



DEPARTMENT OF THE NAVY
NAVAL ORDNANCE SAFETY AND SECURITY ACTIVITY
FARRAGUT HALL
3817 STRAUSS AVENUE, SUITE 108
INDIAN HEAD, MD 20640-5151

8020
Ser N841/1239
11 Aug 14

From: Commanding Officer, Naval Ordnance Safety and Security Activity
To: President, Naval Postgraduate School, Monterey
(MAE/K. Jones)

Subj: CAPACITY LIMITED LITHIUM BATTERY SITE CLEARANCE FOR NPS

Ref: (a) NAVPGSCOL Monterey ltr 9310 Ser 00AA/623 of 16 Jul 14

Encl: (1) NAVSURFWARCENDIV Crane ltr 8020 Ser GXSM/14043 of 6 Aug 14

1. In response to your request of reference (a), the Naval Ordnance Safety and Security Activity (NOSSA) concurs with a capacity-limited site clearance for lithium ion polymer batteries of less than 300 watt-hours energy capacity in various unmanned aerial systems (UAS), unmanned underwater vehicles (UUV), and robotics during research efforts at the Naval Postgraduate School (NPS).
2. This recommendation for your approval for use of these batteries is based on the safety evaluation of enclosure (1), and is limited to the NPS and research operations under their supervision conducted at controlled ranges and airspace at shore facilities.
3. Naval Air Warfare Center (Code 4.4.5.2) has reviewed the documentation and concurs with use of lithium ion batteries limited to less than 300 watt-hours during research efforts at the NPS and research operations under their supervision conducted at controlled airspace at shore facilities, as documented in enclosure (1).
4. The NOSSA point of contact is John Dow (N841), phone (301) 744-5640, or email: john.dow@navy.mil.


C. A. BATCHELOR
By direction

Copy to:
NAVSURFWARCEN CARDEROCKDIV (Code 616/J. Simmons)
NAVSURFWARCENDIV Crane (GXS/M. Tisher)
COMNAVAIRSYSCOM (Code 4.4.5.2/M. Hurley)



DEPARTMENT OF THE NAVY

NAVAL SURFACE WARFARE CENTER
CRANE DIVISION
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CRANE INDIANA 47522-5001

IN REPLY REFER TO:

8020
GXSM/14043
6 Aug 14

FIRST ENDORSEMENT OF NPS ltr 9310 Ser 00AA/623 of 16 Jul 14

From: Commander, Naval Surface Warfare Center, Crane Division
To: Commanding Officer, Naval Ordnance Safety and Security
Activity (N841)

Subj: CAPACITY LIMITED LITHIUM BATTERY SITE CLEARANCE FOR
NAVAL POSTGRADUATE SCHOOL

Ref: (c) NOSSA ltr 8020 Ser N841/1273 of 16 Jul 12
(d) NOSSA ltr 8020 Ser N841/1378 of 1 Aug 12
(e) NOSSA ltr 8020 Ser N841/1889 of 20 Oct 12
(f) NOSSA ltr 8020 Ser N841/2012 of 8 Nov 12
(g) NOSSA ltr 8020 Ser N841/157 of 29 Jan 13
(h) NOSSA ltr 8020 Ser N841/1185 of 29 Jul 13
(i) NOSSA ltr 8020 Ser N841/526 of 8 Apr 14
(j) NAVAIR 4.4.5.2 (Mr. M. Hurley)/NSWC Crane (Mr. M.
Tisher) E-mail of 29 Jul 14

1. As requested in the basic submission, the Naval Surface Warfare Center, Crane Division (NSWC Crane), Energy, Power and Interconnect Technologies Division, GXS, has conducted a safety review of the capacity limited site clearance for lithium ion batteries of less than 300 watt-hours energy capacity used in various unmanned aerial systems (UAS), unmanned underwater vehicles (UUV), and robotics during research efforts at the Naval Postgraduate School (NPS) located in Monterey, CA. This review was conducted in accordance with references (a) and (b). This letter conveys our recommendation to provide concurrence with use of the capacity limited site clearance at the NPS and research operations under their supervision conducted at controlled ranges and airspace at shore facilities such as McMillan Airfield at Camp Roberts.

2. NPS personnel conduct diverse research efforts using a variety of small UAS, UUV and robotics systems. These systems typically use lithium ion polymer batteries that are common commercially for use in radio control (RC) hobby vehicles such as Thunder Power. References (c) through (i) are previous approvals and extensions issued to NPS for various UAS applications used in flight testing. NPS has established a Standard Operating Procedure (SOP) based on the commonality of

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lithium polymer batteries used across these and other applications within the scope of their research activities and the hazards associated with their use. The SOP establishes safety guidelines for the selection, design, testing, evaluation, use, packaging, storage, transportation and disposal of Lithium batteries at the activity. NSWC Crane has reviewed this SOP and concurs with the documented approaches for mitigating potential battery failures. These approaches include the use of a lithium ion specific charger with individual cell voltage monitoring and balancing, attended charging operations, segregation of batteries, detailed inspection procedures, use of a flammable locker for storage and charging, and emergency response. The 300 watt-hour limit is based on the definition of a medium size battery as defined in special provision 189 in section 172.102 of 49 Code of Federal Regulations issued by the Department of Transportation.

3. NSWC Crane recommends concurrence with the use of various lithium ion polymer batteries limited to less than 300 watt-hours of energy capacity in various UAS, UUV, and robotics systems during research efforts at the NPS and research operations under their supervision conducted at controlled ranges and airspace at shore facilities such as McMillan Airfield at Camp Roberts. This recommendation is based on the reasonable battery size limit, use of a standardized procedure with appropriate mitigations against typical lithium ion polymer battery failure modes and behaviors and operator training to that procedure, and history of safe operations under previous concurrences.

4. Naval Air Systems Command (NAVAIR-4.4.5.2) has reviewed the documentation and concurs with the recommendation for use of various lithium ion polymer batteries limited to less than 300 watt-hours of energy capacity in various UAS systems during research efforts at the NPS and research operations under their supervision conducted at controlled airspace at shore facilities such as McMillan Airfield at Camp Roberts. Concurrence was provided via electronic mail given as reference (j).

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5. NSWC Crane point of contact is Mr. Mark Tisher, Energy,
Power & Interconnect Technologies Division, DSN 482-5912, or
commercial 812-854-5912, or E-mail at mark.tisher@navy.mil.

A handwritten signature in black ink, appearing to read "Roger Smith", written in a cursive style.

ROGER SMITH
By direction



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MONTEREY, CA 93943-5000

IN REPLY REFER TO:

9310
Ser 00AA/623
16 Jul 14

From: President, Naval Postgraduate School
To: Commanding Officer, Naval Ordnance Safety and Security
Activity (N841)
Via: Commander, Crane Division, Naval Surface Warfare Center
(GXS)

Subj: CAPACITY LIMITED LITHIUM BATTERY SITE CLEARANCE FOR NPS

Ref: (a) NAVSEA Technical Manual S9310-AQ-SAF-010 of 15 Jul 10
(b) NAVSEA Instruction 9310.1B Ser 06/487 of 13 Jun 91

Encl: (1) NPS Lithium Battery SOP, Jun 14

1. In accordance with reference (a) as required by reference (b), the Naval Postgraduate School (NPS) requests that the Naval Ordnance Safety and Security Activity (NOSSA) provide concurrence and approval documentation for use of lithium battery cells of less than 300 watt-hours capacity during research activities conducted by NPS researchers.

2. This clearance should cover usage in unmanned aerial systems, unmanned underwater vehicles, robotics, and diverse research efforts. A detailed safety and usage document covering all aspects of use, storage, and disposal is provided as enclosure (1). Participating researchers will receive training on enclosure (1) and will be accountable for procedures in that document as well as restrictions delineated in requested clearance document. This program will be managed through NPS' OSHE directorate.

3. We appreciate your assistance and your expedited technical review. Any questions concerning this letter should be addressed to Dr. Kevin Jones, (831)656-7711 or Mrs. Debora Waxer, (831)656-1072.

A handwritten signature in black ink, appearing to read "J. F. Hyink", is written over the typed name.

J. F. HYINK
By direction