron, hats, shoulder protection, as well as dark substantial clothing. Welders should be trained not to allow electrically live parts to contract the skin or wet clothing and gloves. The welders should insulate themselves from the work and ground.

**Waste Disposal Method:** Discard any product, residue, disposal container, or liner in an environmentally acceptable manner approved by Federal, State and Local regulations.

## SECTION IX – HAZARD IDENTIFICATION

Below are the HMIS ratings for all tungsten electrodes listed in SECTION II.

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	0
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		B

## APENDIX: DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these, which are commonly used, include the following:

**CAS #:** This is the Chemical Abstract Service Number, which uniquely identifies each constituent.

### EXPOSURE LIMITS IN AIR:

**ACGIH** - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

**TLV** - Threshold Limit Value - an airborne concentration of a substance, which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (TWA), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (C). Skin absorption effects must also be considered.

**OSHA** - US Occupational Safety and Health Administration.

**PEL** - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL, which was vacated by Court Order. **IDLH** - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an



entry of NE is made for reference.

#### HAZARD RATINGS:

**HAZARDOUS MATERIALS IDENTIFICATION SYSTEM:** Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]). Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

**NATIONAL FIRE PROTECTION ASSOCIATION:** Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure causes death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

#### FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

#### TOXICOLOGICAL INFORMATION:

**Human and Animal Toxicology:** Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD<sub>50</sub>** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC<sub>50</sub>** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m<sup>3</sup>** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDL<sub>o</sub>**, the lowest dose to cause a symptom and **TCL<sub>o</sub>** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TC<sub>o</sub>**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information:** **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. **Ecological Information:** **EC** is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in life forms which consume contaminated plant or animal matter. Coefficient of Oil/Water Distribution is represented by **log K<sub>ow</sub>** or **logs K<sub>oc</sub>** and is used to assess a substance's behavior in the environment.

#### REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **U.S.:** **EPA** is the U.S. Environmental Protection Agency. **DOT** is the U.S. Department of Transportation. **SARA** is the Superfund Amendments and Reauthorization Act. **TSCA** is the U.S. Toxic Substance Control Act. **CERCLA (or Superfund)** refers to the Comprehensive Environmental Response, Compensation, and Liability Act. Labeling is per the American National Standards Institute (**ANSI Z129.1**). **CANADA:** **CEPA** is the Canadian Environmental Protection Act. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **TC** is Transport Canada. **DSL/NDSL** are the Canadian Domestic/Non-Domestic Substances Lists. **The CPR is the Canadian Product Regulations.** This section also includes information on the precautionary warnings, which appear, on the materials package label.

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XL Technologies, Inc. believes that the information contained in this (MSDS) Material Safety Data Sheet is accurate. However, XL Technologies, Inc. does not express or implies any warranty with respect to this information.