



# NAVAL SAFETY COMMAND SAFETY AWARENESS DISPATCH



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## ***Lithium-Ion Battery Mishaps II***

In this information era we've got a growing array of cordless electronic devices at our disposal: cell phones, drones, power tools, electric bikes/scooters and more, all of which rely on a reliable power source. Enter the lithium-ion (LI) battery. Advancements in battery technology have improved device run-time and recharge rates and they are *generally* safe, if (*repeat, "IF"*) we follow the safety guidelines. If you have any doubts about those guidelines, here are some examples that may make you a believer.



- **Plug-in and Go.** A Sailor plugged his portable power pack into his berthing rack light USB receptacle before standing duty and left it unattended to charge (*he was probably hoping to relax after duty with some extra juice for his phone or laptop... Alas, this was not meant to be*). In less than an hour the pack overheated, erupting in smoke and fire. Another Sailor saw a green and blue flame coming from the berthing rack and grabbed a blanket to smother it. A second responder arrived with a portable CO2 fire extinguisher and put the flames out. The first responder called away the fire and the flying squad arrived at the scene, evacuated personnel from the space and identified the burnt battery pack. They submerged it in a bucket of water and placed it on a weather deck while the crew completed the damage control procedures to ensure the space was safe for re-entry. —*The crew stopped this incident from becoming much worse by acting quickly and appropriately to the emergency. This could have been avoided completely, though, if someone had been there to keep an eye on the battery pack. It's always a good idea to monitor what you're charging.*

- **Battery Bureaucracy.** Marines embarked on an amphibious assault ship needed to charge the LI batteries for the Joint Precision Air Drop System (JPADS) they'd be using the next day, so at 2200 they brought the batteries from their storage QUADCON in the vehicle storage area to the troop berthing space and plugged them into a rack light outlet. Three hours later the Marines in the living space woke to a burning chemical smell and reported experiencing eye irritation and chest pains. One of the Marines checked the batteries and found one was overheating and smoking, so he wrapped it in a berthing rack sheet and placed it in a paper bag (*Ooh! Let's wrap the unstable and overheating battery in not one, but two highly flammable objects*). He then took the battery to an adjacent berthing to ask for guidance from a Marine who is more knowledgeable with the JPADS (*now exposing more personnel to the venting fumes*). Both Marines then took the smoldering package to find the embarked HAZMAT representative to seek his guidance (*quite the game of "hot potato" going on*). The HAZMAT rep advised the Marines to take the battery to the ship's HAZWASTE to request disposal (*now it's a joint service "hot potato" game*). Once at HAZWASTE, the Sailor manning the office couldn't find a result for the battery after a parts number search and said he couldn't accept it (*"hot potato" game over*) and advised the Marines to jettison the battery over the side of the ship, which they did (*"Sploosh." It's the ocean's problem now*). A thorough investigation the following day identified several errors, starting with charging the batteries in the berthing area, which NAVSEA policy advises against due to the lack of ventilation. In the event of thermal runaway, the policy says the area should be evacuated and EOD contacted if possible. Lastly, policy states LI batteries shall be turned in to the Hazardous Material Minimization Center for disposal, not "jettisoned." The investigator noted embarked personnel did request proper storage/safe charging locations before embarking, but different ship divisions kept referring them to other places, leading to the Marines giving up and simply charging in berthing. —*Supervisors, do some of that supervising. The ship crew's lack of planning and understanding resulted in failing to provide necessary resources. The Marines' lack of training and understanding of LI battery procedures led them to accept the ship's lack of support and take improper actions.*

- **Burning Out the Battery.** A worker drained the charge of a LI battery power tool via constant use and immediately placed it on the charger. Once the charging cycle was complete, the worker immediately put the battery back into use. The continuous use-recharge-use of the battery caused it to remain in a hot/warm status. When the work was done, the tool was put in a tool bag which was transported with other items via a

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crane. While in the air (roughly 5 feet off the ground) the tool bag burst into flames with a 6-foot flame shooting out of the bag and several loud gunshot-like bangs. The fire team responded, extinguished the flames, and properly disposed of the battery. The constant hot/warm status triggered the battery to fall into a rapid discharge state. While in the bag (and lacking ventilation) the already warm battery progressed to thermal runaway. — *Using only one battery continuously for long durations doesn't allow for cooldown between cycles. It's less expensive to buy an extra battery to swap out than to literally burn one out through overuse. If you have to use one like that, remember this situation. Don't stow the battery until it's cool.*



- **Dreaming Smokey Dreams.** A Sailor in the barracks plugged in his phone to charge overnight and stuck it under his pillow as he went to sleep (*you know, so the cell phone fairy might pay a visit*). The cell phone became warmer as it charged and the heat was unable to dissipate, ultimately leading to thermal runaway and catching fire. The Sailor awoke from the heat, yelling “Fire!” as the smoke alarm went off. His roommate tried to put the fire out with a sandal (*okay, so basically fanning the flame*) which didn't work (*no surprise there*). The Sailor then tried beating the flames with a pillow (*this also didn't work, again no surprise there*) and finally threw the phone onto the floor where it burnt out and smoldered. The fire department arrived shortly after and declared the scene safe. — *One of the major factors that lead to LI battery fires is overheating. Insulating your phone with a pillow is definitely a good way to achieve overheating. Don't charge your phone or other devices under something or on top of stuff that can burn (like your bed and blankets). Cuddling your charging phone like a teddy bear while you sleep seems like a bad idea.*

- **Duty Van Smoke Out.** A Sailor returned from an off-site training evolution, parked the command duty van and departed for the day. About an hour later, security video footage showed gray smoke coming from the van lasting approximately 30 minutes (*hmm, maybe should have double checked what was in the back*). An investigation determined that a fire started on a metal shelf in the cargo area, where a high-capacity LI battery was improperly stored. Safety and warning instructions for the battery prohibit storing it in any area, specifically vehicles or buildings, where the temperature may exceed 100° F. It was estimated that the van's interior temperature had reached 127°F (*definitely outside the limit*). The improperly stored battery caused a fire that charred components of the battery and adjacent combustible material, costing over \$55,000 in repairs. — *Improper storage is one of most common causes of LI battery malfunctions (and fires). Keep track of what batteries you have and where they are. Hot places next to other stuff that can catch fire is NOT the right storage method.*

### Key Takeaways

More and more devices are using lithium-ion batteries. Not adhering to use, charging or storage procedures is a surefire (*pun intended*) way of leading to an incident. Be aware of these batteries and respect the associated hazards to prevent damage and injury.

1. **Know what you have.** In many cases people aren't aware their device has a LI battery. Take note of your LI devices. It's hard to follow guidelines for a device if you don't know it has guidelines.
2. **Charge Appropriately.** Make sure you use the correct charger, ideally the one issued with the device, and unplug once complete. Don't leave charging devices completely unattended (*or sleep on top of them*).
3. **Store Intelligently.** LI batteries should be kept in cool, dry places away from combustible material or other heat sources. Placing them in or near high heat is asking for thermal runaway to occur.
4. **Take the proper emergency response.** Many LI batteries require specialized procedures for response to overheating, leaking/venting, or fire, and this often needs to be done by emergency services. Know your devices and what to do in an emergency. When in doubt, call in the pros and tell them of the lithium batteries.

### Useful Resources

NAVSEA S9310-AQ-SAF-010-Rev 3 – Navy Lithium Battery Safety Program Responsibilities and Procedures  
OSHA SHIB 06-20-2019 – Preventing Fire and/or Explosion Injury from Small and Wearable Lithium Battery Devices <https://www.osha.gov/sites/default/files/publications/shib011819.pdf>

***And remember, “Let's be careful out there.”***

This product is posted on the NAVSAFECOM public site at <https://navalsafetycommand.navy.mil/Media/Safety-Awareness/>

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