

# Seward Marine Center (SMC) & R/V *Sikuliaq*

## Lithium Battery Handling, Storage, and Disposal Policy

(Shoreside Operations Only)

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### 1. Purpose

This policy establishes requirements for the safe handling, storage, charging, staging, collection, and disposal of lithium-based batteries used at the Seward Marine Center (SMC) and aboard the R/V *Sikuliaq* while the vessel is in port at SMC.

Lithium batteries present unique hazards, including fire, gas release, and delayed failure. Shoreside operations concentrate batteries during staging, charging, and disposal activities, increasing risk if not managed consistently. This policy is intended to reduce injury, fire risk, environmental hazards, and operational uncertainty by defining clear expectations and responsibilities.

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### 2. Scope & Definitions

#### 2.1 Scope

This policy applies to the handling, storage, charging, staging, disposal, and shoreside movement of lithium-based batteries used at SMC facilities and aboard the R/V *Sikuliaq* while in port at SMC.

Covered battery types include:

- Lithium-ion (Li-ion) batteries
- Lithium polymer (LiPo) batteries
- Lithium primary (non-rechargeable) batteries (including Lithium thionyl chloride, lithium manganese dioxide, and others)

This policy applies to:

- Standalone batteries
- Equipment and instruments containing lithium batteries
- Pre-cruise and post-cruise gear while staged, stored, or handled shoreside

This policy does **not** cover:

- At-sea vessel operations
  - Detailed hazardous materials shipping requirements (addressed through EHS and pre-cruise planning processes)
  - Large fixed battery banks or UPS systems, which may require additional controls
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## 2.2 Definitions (Battery Types)

- **Rechargeable (Secondary) Lithium Batteries:** These batteries rely on the movement of lithium ions between electrodes and do not contain metallic lithium. The primary safety risk is thermal runaway triggered by internal shorts, overcharging, or physical damage.
  - **Lithium-Ion (Li-ion):** These use a liquid electrolyte contained within a rigid metal casing and are commonly used in electronics, power tools, and instrumentation.
  - **Lithium Polymer (LiPo):** These are a variant of Li-ion batteries, using a gelled electrolyte in a soft-sided pouch, making them more susceptible to mechanical puncture and swelling.
- **Primary (Non-rechargeable) Lithium Batteries:** Unlike the types above, these contain metallic lithium, which is water-reactive and presents different fire-suppression challenges. These are often used for long-term, low-drain scientific instrumentation. The most common chemistries are below, but others may be preferred in specific applications.
  - **Lithium Thionyl Chloride (Li-SOCl<sub>2</sub>):** High energy density, can vent toxic gases (sulfur dioxide and hydrogen chloride).
  - **Lithium Manganese Dioxide (LiMnO<sub>2</sub>):** More stable than LiSOCl<sub>2</sub> but still contain metallic lithium and pose a significant metal-fire risk if compromised.

## 2.3 Regulatory Reference (Informational)

Common UN identifiers include:

- UN 3090 / UN 3091 – Lithium metal batteries (including Li-SOCl<sub>2</sub>)
- UN 3480 / UN 3481 – Lithium-ion batteries

(UN numbers are provided for reference and coordination only; shipping is coordinated through EHS and pre-cruise planning.)

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## 3. Roles and Responsibilities

### **3.1 Local Facility Lead (SMC)**

**Jennifer Elhard**, [jaelhard@alaska.edu](mailto:jaelhard@alaska.edu), +1 907-224-5261  
Facility Manager, Seward Marine Center

Acts as the local point of contact for:

- Battery storage locations
  - Disposal coordination
  - Incident escalation and liaison with Environmental Health & Safety (EHS)
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### **3.2 SMC Supervisors / Leads**

- Ensure staff follow this policy
  - Identify battery collection locations in their work areas
  - Ensure damaged or suspect batteries are reported immediately
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### **3.3 Employees / Users**

- Handle and store batteries according to this policy
  - Do not dispose of batteries in regular trash
  - Report damaged, overheating, or water-exposed batteries immediately
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### **3.4 Environmental Health & Safety (EHS)**

- Provides technical guidance, disposal pathways, and emergency response support
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## **4. General Safety Requirements**

### **4.1 Handling**

- Prevent short circuits at all times; keep battery terminals from contacting metal or other conductive surfaces.
- Remove conductive jewelry when handling bulk batteries or open packs to prevent accidental short-circuits. Use non-conductive tools whenever possible.
- Do not crush, puncture, drop, disassemble, or modify batteries.
- Remove batteries from service immediately if they show:

- Swelling or bulging
  - Cracks, corrosion, or leaks
  - Excessive heat
  - Hissing, smoke, or unusual odor
  - When opening pressure housings with lithium batteries, treat it as a potential pressure hazard. If a battery has failed internally, the housing may be pressurized with toxic or flammable gas. Open slowly in a well-ventilated area and listen for hissing.
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## 4.2 Storage (Shoreside)

### 4.2.1 General Storage Requirements

- Primary and secondary lithium batteries must be stored in **cool, dry locations** away from ignition sources and combustible materials.
- Batteries must be stored in **labs, shops, or designated workspaces** when quantities exceed incidental use.
- Office spaces are limited to incidental batteries associated with personal or issued devices only.

### 4.2.2 Approved Storage Methods

Approved storage methods include:

- Original manufacturer packaging
- **Specialized battery trays** that physically separate terminals
- Rigid, non-conductive containers that prevent movement and terminal contact and are **not sealed or airtight**

Tray storage is an approved and preferred method where it allows visual inspection and terminal separation.

### 4.2.3 Prohibition on Sealed Containers

- Lithium batteries must **not** be stored in sealed or airtight containers.
- This applies to both primary and rechargeable batteries.
- The intent is to prevent pressure buildup or hazardous gas accumulation in the event of battery venting or failure.
- If a container is used for damaged batteries (Section 6), it must be filled with an inert suppressant (sand or Vermiculite) and left unsealed to allow for pressure relief.

### 4.2.4 Protection From Water and Flooding

- Batteries must not be stored:
  - On floors
  - Under sinks

- Near drains, eyewash stations, hose connections, or washdown areas
  - In locations with known leak or flooding history
- Where water exposure is possible, batteries must be stored on elevated shelving and in open or ventilated containers. Metal or wire shelving is preferred.
- When moving batteries from cold environments to warm labs, keep them sealed in equipment or in a sealed bag until they reach room temperature to prevent internal condensation.

#### 4.2.5 Water-Exposed Batteries

- **Any lithium battery exposed to water is considered damaged**, regardless of visible condition.
  - Do not attempt to dry, recharge, reuse, or return water-exposed batteries to storage.
  - Manage per Section 6 and notify the SMC contact immediately.
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### 4.3 Terminal Protection & Packaging

- Battery terminals must be protected whenever batteries are stored outside equipment, staged, or handled in bulk.
- Approved methods include:
  - Battery trays
  - Clear tape over terminals (preferred for disposal)
  - Individual plastic bags (not sealed)

Electrical or flame-resistant tape may be used for operational storage if terminals are fully insulated and the battery is not sealed.

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### 4.4 Charging

- Use manufacturer-approved chargers only.
  - Charge batteries on non-combustible surfaces.
  - Do not leave batteries charging unattended in unsecured areas.
  - Remove batteries from service immediately if overheating or deformation occurs during charging.
  - If a battery begins to smoke or hiss, safely disconnect power if possible and move the battery to an outdoor, non-flammable area.
  - Do not attempt to recharge a cell below 3.0V (attempting to “revive” a deeply discharged cell can lead to internal short-circuiting and thermal runaway during the charge cycle).
  - For batteries in long-term storage, perform a maintenance charge every 3-6 months to roughly 50% capacity (3.8V per cell)
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### 4.5 Workspace vs Office Designations

### **Workspaces (labs, shops, staging areas):**

- Bulk storage, tray systems, disposal staging, and temporary project storage are permitted.

### **Office spaces:**

- Limited to incidental batteries in personal or issued devices.
- Bulk storage, staging, charging setups, or damaged batteries are not permitted.

When in doubt, batteries should be moved to a workspace and the SMC contact consulted.

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## **4.6 Fire Suppression**

- Li-ion/LiPo: Use water to cool the cells and prevent thermal runaway from spreading to adjacent batteries. ABC extinguishers can knock out surface flames but will not stop internal cell heating.
- Primary lithium: These batteries will release toxic gases; do not attempt to extinguish beyond the incipient stage. Use Class D extinguisher (Copper-based / Lith-X). Water may be used only to keep battery cool or prevent thermal runaway from spreading to adjacent cells. Do not use water if the casing is compromised.

## **5. Battery Collection & Accumulation (Undamaged Batteries)**

- Each work area generating batteries must maintain a designated “**Universal Waste – Batteries**” container.
- Containers must be rigid, closed, labeled, and dated.
- Battery accumulation may not exceed **one (1) year**.

Before placing a battery in a collection container:

- Confirm the battery is undamaged
  - Tape terminals using clear tape
  - Bag when practical
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## **6. Damaged or Suspect Batteries**

### **6.1 Definition**

A battery is considered damaged or suspect if it shows:

- Swelling, cracks, corrosion, or leaks

- Excessive heat
- Hissing, venting, smoke, or odor
- Physical damage
- Any water exposure

## 6.2 Immediate Actions

- Do **not** place damaged batteries in standard battery trays or collection containers.
- Isolate the battery away from people and combustible materials if safe to do so.
- If actively venting or overheating, activate emergency response procedures and evacuate the area.
- In the event of a damaged Li-SOCl<sub>2</sub> battery - a strong odor indicates toxic off-gassing. Personnel must evacuate immediately; standard particulate masks do not provide protection against these vapors.

## 6.3 Temporary Storage

- Store damaged batteries in a designated isolation area using a non-sealed, non-combustible container.
- Clearly label **DAMAGED – DO NOT USE**.
- Do not attempt repair, taping, bagging, drying, or recharging.

## 6.4 Notification

- Notify **Jennifer Elhard** immediately.
  - Disposal and removal will be coordinated with EHS.
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# 7. Training & Awareness

Training is required for personnel who handle, store, stage, or dispose of lithium batteries.

Training must address:

- Battery types used at SMC
- Hazards and failure modes
- Storage and terminal protection requirements
- Workspace vs office expectations
- Damaged battery identification and response

Training may be delivered through briefings, SOP review, onboarding, or pre-cruise meetings and documented informally unless otherwise required.

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## 8. Pre-Cruise, Post-Cruise, and Logistics Coordination

- Lithium batteries must be identified during pre-cruise planning.
  - Returned gear must be inspected post-cruise for damage or water exposure.
  - Batteries staged at SMC must follow storage and workspace requirements.
  - Shipping lithium batteries offsite must be coordinated through SMC administration and EHS.
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## 9. Leaks, Spills, or Battery Residue

- Treat leaking batteries or residue as potentially hazardous.
  - Do not attempt cleanup beyond basic containment.
  - Notify the SMC contact for EHS coordination.
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## 10. Prohibited Practices

- Do not place lithium batteries in regular trash.
  - Do not store damaged batteries in offices or standard collection containers.
  - Do not stockpile batteries beyond accumulation limits.
  - Do not independently ship lithium batteries offsite.
  - Do not attempt to jump-start a lithium battery below 3.0V, it must be retired.
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## 11. Questions or Assistance

**Primary Contact:**

Jennifer Elhard  
Seward Marine Center

**Additional Assistance:**

University of Alaska Environmental Health & Safety (EHS)

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# SUPPLEMENTAL SOP

# Lithium Battery Handling & Disposal

## SMC & R/V *Sikuliaq* (While in Port)

### A. Identify Battery Status

If damaged or suspect → isolate and notify SMC contact.

If undamaged → proceed with normal handling.

### B. Normal Handling & Storage

Prevent short circuits, store in approved workspaces, use trays or approved containers.

### C. Disposal (Undamaged)

Tape terminals (clear tape), bag when practical, place in labeled collection container.

### D. Damaged Batteries

- Isolate: Move to a non-combustible area (Metal bin/sand bucket/concrete floor/outside)
- Contain: Place in a bucket of dry sand if available
- Ventilate: Ensure the area has high airflow to dissipate toxic vapors
- If a battery is inside a housing, do not fully open the housing
- Do not tape or bag
- Notify SMC contact immediately.

### E. Charging

Approved chargers only, non-combustible surfaces, no unattended charging.

### F. Shipping

Coordinate through SMC and EHS only.