



DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
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IN REPLY REFER TO
NAVSEAINST 9310.1C
Ser 05Z/327
12 Aug 2015

NAVSEA INSTRUCTION 9310.1C

From: Commander, Naval Sea Systems Command

Subj: NAVAL LITHIUM BATTERY SAFETY PROGRAM

Ref: (a) OPNAVINST 5100.23G
(b) OPNAVINST 5100.19E
(c) MCO 5100.8
(d) NAVMC DIR 5100.8
(e) SECNAVINST 5400.15C CH-1
(f) NAVSEAINST 5000.8
(g) S9310-AQ-SAF-010, Navy Lithium Battery Safety Program Responsibilities and Procedures, 15 Jul 10
(h) through (q) - see enclosure (1)

Encl: (1) Additional References (h through q)
(2) Implementation and Auditing Plan: Naval Lithium Battery Safety Program

1. Purpose. To issue policy and responsibilities concerning the safety of all aspects for all types of lithium batteries, lithium cells, and lithium battery-powered equipment or systems related to design, acquisition, use, maintenance, storage, transportation, and disposal per references (a) through (d). This instruction is a complete revision and should be reviewed in its entirety.

2. Cancellation. NAVSEAINST 9310.1B, and NOSSA ltr 8020 Ser N84/521 of 2 Apr 09.

3. Scope and Applicability. This instruction applies to all Department of the Navy (DON) Commands and activities responsible for the design, acquisition, use, maintenance, storage, transportation, or disposal of lithium batteries, consistent with references (a) through (d). Reference (a) assigns responsibility for lithium battery safety to Naval Sea Systems Command (NAVSEA). Reference (e) delegates Technical Authority and operational safety and certification authority to the Systems Commands (SYSCOMS) for systems under their responsibility. Naval Reactors (NAVSEA 08) and Strategic Systems Programs are excluded from this instruction. The term

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"lithium battery" used in this instruction includes: lithium batteries, lithium cells, and lithium battery-powered, or associated, systems or equipment. All batteries that utilize lithium metal, alloys, or compounds are within the scope and applicability of this instruction.

4. Discussion

a. Commander, Naval Sea Systems Command (COMNAVSEA), is responsible to the Chief of Naval Operations for the safety of lithium batteries used by DON. To fulfill this responsibility, COMNAVSEA has established a certification process as defined in this instruction utilizing the existing SYSCOM risk management policy as specified in reference (f).

b. Modern warfighting systems increasingly rely on lithium battery energy sources. Given the current state of the art, lithium batteries can represent extreme danger to personnel, platforms and facilities in the event of uncontrolled release of energy in various forms. Recent high-profile failures highlight a need to improve safety and reliability standards for lithium batteries.

c. When compared to other power sources, lithium cells and batteries offer advantages such as increased power and energy density. However, lithium cells and batteries are high-energy devices and shall be considered potentially hazardous at all times.

5. Policy. NAVSEA executes its responsibility for lithium battery safety by leveraging the safety certification authority of the SYSCOMs within their technical domains. Certification of individual lithium battery applications within the scope of this instruction requires the following:

a. Lithium batteries and associated systems will comply with the guidelines and requirements of reference (g). Reference (g), using the responsibilities assigned in paragraph 6 of this instruction, shall serve as the basis for safety testing, assessment, review, and certification requirements.

b. Implementation of an overarching System Safety Program (SSP) per reference (h). The SSP shall identify and mitigate lithium battery risks, at a minimum, to systems co-located; interfacing systems; and subsystems, platforms, facilities, and personnel.

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c. Including in the certification process that lithium batteries will be recycled or disposed of per references (g) and (i). If this is not possible, certification depends on the system-specific life cycle management plans adequately addressing recycling or disposal.

d. All lithium batteries that are intended for shipboard use, maintenance, storage, or transport, and have a total stored electrical energy greater than 1 kilowatt hour (kWh) per single battery pack, or 2 kWh per system, shall comply with the guidelines and requirements of references (g) through (j).

e. Certification authorities are responsible to certify lithium batteries that meet the requirements and references of this instruction to ensure:

(1) Safe operation in the environment intended by the procuring activity, purchasing agency, or user.

(2) The evaluation of test results and analyses, required per references (g) and (j), to adequately identify failure modes, characterize failure behavior, and provide evidence that the lithium batteries can be operated safely, and that a design/system review is conducted to effectively eliminate or mitigate risk to an acceptable level. Any risk that cannot be eliminated shall be assessed and accepted per references (f) and (h).

(3) Test reports, evaluation documentation, and certifications are maintained in a readily retrievable format to support auditing by NAVSEA per reference (g).

(4) Battery certification is reviewed and suspended as required upon notification of a mishap per reference (g).

f. Enclosure (2) provides implementation requirements that supplement reference (g). These will be added to a revision of reference (g) which will supersede enclosure (2).

g. Exemptions from certification:

(1) All lithium batteries deemed acceptable for use per previous policy and guidance shall remain "approved for use" to the same limitations and restrictions in the certifications issued. Additional or alternate uses or applications of lithium batteries previously certified must be reevaluated per references (g) and, if applicable, (j).

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(2) Lithium batteries identified and certified by the certification authority as having minimal risk may be exempted from testing, given general authorization for use, or granted other deviations from full review and approval per reference (g); for example, commonly used coin cells in single cell applications.

6. Responsibilities. COMNAVSEA is responsible for DON lithium battery safety. This responsibility is assigned across the DON as follows:

a. NAVSEA Chief Engineer (CHENG):

(1) Establish lithium battery safety policies and processes that engage independent safety and technical authorities to provide the maximum level of assurance that lithium battery systems can be operated safely ashore, afloat, and aloft.

(2) For DON and unique systems: NAVSEA may serve as the certification authority or delegate to an appropriate SYSCOM when the procuring activity for a lithium battery system resides external to the DON, or there is no SYSCOM equivalent with the capability to properly exercise certification authority, per references (e), (h), and (k).

(3) Establish and maintain a program to audit SYSCOM lithium battery safety certification authorities for compliance with this and other governing instructions. Continuously assess the effectiveness of SYSCOM lithium battery safety certification processes through periodic surveillance, per reference (g).

b. SYSCOM Commanders:

(1) Exercise independent safety certification authority for all lithium batteries developed or procured by an activity within their command structure. SYSCOM Commanders may delegate this authority internally or to other DON activities. NAVSEA shall be informed of such delegations.

(a) In order to certify a lithium battery system with the maximum assurance of safe operation, SYSCOMs with certification authority must ensure that concurrences have been obtained from all SYSCOMs responsible for the platforms that will use, maintain, store, or transport the lithium battery system. For example, NAVSEA concurrence must be obtained for

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shipboard applications, NAVAIR concurrence is required if placed on an airframe, etc.

(b) Naval Ordnance Safety and Security Activity (NOSSA) is the Navy's designated authority for weapon systems safety per reference (l). As part of the Weapons System Explosive Safety Review Board process, NOSSA must review and concur with the certification of all lithium batteries used in ordnance and weapon systems.

(2) Exercise technical and certification authority over the design, acquisition, sustainment, and disposal of lithium batteries within the scope of their assigned responsibilities per reference (e).

(3) Establish formal lithium battery safety certification policies and procedures to properly exercise lithium battery safety certification authority. At a minimum, this requires SYSCOMs to have applicable Technical Warrant Holders, or equivalents meeting the requirements of references (e) and (m) and a SSP per references (h) and (k). These policies and procedures shall be submitted to the NAVSEA CHENG to document the SYSCOM's processes per reference (g).

(4) Ensure certification authorities maintain records to support audits per reference (g) to include personnel qualifications, and adherence of lithium battery safety program in accordance with this instruction.

c. Technical Agents: Naval Surface Warfare Center (NSWC) Carderock, Code 60, and NSWC Crane, Code GX, are the Technical Agents for lithium batteries and the systems and equipment integrating or using lithium batteries, and will provide technical support to SYSCOM certification authorities per references (m) and (n). In support of SYSCOM certification authorities, these agents are responsible to:

(1) Serve as the entry point for lithium battery safety certification processes and identify the appropriate certification authority and concurrence SYSCOMs for each lithium battery system evaluated.

(2) Prepare periodic updates of references (g) and (j) to maintain consistent minimum standards for certification, standard test methods, criteria for evaluation, and other technical information as deemed appropriate by the Technical

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Agents. Updates will be coordinated with stakeholders and approved by NAVSEA 05 per reference (o).

(3) Test, or approve testing, of lithium batteries and the systems and equipment integrating or using lithium batteries, in order to identify failure modes, characterize failure behavior, and verify safe operation in the environment intended by the procuring activity, purchasing agency, or user.

(4) Evaluate lithium batteries in regards to design, intended use, test results, and analysis. Technical Agents shall also provide the evaluation and recommendation for approval to the appropriate SYSCOM certification authorities, and obtain concurrences from all applicable SYSCOMs that use, maintain, store, or transport lithium batteries.

(5) Ensure test results, evaluation documentation, and certifications are maintained in a readily retrievable format to support auditing by NAVSEA. Maintain a copy of all lithium battery certification and concurrence letters issued according to this instruction to allow for a comprehensive archive.

d. The acquisition Program Executive Office and Program Managers for systems with lithium batteries are responsible to:

(1) Ensure that programs using lithium batteries comply with this instruction and references, to include references (g) through (j), as applicable.

(2) Coordinate with the Technical Agents and the certification authority to understand the technical requirements and level of effort to comply with references (g) through (j), as applicable, for safe lithium battery use, maintenance, storage, transport, and disposal ashore, afloat, and aloft.

(3) Coordinate with appropriate SYSCOM Program Managers, consistent with references (h) and/or (k), in order to understand and identify possible safety and programmatic integration risks that may exist when using, maintaining, storing, or transporting a lithium battery or lithium battery-powered system on their respective platforms.

(4) Ensure that lithium batteries and lithium battery-powered, or associated, systems or equipment are procured to comply with references (p) or (q), as applicable, to ensure commonality of regularly used items (e.g., damage control

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lanterns, emergency backup lights, radio communication batteries).

7. Concurrence. The SYSCOMs on distribution have concurred with this instruction.

8. Point of Contact (POC) Information. The POCs for lithium battery safety are:

a. Battery and Battery Monitoring Systems - Ships TWH:
David Cherry, NAVSEA 05Z34, (202) 781-1304,
david.f.cherry@navy.mil.

b. Lithium Battery Safety Program: Joseph Vignali,
NAVSEA 05Z34, (202) 781-5412, joseph.vignali@navy.mil.

A handwritten signature in black ink, appearing to read 'W. H. Hilarides', is written over a horizontal yellow line.

W. H. HILARIDES

Distribution:

Electronic only, via the NAVSEA Intranet Website located at
<https://navsea.portal.navy.mil>.

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ADDITIONAL REFERENCES (h through q)

- Ref:
- (h) DoD Instruction 5000.02 of 07 January 2015
 - (i) DoD 4160.21-M, Defense Materiel Disposition Manual, 18 August 1997
 - (j) SG270-BV-SAF-010, High-Energy Storage System Safety Manual, issued as enclosure (1) of NAVSEA ltr 9310, Ser 05Z/067, 27 Apr 11
 - (k) SECNAVINST 5100.10
 - (l) OPNAVINST 8020.14A
 - (m) NAVSEAINST 5400.97C
 - (n) NAVSEAINST 5400.111A
 - (o) NAVSEAINST 4120.24
 - (p) NAVSEAINST 4120.8
 - (q) NAVAIRINST 13280.1A

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IMPLEMENTATION AND AUDITING PLAN:
NAVAL LITHIUM BATTERY SAFETY PROGRAM

1. Implementation. SYSCOM-specific lithium battery safety certification programs will be implemented according to the attachment (1) implementation and auditing schedule. NAVSEA will conduct three technical assist meetings with each SYSCOM over the course of a year to understand the implementation of the SYSCOM specific lithium battery safety certification program, including:

- Establish certification authority selection criteria, and roles and responsibilities (full-time or collateral duty).
- Create tailored, SYSCOM-specific lithium battery safety certification policies and procedures, to include archiving correspondence, data, and reports.
- Institute lithium battery safety certification training, internal reviews, and continuous improvement initiatives, as required.
- Develop processes and measures to assure compliance.

After one year, NAVSEA will conduct an initial lithium battery safety program audit at each SYSCOM, which will measure the effectiveness of each SYSCOM's implementation of their policies and procedures. Attachment (2) provides a preliminary audit plan template for the initial SYSCOM audits. Follow-up audits will occur on a yearly basis thereafter.

2. SYSCOM Actions. Following the attachment (1) schedule, SYSCOMs will develop policies and procedures and assign responsibilities to best assure safe design, acquisition, use, maintenance, storage, transportation, and disposal of their lithium battery systems. The resulting documentation will form the basis for annual lithium battery safety program audits by the DON lithium battery safety program manager (NAVSEA 05Z).

3. Technical Agent Actions. Technical Agents (NSWC Crane and NSWC Carderock Division) will aid SYSCOMs in implementing and executing their lithium battery safety programs. In addition, Technical Agents will incorporate applicable information from this correspondence into the next revision of the Lithium Battery Safety (S9310-AQ-SAF-010) technical manual.

4. Applicability. This enclosure shall be used for the DON lithium battery safety program initiation and audit preparation at each of the SYSCOMs until the information contained within is

incorporated into the Lithium Battery Safety (S9310-AQ-SAF-010) technical manual.

5. Point of Contact (POC) Information: The POC for the lithium battery safety program is Mr. Joseph Vignali, NAVSEA 05Z34, (202) 781-5412, joseph.vignali@navy.mil.

ATTACHMENT 1: IMPLEMENTATION AND AUDITING SCHEDULE

1. Technical Assist 1: Initial NAVSEAINST 9310.1C kickoff meetings with each individual SYSCOM.
 - a. Purpose: Support development of SYSCOM policies and procedures, and address any questions directed to NAVSEA and the Technical Agents.
 - b. Attendees: NAVSEA 05Z34, SYSCOM certification authority representatives and Technical Agents.
 - c. Two weeks after COMNAVSEA approval of this instruction.
2. SYSCOMs implement lithium battery certification programs.
 - a. Program initiation upon COMNAVSEA approval of instruction.
3. SYSCOM submits draft implementation policies and procedures.
 - a. 90 days after program initiation.
4. Technical Assist 2: SYSCOM policy reviews.
 - a. Purpose: Review, comment and concur with SYSCOM NAVSEAINST 9310.1C implementation policies & procedures.
 - b. Attendees: SEA 05Z34, SYSCOM certification authority representatives, and Technical Agents.
 - c. 30 days after receipt of policies and procedures at each SYSCOM.
5. Technical Assist 3: Progress checks.
 - a. Purpose: Review latest progress of implementation.
 - b. Attendees: SEA 05Z34, SYSCOM certification authority representatives, and Technical Agents.
 - c. Nine months after program initiation at each SYSCOM.
6. SYSCOM Audits

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a. Purpose: Evaluation of the implementation of lithium battery safety program at the SYSCOMs.

b. Attendees: SEA 05Z34, SYSCOM certification authority representatives, and Technical Agents.

c. Auditing commences 12 month after program initiation at each SYSCOM.

7. Joint SYSCOM Meeting

a. Purpose: To promote the joint exchange of information and lessons learned of the implementation and execution by the SYSCOMs.

b. Attendees: SEA 05Z34, SYSCOM certification authority representatives, Technical Agents, and others as required.

c. Periodicity: Annual (off-set from audit schedule)

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ATTACHMENT 2: AUDIT PLAN TEMPLATE

In order to assess effectiveness of a SYSCOM's lithium battery safety program certification program, the DON's lithium battery safety program manager (NAVSEA 05Z) will periodically evaluate the following attributes of the approval function within each SYSCOM. This evaluation is a review of policies, processes, controls, and procedures used to perform lithium battery safety certification related tasks. The results will provide all levels of management at NAVSEA and the SYSCOMs with an independent, objective, and constructive evaluation of the effectiveness and efficiency with which lithium battery safety certification responsibilities are being implemented and followed.

Part 1: Lithium battery safety program infrastructure.

1. Lithium battery safety program safety certification authority designation:

- 1.1. Are SYSCOM certification authority designated?
- 1.2. Have certification authority designations been communicated across the SYSCOMs?
- 1.3. Are certification authority duties & responsibilities documented?

2. Lithium battery safety program safety certification process:

- 2.1. Is the SYSCOM specific lithium battery safety program safety certification process documented? Does it comply with the Naval Lithium Battery Safety Program instruction (NAVSEAINST 9310.1C), as well as the Lithium Battery Safety (S9310-AQ-SAF-010) and High Energy Storage System Safety (SG270-BV-SAF-010) technical manuals?
- 2.2. Are program and technical authority, safety leads, Technical Agent, and certification authority roles clearly identified in process documents?
- 2.3. Are all phases of lithium battery safety program safety certification explained?
- 2.4. Are both safety certification and concurrence processes adequately documented and explained?

3. Lithium battery safety program health:
 - 3.1. Are certification authorities trained on DON and SYSCOM specific lithium battery safety program policies and procedures?
 - 3.2. Does the SYSCOM conduct periodic training to lithium battery safety program stakeholders to learn and/or refresh lithium battery safety program knowledge?
 - 3.3. Does the SYSCOM have a means to determine the effectiveness of its lithium battery safety program policies and procedures, and how well they are executed?
 - 3.4. Does the SYSCOM conduct periodic internal reviews, including prior to lithium battery safety program audits?

Part 2: Execution of SYSCOM specific lithium battery safety program.

4. Compliance to lithium battery safety program requirements:
 - 4.1. Are SYSCOM specific policies and procedures being followed?
 - 4.2. Are adequate records maintained on-site with SYSCOM certification authorities?
 - 4.3. Does documentation indicate that technical requirements specified in the Lithium Battery Safety (S9310-AQ-SAF-010) and High Energy Storage System Safety (SG270-BV-SAF-010) technical manuals have been met for certified lithium battery systems?
 - 4.4. Has a repository for safety certification related information, data, and/or reports been established by the SYSCOM? Are the SYSCOM certification authority and Technical Agents working together to ensure a comprehensive archive of each lithium battery safety certification effort is maintained?
5. Issue resolution:
 - 5.1. Is a process in place to resolve disputes? Is it followed?
 - 5.2. Are issues identified during testing, or with operational lithium battery systems, tracked to completion? Are resolutions documented?

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- 5.3. Are critiques and/or root-cause analyses conducted following lithium battery system incidents? Are reports filed and archived?
- 5.4. Are lessons learned communicated throughout the SYSCOM, and to other SYSCOMs that could benefit?