Exhibit J

DEPARTMENT OF THE NAVY
NAVAL SAFETY CENTER
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NORFOLK, VA 23511-4399

5100
Ser 00/0123
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From: Commander, Naval Safety Center
To: Director, Military Personnel Plans and Policy Division

Subj: FACE SEAL GUIDANCE

Encl: (1) Effects of Facial Hair on Naval Breathing Apparatuses

1. In response to your inquiry regarding the risks associated with facial hair on the efficiency of naval breathing apparatuses, the Naval Safety Center conducted a comprehensive review of the laws and studies impacting current naval and federal respiratory protection regulations. Enclosure (1) with references details the research and the basis for our conclusions.

2. Based on the available research and long established negative effects of facial hair on face seal efficiency of all current Navy breathing apparatuses, the Naval Safety Center concludes that deviations from the current prescribed facial hair grooming standards represent significant increased risk to the individual. Subsequent risk is also incurred by other crew members that may have to assist or rely upon these individuals.

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Effects of Facial Hair on Naval Breathing Apparatuses

Ref: (a) Occupational Safety and Health Administration (OSHA) 29 CFR 1910.134 Respiratory Protection
(b) OPNAVINST 5100.19E (Naval Occupational Safety and Health–Afloat)
(c) OPNAVINST 5100.23G (Naval Occupational Safety and Health–Ashore)
(d) American National Standards Institute (ANSI) Z88.6
(e) National Fire Protection Association (NFPA) Standard 1500
(f) E. C. Hyatt, J. A. Pritchard, C. P. Richards, and L. A. Geoffrion, "The Effect of Facial Hair on Respirator Performance", Report LA-DC-13307, Los Alamos Sientific Laboratory, Los Alamos, New Mexico, 1972.
(g) McGee M. K., Oestenstad R. K. The Effect of the Growth of Facial Hair on Protection Factors for One Model of Closed- Circuit, Pressure-Demand, Self-Contained Breathing Apparatus, Amer. Ind. Hyg. Assn. J. 1983; 44:480–484.
(h) Skretvedt O. T., Loschiavo J. G. Effect of Facial Hair on the Face Seal of Negative-Pressure Respirators. Amer. Ind. Hyg. Assn. J. 1984;45:63–66
(i) Letter to All Respirator Manufacturers from the National Institute for Occupational Safety and Health (NIOSH) dated 2 October 2006
(j) Respirator Special Problems, Navy and Marine Corps Public Health Center (NMCPHC), December 2014
(k) Naber, D. G., “Effects of Facial Hair in Oxygen Masks”. Final Report by the Naval Air Development Center, 29 December 1972.
(l) Federal Aviation Administration, “The Influence Of Beards On Oxygen Mask Efficiency, 27 January 1987
(m) U. S. Naval Flight Surgeon’s Manual, 3rd Ed, 1991

1. Reference (a) paragraph (g) requires employers to establish and implement procedures for the proper use of respirators. These requirements include prohibiting conditions that may result in face piece seal leakage, preventing employees from removing respirators in hazardous environments, taking actions to ensure continued effective respirator operation throughout the work shift, and establishing procedures for the use of respirators in Immediately Dangerous to Life or Health (IDLH) atmospheres or in interior structural firefighting situations. Specifically, employers shall not permit respirators with tight-fitting face pieces to be worn by employees who have facial hair

that comes between the sealing surface of the face piece and the face, that interferes with valve function, or any condition that interferes with the face-to-face piece seal or valve function. References (b), (c), (d), and (e) mirror these requirements and derive their validity from the research used to set the federal guidelines.

2. The Federal Register of Final Rule contains the full justification for OSHA's reference (a) paragraph (g) determination. The full decision report of the following excerpts can be found at https://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=PREAMBLES&p_toc_level=1&p_keyvalue=Respiratory~Protection. Although several of the studies contained within the Federal Register are greater than 40 years old, their results are currently cited to this day and are considered the industry standard. During the period of 1995 to 1997 OSHA revisited federal laws regarding respiratory protection. The outcome of this reinvestigation is contained in Federal Register of Final Rule. The reinvestigation contained 200 exhibits, more than 3,000 individual items, and approximately 2,300 transcript pages and was certified by the presiding administrative law judge on June 30, 1997. The final (and current) revisions to 29 CFR 1910.134 are based on consideration of the entire record of this proceeding, including materials discussed or relied upon in the proposal, the record of the informal hearing, and all written comments and exhibits received.

a. Fit factors are unit-less quantitative estimates of the fit of a particular respirator to a specific individual and estimate the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn. Per reference (a) Appendix A Part I Section C Paragraph 2(b)(9), "the test subject shall not be permitted to wear a half mask or quarter face piece respirator unless a minimum fit factor of 100 is obtained, or a full face piece respirator unless a minimum fit factor of 500 is obtained." With regards to testing an individual with facial hair, reference (a) Appendix A specifically prohibits fit testing these individuals stating that fit tests "shall not be conducted if there is any hair growth between the skin and the face piece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface."

b. The rulemaking record on which OSHA derived reference (a) paragraph (g) contains strong evidence that facial hair can interfere with tight-fitting face piece seals. In reference (f)

Hyatt and Pritchard state facial hair includes stubble. A number of studies and comments that were submitted to the record (see full text of the Federal Register of Final Rule) addressed the negative effects of facial hair on respirator performance. In reference (g), McGee and Oestenstad tested eight volunteers on a closed-circuit, pressure-demand, self-contained breathing apparatus. The volunteers were clean-shaven at the beginning of the study. They underwent quantitative fit tests at two-week intervals over an eight-week beard growth period. Beard growth had a profound, negative effect on the observed fit factors. Most of the volunteers started with fit factors of 20,000 when first fit tested; after eight weeks, these same workers achieved fit factors ranging only from 14 to 1067.

c. In reference (f), E.C. Hyatt, J.A. Pritchard and others investigated the effect of facial hair on the performance of half-mask and full-face piece respirators. Quantitative fit tests were performed on test volunteers with varying amounts of facial hair, including stubble, sideburns, and beards. The results showed that facial hair can have a range of effects on respirator performance, depending on factors such as the degree to which the hair interferes with the sealing surface of the respirator, the physical characteristics of the hair, the type of respirator, and facial characteristics. In general, the presence of beards and wide sideburns had a detrimental effect on the performance of the respirators. The authors concluded that individuals with excessive facial hair, including stubble and wide sideburns, that interferes with the seal cannot expect to obtain as high a degree of respirator performance as clean shaven individuals; the degree of interference depends on many factors (e.g., the length, texture, and density of facial hair) and the extent to which those factors interfere with the respirator's sealing surface. Short of testing a bearded worker for fit daily, the only prudent approaches are to require that facial hair not interfere with the respirator seal surface (e.g., shave where the seal touches the face) or to prohibit the employee from working in areas requiring respiratory protection.

d. Other fit testing studies (available in the Federal Register of Final Rule) show that non-bearded workers have significantly higher fit factors than bearded workers. In reference (h), Skretvedt and Loschiavo tested both half-mask and full face piece respirators on 370 male employees who were fit tested both qualitatively and quantitatively; 67 of the employees had full beards. The bearded workers consistently failed qualitative fit testing. Bearded employees using half-masks had a median fit
factor of 12, while clean-shaven employees had a median fit

factor of 2950. For full face piece respirators, bearded workers had a median fit factor of 30 and clean-shaven employees had a fit factor of greater than 10,000.

e. In reference (i), NIOSH, the respirator accrediting agency, reaffirmed the facial hair prohibition stating that: "Facial hair that lies along the sealing area of a respirator, such as beards, sideburns, or mustaches will interfere with respirators that rely on a tight face piece fit to achieve maximum protection. The areas of the skin, which contact the face or neck seal and nose cup seal, must be free of any hair."

f. In reference (j), Navy and Marine Corps Public Health Center (NMCPHC) reiterated the adverse effect of facial hair and face piece seals stating "tight-fitting respirators are not allowed to be worn by individuals with facial hair that interferes with respirator face piece-to-face seal or valve function". Reference (f) research was used to reinforce the adverse effects of even one day's growth (See Figure 1).

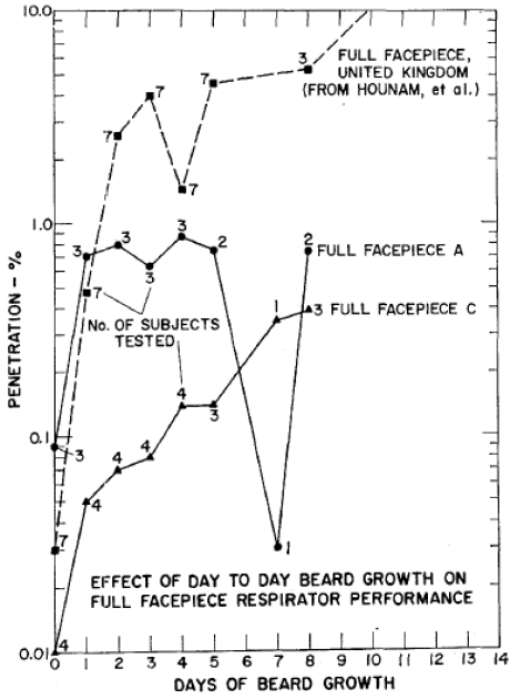

Figure 1: Table from Reference (f) Showing Facial Hair Stubble Effect on Respirator Leakage

g. With regard to effects of facial hair in oxygen masks, reference (k) concluded that "It is evident that there exists undesirable conditions due to facial hair" and "it appears that the wearing of facial hair should be considered a potential

hazard that could affect the safety and efficient operation of the aircraft." Alveolar nitrogen levels at 18,000 feet ranged from 14 to 26% for fine dense beards to 55-70% for coarse, very dense beards while non-bearded subjects show no alveolar nitrogen. The presence of alveolar nitrogen is indicative of mask seal leakage (individual is breathing in ambient air). The Federal Aviation Administration released reference (l) finding that "data indicated beards adversely affect the efficiency of continuous flow oxygen masks" and "the leakage of ambient air caused by beards does not permit an adequate percentage of oxygen to be presented to the lower portion of the respirator track". Per reference (m), improperly fitting oxygen masks raise the risk of hypoxia and altitude decompression sickness at altitudes greater than 18,000 feet (risk is further increased during a rapid decompression event). The effects of these phenomena may include but are not limited to increased fatigue, reduced cognitive function, incapacitation, and death. The Naval Safety Center found no quantitative studies clearly defining the additional risk involved with the adverse effects of oxygen mask leakage. The Naval Aviation Enterprise and Federal Aviation Administration consider this research relevant to current rules and regulations.

3. The Naval Safety Center contacted several civilian organizations to verify the validity of current research, industrial standards, and product regulations. All manufacturers verified that advances in respirator technologies have not invalidated the findings of references (f)-(h) nor the rules created based on their findings (references (a)-(e)).

a. Scott Safety, MSA The Safety Company, 3M Company, and North Safety (all are manufacturers of Navy/Marine Corps respirators, SCBA's, and EEBD's) were contacted. All verified that their products rely on the "clean-shaven" standard to ensure maximum protection and that facial hair is explicitly prohibited for use with their products.

b. The American Thoracic Society and The American College of Occupational and Environmental Medicine reaffirmed the industry standard of "no facial hair" and the validity of previous studies.

c. Naval Sea Systems Command Industrial Health and Occupational Safety offices stated that the current OSHA guidance is relevant (thus the mirrored rules contained in Naval instructions).

4. Although public employers are not required by law to comply

with OSHA standards (29 U.S.C. § 652(5) excludes states and their political subdivisions from the definition of OSHA "employer"), such standards certainly provide a trustworthy bench mark for assessing safety-based business necessity claims. It is true that the OSHA and ANSI standards speak in somewhat general terms about "facial hair" and "growths of beard" and do not specifically address the case of very short shadow beards; however, the NIOSH standard provides that "even a few days growth of stubble should not be permitted." In the absence of any evidence showing that safety experts view shadow beards as a special case, we hold that the only reasonable inference supported by the OSHA, ANSI, and NIOSH standards is that shadow beards are encompassed by the prohibitions.

5. Since the 1997 update reference (a) guidance, OSHA has responded to several congressional inquiries (constituent appeals for the allowance for facial hair based on religious observation) citing study-based evidence of the detrimental effects of hair growth on respirator performance. In each case, the guidance was upheld.

6. Although "no shave" chits are often prescribed by medical authorities, these exceptions to regular grooming standards represent significantly increased risk to the individual in regards to efficiency of current Navy breathing protection devices (casualty and other). In addition to adverse effects of facial hair, it should be noted that individuals with Pseudofolliculitis Barbae (shave bumps) will have a difficult time achieving a satisfactory fit-test due to the "non" smooth nature of their skin.

7. Research contained in the Federal Register of Final Rule has proven that although a member may achieve a satisfactory face seal check with facial hair in accordance with prescribed guidance, this is often not repeatable and not a future guarantee of a successful face seal. Reference (a) prohibits fit testing if there is any hair growth between the skin and sealing surface of the respirator. This requirement is mirrored in Naval guidance.

8. The long term cumulative effects of reduced face seal efficiency due to facial hair have not been studied (prohibited by current law) and are not well understood. The effects of particulate deposition into the linings of human lungs are well defined and directly contribute to variety of pulmonary illnesses such as asthma, bronchitis, and chronic obstructive pulmonary diseases. Reductions in face seal efficiency directly contribute to higher inhaled levels of adverse atmospheres and particulates.