



DEPARTMENT OF THE NAVY
NAVAL HOSPITAL
937 FRANKLIN AVENUE
LEMOORE, CALIFORNIA 93246-5004

IN REPLY REFER TO:

6260
Ser 00/626
9 Sep 14

From: Commanding Officer, Naval Hospital Lemoore
To: Chief of Staff, Naval Postgraduate School, Monterey,
1 University Circle, Monterey CA 93943

Subj: NOISE MEASUREMENTS, NAVAL POSTGRADUATE SCHOOL,
SEVERAL GRADUATE SCHOOL OF ENGINEERING AND APPLIED
SCIENCES DEPARTMENTS, OUTDOOR LIQUID NITROGEN
DISPENSING, HALLIGAN HALL, BLDG 234

Encl: (1) Industrial Hygiene Noise Survey Report

1. As requested by the Space Systems Lab Manager, noise measurements of the dispensing of liquid nitrogen from large outdoor tanks (located outdoors at the West side of Halligan Hall) into both a two-liter wide mouth dewar and a 230-liter portable tank were conducted on 13 August 2014 by the Naval Hospital, Lemoore, Monterey area Industrial Hygienist.

2. Results and recommendations are discussed in enclosure (1).

3. Further clarification or consultation with respect to this report is available from S. Eric Thurston, Industrial Hygienist at COMM (831)656-1074, e-mail sethurst@nps.edu.

A handwritten signature in black ink, appearing to read "K. R. Dagher", is located below the text.

K. R. DAGHER
By direction

Copy to:
NPS Safe Offcr
NPS Dir Fac Mgt

INDUSTRIAL HYGIENE SURVEY DATA

Command: Naval Postgraduate School School: GSEAS

Location: Outside Bldg 234, West side POC: David Rigmaiden

Depts: SP, PH, MAE, ECE Date: 13 August 2014

DESCRIPTION: Noise levels during the dispensing of liquid nitrogen from one of two 500-gallon capacity tanks into both a wide mouth two-liter dewar and a portable 230-liter tank were measured on 13 August 2014. A proposal is being considered for members of the Space Systems, Electrical and Computer Engineering (ECE), Physics, and the Mechanical and Aerospace Engineering Departments (MAE) to dispense liquid nitrogen into their receptacles as a cost-saving measure. The breakdown of usage is expected to occur as follows:

- The Space Systems Department will fill two-liter wide mouth dewars that more easily accommodate dipping of objects into the liquid nitrogen content, but can also be used for pouring of liquid nitrogen. This department will also fill 230-liter or very similar capacity portable tanks to be used to support operation of their Bldg 234, Room 101C Tennax Thermal Vacuum Chamber.
- For use during Bldgs 232 and 245 processes, the Physics, MAE and ECE Departments will also fill two-liter dewars, but likely will primarily use narrow mouth versions since they won't be used for dipping objects but solely for pouring.
- The MAE Department intends to also fill 230-liter or similar capacity portable tanks with liquid nitrogen in support of Bldg 245, second floor nanoMEMS processes: it is anticipated that once the liquid nitrogen has cooled to room temperature (through gradual heat exchange while travelling through the tubing feeding into this room) it will be converted into gaseous nitrogen for use during Lab processes/experiments. If the anticipated conversion of liquid nitrogen into gaseous nitrogen as described above is successful, the Physics Department intends to submit a work order to have tubing permanently installed to feed directly from the 500-gallon outdoor tanks into an area in Bldg 245 so that the manual transfer process involving moving of the portable tanks between the second floor nanoMEMS Lab and the outside Bldg 234 liquid nitrogen dispensing area will be unnecessary.

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RECOMMENDATIONS:

DISPENSING INTO TWO-LITER DEWARS:

As required by reference (a), enclosure (1), paragraphs 5 and 6c, personnel need to wear double hearing protection (earplugs and muffs) if they will be clearing the dispensing nozzle (or within 8 feet of the process), but only single hearing protection (either earplugs or muffs) if filling the small dewar filling (or within 6 feet of the process). Since their 8-hour average noise exposures will not be significant, audiograms and formal hearing conservation training will be unnecessary, but personnel will need to complete PPE training (currently accomplished through ESAM training module 110) as required by reference (b), Chapter 20, Section 2013.

DISPENSING INTO LARGE CAPACITY PORTABLE TANKS:

As required by reference (a), enclosure (1), paragraphs 5 and 6c, personnel need to wear double hearing protection (earplugs and muffs) during dispensing-nozzle clearing or filling of large capacity portable tanks (or those personnel within 20 feet of either process). Because their 8-hour average exposures will be significant, those involved in this process will need to complete both PPE and annual hearing conservation training (currently accomplished through ESAMS training modules 110 and 1398) as required by reference (b), Chapter 18, paragraph 1808b and Chapter 20, Section 2013. Those performing this process for more than two days per month will also need to receive annual audiograms (hearing tests) (currently provided and scheduled through the Presidio of Monterey Occupational Health Department) as required by reference (b), Chapter 18, Section 1806.

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RECOMMENDATIONS (continued):

Other process recommendations include the following:

- Access to the service area between Halligan and Watkins Halls needs to be controlled during liquid nitrogen dispensing or its entrance point should be posted with the NAVMED signs as describe above. During the noise survey, an NPS employee that lacked hearing protection exited the nearby door leading from the Northwest first floor corner of Halligan Hall and proceeded outside to walk past Watkins Hall, within the noise hazard radius while the large capacity portable tank dispensing process was occurring. To avoid a recurrence, a portable mast with a large NAVMED 6260/2 noise hazard sign attached should be positioned in front of this door so that personnel desiring to exit the building using that door are made aware of the noise hazard posed during performance of this process and the need to wear the specified hearing protection while passing near the dispensing area.
- the outside 500 gallon tanks need to be posted with large NAVMED 6260/2 noise hazard signs as required by reference (b), Chapter 18, Section 1805.
- The Space Systems Lab Manager who has been hosting this process during its formulative stage indicates he will attempt to design a muffler made of metal wool and copper tubing to be attached to gas outlets of large capacity portable tanks in an attempt to significantly reduce the noise levels created during this process. This muffler will serve as an engineering control, which as outlined in reference (b), Chapter 18, paragraph 1810 is intended to serve as the primary means of controlling worker noise exposure. If the muffler is installed, contact the Industrial Hygienist to remeasure the noise levels and reassess necessary controls as outlined in reference (b), Chapter 18, paragraph 1804a(4).

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RECOMMENDATIONS (continued):

- The Industrial Hygienist needs to be contacted to measure the noise levels when dispensing into a narrow mouth small dewar is performed since different noise levels are anticipated due to the narrower orifice of this model of dewar. Once noise levels are measured, appropriate recommendations concerning noise exposure can be made if different from those involving the small wide mouth dewars.
- The Space Systems Lab Manager is spearheading the development of SOP's for this process. As discussed in reference (c), the SOP's should be forwarded for review and input by the Industrial Hygienist to include not only noise exposure control but also use of appropriate personal protective equipment (PPE) to protect against exposure to extreme cold prior to being finalized.

REFERENCES: (a) BUMEDNOTE 6260 of 24 Apr 14
(b) OPNAVINST 5100.23G
(c) Federal OSHA VPP Section II: Worksite Analysis
B1/B2