

# MATERIAL SAFETY DATA SHEET / SAFETY DATA SHEET

## SECTION I – PRODUCT AND COMPANY IDENTIFICATION

|                           |                                                                      |                                 |                                                               |
|---------------------------|----------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------|
| Product Description       | CELL, LiMN02, U2550                                                  |                                 |                                                               |
| Product Identification    | 220473, U10017, U10018, U10019, U10020, U10025, S00207, S00198       |                                 |                                                               |
| Manufacturer Name/Address | Ultralife Corporation<br>2000 Technology Parkway<br>Newark, NY 14513 | 24 Hour<br>Emergency<br>Contact | ChemTrec<br>800-424-9300 (US)<br>703-527-3887 (International) |
| Technical Contact         | 800-332-5000                                                         | Issue Date                      | 02 MAY 01                                                     |
| Prepared By               | John Diggory                                                         | Revision Date:                  | 22 OCT 10                                                     |

## Section II - HAZARD IDENTIFICATION

|                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hazard Classification                                                                                                                                          | This Ultralife battery product meets the definition of an article. Under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS), "Articles" as defined in the Hazard Communication Standard (29 CFR 1910.1200) of the Occupational Safety and Health Administration of the United States of America, or by similar definition, are outside the scope of the system. [Rev. 2 (2007) Part 1.3.2.1.1] |
| Hazard/Caution Statements                                                                                                                                      | <ul style="list-style-type: none"> <li>Do not open or disassemble.</li> <li>Do not expose to fire or open flame.</li> <li>Do not mix with batteries of varying sizes, chemistries or types.</li> <li>Do not puncture, deform, incinerate or heat above 85°C (194 °F).</li> </ul>                                                                                                                                             |
| The materials contained in this product may only represent a hazard if the integrity of the cell or battery is compromised; physically or electrically abused. |                                                                                                                                                                                                                                                                                                                                                                                                                              |

## SECTION III - COMPOSITION - INGREDIENTS/IDENTITY INFORMATION

Under normal use conditions, cells and batteries do not emit hazardous or regulated substances.

| Component                                                                                           | CAS Number | EINECS Number | % by Wt. |
|-----------------------------------------------------------------------------------------------------|------------|---------------|----------|
| Manganese Dioxide, MnO <sub>2</sub>                                                                 | 1313-13-9  | 215-202-6     | 40-45    |
| Lithium Metal, Li                                                                                   | 7439-93-2  | 231-102-5     | 3-4      |
| Propylene Carbonate, C <sub>4</sub> H <sub>6</sub> O <sub>3</sub>                                   | 108-32-7   | 203-572-1     | 4-5      |
| Ethylene Glycol Dimethyl Ether (1,2-Dimethoxyethane), C <sub>4</sub> H <sub>10</sub> O <sub>2</sub> | 110-71-4   | 203-794-9     | 3-4      |
| Tetrahydrofuran, C <sub>4</sub> H <sub>8</sub> O                                                    | 109-99-9   | 203-726-8     | 5-9      |
| Lithium Perchlorate, LiClO <sub>4</sub>                                                             | 7791-03-9  | 232-237-2     | 1        |

Depending on product configuration, components used to assemble battery packs (e.g. housings, electronic components and wiring) may contain additional hazardous materials, such as lead solder.

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**SECTION IV - FIRST AID MEASURES**

|              |                                                                                                                                                                                                                                                                            |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Inhalation   | <ul style="list-style-type: none"><li>• Avoid inhaling any vented gases.</li><li>• Remove to fresh air immediately.</li><li>• If breathing is difficult, seek emergency medical attention.</li></ul>                                                                       |
| Ingestion    | Consult a physician or local poison control center immediately                                                                                                                                                                                                             |
| Skin Contact | <ul style="list-style-type: none"><li>• Exposure to materials from a ruptured or otherwise damaged cell or battery may cause skin irritation.</li><li>• Flush immediately with water and wash affected area with soap and water.</li></ul>                                 |
| Eye Contact  | <ul style="list-style-type: none"><li>• Exposure to materials from a ruptured or otherwise damaged cell or battery may cause eye irritation.</li><li>• Flush immediately with copious amounts of water for at least 15 minutes; consult a physician immediately.</li></ul> |

**SECTION V - FIRE FIGHTING MEASURES**

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Extinguishing Media               | <ul style="list-style-type: none"><li>• Copious amounts of cold water or water-based foam may be used to cool burning cells or batteries. Do not use warm or hot water.</li><li>• A carbon dioxide (CO<sub>2</sub>) extinguisher is also effective.</li><li>• For fires involving exposed, raw lithium metal (characterized by deep red flames), use only metal (Class D) fire extinguishers.</li></ul> |
| Special Fire Fighting Procedures  | <ul style="list-style-type: none"><li>• Use a positive pressure self-contained breathing apparatus (SCBA) if cells or batteries are involved in a fire.</li><li>• Full fire fighting protective clothing is necessary.</li><li>• During water application, caution is advised as burning pieces of flammable particles may be ejected from the fire.</li></ul>                                          |
| Unusual Fire and Explosion Hazard | Cells or batteries that are damaged, opened or exposed to excessive heat/fire may flame or leak potentially hazardous organic vapors.                                                                                                                                                                                                                                                                   |

**SECTION VI - ACCIDENTAL RELEASE MEASURES**

- In the event a cell or battery is crushed; releasing its contents, rubber gloves must be used to handle all battery components.
- Avoid inhalation of any vapors that may be emitted.
- Damaged batteries that are not hot or burning should be placed in a sealed plastic bag or container.

**SECTION VII - HANDLING AND STORAGE**

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Precautions for Safe Handling                   | <ul style="list-style-type: none"> <li>Batteries are not designed to be recharged. Charging a primary cell or battery may result in electrolyte leakage and/or cause the cell or battery to flame.</li> <li>Never disassemble a battery or bypass any safety device.</li> <li>More than a momentary short circuit will generally reduce the battery service life. Batteries with fuses will no longer be functional after being shorted.</li> <li>Extended short-circuiting creates high temperatures in the cell.</li> <li>High temperatures can cause burns in skin or cause the cell to flame.</li> <li>Avoid reversing battery polarity within the battery assembly. To do so may cause cell to flame or to leak.</li> </ul> <p><b>Note: Contains a perchlorate material – special handling may apply.</b><br/>See <a href="http://www.dtsc.ca.gov/hazardouswaste">www.dtsc.ca.gov/hazardouswaste</a></p> |
| Conditions for Safe Storage and Incompatibility | <ul style="list-style-type: none"> <li>Batteries should be separated from other materials and stored in a non-combustible, well ventilated structure with sufficient clearance between walls and battery stacks. Do not place batteries near heating equipment, nor expose to direct sunlight for long periods.</li> <li>Do not store batteries above 85°C (194°F) or below 20°C (-4°F). Store batteries in a cool (below 25°C (77°F)), dry area that is subject to little temperature change. Elevated temperatures can result in reduced battery service life. Battery exposure to temperatures in excess of 130°C (266°F) will result in the battery venting flammable liquid and gases.</li> <li>Do not store batteries in a manner that allows terminals to short circuit.</li> </ul>                                                                                                                    |

**SECTION VIII: EXPOSURE CONTROLS / PERSONAL PROTECTION**

|                                         |                                                                                                                                                                                                                                                                         |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Engineering Controls and Work Practices | <ul style="list-style-type: none"> <li>Under conditions of normal use, batteries do not emit hazardous or regulated substances.</li> <li>No engineering controls are required for handling batteries that have not been damaged.</li> </ul>                             |
| Personal Protective Equipment           | <ul style="list-style-type: none"> <li>Personal protective equipment for damaged batteries should include chemical resistant gloves and safety glasses.</li> <li>In the event of a fire, SCBA should be worn along with thermally protective outer garments.</li> </ul> |

**SECTION IX. PHYSICAL AND CHEMICAL PROPERTIES**

|                  |                          |                           |                |
|------------------|--------------------------|---------------------------|----------------|
| Appearance       | Cylindrical cell or pack | UEL/LEL                   | Not Applicable |
| Odor             | None                     | Vapor Pressure            | Not Applicable |
| Odor Threshold   | Not Applicable           | Vapor Density             | Not Applicable |
| pH               | Not Applicable           | Relative Density          | Not Available  |
| Melting Point    | Not Available            | Solubility                | Not Applicable |
| Boiling Point    | Not Available            | Partition Coefficient     | Not Applicable |
| Flash Point      | Not Applicable           | Auto-ignition Temperature | Not Available  |
| Evaporation Rate | Not Applicable           | Decomposition Temperature | Not Available  |
| Flammability     | Not Applicable           | Viscosity                 | Not Applicable |

**SECTION X. STABILITY AND REACTIVITY**

|                         |                                                                       |                          |                |
|-------------------------|-----------------------------------------------------------------------|--------------------------|----------------|
| Stability               | Stable                                                                | Hazardous Polymerization | Will Not Occur |
| Conditions to Avoid     | It is not recommended that this product be stored above 85°C (194°F). |                          |                |
| Hazardous Decomposition | Carbon Monoxide (CO), Hydrogen Chloride (HCl) and other VOC's         |                          |                |

**SECTION XI – TOXICOLOGICAL INFORMATION**

- No toxicological impacts are expected under normal use conditions.
- The electrolytes contained in this cell or battery can irritate eyes with any contact.
- Prolonged contact of electrolytes with lung tissue, skin or mucous membranes may cause irritation.
- The electrolytes contained in this cell or battery contain Ethylene Glycol Dimethyl Ether (EGDME). According to the manufacturer of the electrolyte, teratogenic effects have been demonstrated to occur causing birth defects and reversible testicular and sperm damage in compounds like EGDME and other glycol ethers. There may be particular risk for women of child bearing potential regarding this compound. Exposure to vapors or mists should be avoided, especially for women of childbearing potential.
- The electrolytes contained in this cell or battery contain Tetrahydrofuran (THF). According to the manufacturer of the electrolyte, this compound has been proven to show carcinogenic activity in the liver and kidneys of laboratory animals.
- Detailed information regarding sensitization, carcinogenicity, mutagenicity or reproductive toxicity related to internal cell or battery components has not been included in this document.

**Carcinogen References**

National Toxicology Program (NTP): Yes (THF)

IARC Monographs: No

OSHA: No

**SECTION XII – ECOLOGICAL INFORMATION**

- No ecological impacts expected under normal use conditions.
- Detailed information regarding the ecological impact of internal cell or battery components has not been included in this document.

**SECTION XIII. DISPOSAL CONSIDERATIONS**

Do not dispose in fire. Battery disposal regulations vary on national, state/provincial and local bases.

**Disposal must be conducted in accordance with the applicable regulations.**

**These batteries contain recyclable materials and recycling is encouraged over disposal.**

**SECTION XIV. TRANSPORTATION INFORMATION**

Ultralife's lithium metal primary cells and batteries and lithium-ion cells and batteries are classified and regulated as Class 9 dangerous goods (also known as "hazardous materials" in the United States) by the International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), International Maritime Organization (IMO) and many government agencies such as the U.S. Department of Transportation (DOT). These organizations and agencies publish regulations that contain detailed packaging, marking, labeling, documentation, and training requirements that must be followed when offering (shipping) Ultralife's cells and batteries for transportation. **However, small cells and batteries are not subject to certain provisions of the regulations (e.g. Class 9 labeling and UN specification packaging) if they meet specific requirements.** The regulations are based on the UN Recommendations on the Transport of Dangerous Goods Model Regulations and the UN Manual of Tests and Criteria. **These regulations also apply to shipments of cells and batteries that are packed with or contained in equipment.** Failure to comply with these regulations can result in substantial civil or criminal penalties.

The dangerous goods regulations require that each cell and battery design be subject to tests contained in Section 38.3 of the UN Manual of Tests and Criteria prior to being offered for transport..

**Approved, production level cells and batteries manufactured and assembled by Ultralife have been tested to Section 38.3 of the UN Manual of Tests and Criteria and passed T1 through T8.**

Batteries or battery packs constructed by other parties using Ultralife's cells must be subjected to the tests contained in Section 38.3 of the UN Manual of Tests and Criteria.

**Important Note Regarding Prototype Cells and Batteries**

As a member of PRBA (The Rechargeable Battery Association) Ultralife is permitted to ship prototype cells and batteries as Class 9 hazardous materials/dangerous goods in accordance with the requirements contained in Approval #CA2003030003; provided by the US DOT Research and Special Programs Administration. Recipients of these shipments are prohibited from reshipping unless they are also PRBA members.

For more detailed information, refer to the Transportation Regulations Page on Ultralife's website.

| SECTION XIV. TRANSPORTATION INFORMATION (continued)                                                                                                                                                 |   |                                                          |    |             |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------|----|-------------|---|
| Air, Sea and Surface Classification                                                                                                                                                                 |   | UN 3090, Lithium metal batteries                         |    |             |   |
|                                                                                                                                                                                                     |   | UN 3091, Lithium metal batteries, contained in equipment |    |             |   |
|                                                                                                                                                                                                     |   | UN 3091, Lithium metal batteries, packed with equipment  |    |             |   |
| These cells and batteries must be identified as above on the Bill of Lading (or other shipping documentation) and properly packaged with their terminals protected from short circuit.              |   |                                                          |    |             |   |
| Air shipments of lithium metal cells and batteries must be packed and marked according to IATA/ICAO Packing Instruction 968 (batteries only); 969 (with equipment) or 970 (contained in equipment). |   |                                                          |    |             |   |
| Sea shipments of lithium metal cells and batteries must be packed and marked according to IMDG Packing Instruction P903.                                                                            |   |                                                          |    |             |   |
| Hazard Class                                                                                                                                                                                        | 9 | Packing Group                                            | II | Tunnel Code | E |
| Stowage Location                                                                                                                                                                                    | A | Marine Pollutant                                         | No |             |   |

| SECTION XV. REGULATORY INFORMATION |                                                                                                                                                                      |                |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| US                                 | Hazard Communication Standard (29 CFR 1910.1200)                                                                                                                     | Article        |
|                                    | CERCLA SECTION 304 Hazardous Substances                                                                                                                              | NA             |
|                                    | EPCRA SECTION 302 Extremely Hazardous Substance                                                                                                                      | NA             |
|                                    | EPCRA SECTION 313 Toxic Release Inventory                                                                                                                            | Yes            |
|                                    | EPCRA SECTION 312                                                                                                                                                    | NA             |
|                                    | Components Listed on US Toxic Substances Control Act (TSCA) Inventory                                                                                                | Yes            |
| EU                                 | Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)                                                                                         | Article        |
|                                    | European RoHS Directive 2002/95/EC                                                                                                                                   | Not Applicable |
|                                    | European WEEE Directive 2002/96/EC<br>Note: Applies to cells and batteries incorporated into electrical and electronic equipment, when that equipment becomes waste. | See Note       |

| SECTION XVI. OTHER INFORMATION                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------|
| If returning product to any division of Ultralife, consult the relevant regulations regarding handling, packaging, labeling and transportation. |

### Disclaimer

The information contained herein is furnished without warranty of any kind. Users should consider this data only as a supplement to other information gathered by them and must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers.

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