3.13 Public Health and Safety

Supplemental Environmental Impact Statement/ Overseas Environmental Impact Statement Northwest Training and Testing

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3.13 Public Health and Safety

3.13.1 Affected Environment

For purposes of this Supplemental Environmental Impact Statement (EIS)/Overseas Environmental Impact Statement (OEIS), the region of influence for public health and safety remains the same as was identified in Section 2.1 (Description of the Northwest Training and Testing Study Area) of the 2015 Northwest Training and Testing (NWTT) Final EIS/OEIS (the NWTT Study Area). This includes the Puget Sound; the Strait of Juan de Fuca; the Southeast Alaska Acoustic Measurement Facility; and waters off the coasts of Washington, Oregon, and northern California (see Figure 1.1-1). However, each stressor may only affect portions of the total region of influence. For this reason, each stressor will specify the portions of the Study Area that are relevant to the analysis.

3.13.1.1 Overview

3.13.1.1.1 Sea Space

Sea space accessibility within the Study Area is the same as described in Section 3.13.2.1.1 (Sea Space) in the 2015 NWTT Final EIS/OEIS. Only select areas have activity restrictions or prohibitions on access to reserve capacity for training and testing activities performed by the United States (U.S.) Department of the Navy (Navy) in accordance with Title 33 Code of Federal Regulations Part 334 (Danger Zone and Restricted Area Regulations). Danger Zones and Restricted Areas within the Study Area include the Southeast Alaska Acoustic Measurement Facility and select portions of the Puget Sound, which can be viewed on nautical charts provided by the National Oceanic and Atmospheric Administration.

The Navy continues to request the U.S. Coast Guard to publish upcoming training and testing activities in their three channels for disseminating information to the public: the Notice to Mariners (NTM) (a weekly publication that notifies mariners of changes or deficiencies in navigational aids, new maps, channel depths, naval operations, and regattas), the Local NTM (a weekly publication that is more focused on particular areas, and the Marine Broadcast NTM (a radio broadcast that provides important information from the weekly NTM publications). These notices are posted prior to performing any activities that would require activating restrictions or establishing safety zones on the water as specified in Title 33 Code of Federal Regulations Subpart 72.01, and detailed in Section 3.13.2.1.1 (Sea Space) of the 2015 NWTT Final EIS/OEIS.

3.13.1.1.2 Airspace

Airspace accessibility within the Study Area is still the same as the 2015 NWTT Final EIS/OEIS, is still relevant, and can be viewed in Section 3.13.2.1.2 (Airspace) of the 2015 NWTT Final EIS/OEIS. Topics that were discussed in the previous EIS/OEIS included how weather conditions may determine whether pilots fly under visual flight rules or instrument flight rules, and how notices to airmen are published by the Federal Aviation Administration (FAA) and provide information on when and if special use airspace would be active. It is the responsibility of any licensed pilots to be knowledgeable and compliant with all types of airspace and of any notices to airmen that are in effect.

3.13.1.2 Safety and Inspection Procedures

As stated in Section 3.13.2.2 (Safety and Inspection Procedures) in the 2015 NWTT Final EIS/OEIS, the Navy complies with all applicable regulations and uses best practices, including standard operating procedures, to ensure public health and safety. This may be accomplished by utilizing communication and notification channels provided by the U.S. Coast Guard and the FAA as described above, considering

the location when planning activities, and ensuring that training and testing areas are clear of nonparticipants before commencing.

3.13.1.3 Aviation Safety

Navy requirements outlined in the Office of the Chief of Naval Operations Instruction 3500.39D, *Operational Risk Management*, provide a process to maintain readiness in peacetime and achieve success in combat while safeguarding people and resources. The FAA is responsible for ensuring safe and efficient use of U.S. airspace by military and civilian aircraft and for supporting national defense requirements. In order to fulfill these requirements, the FAA has established safety regulations, airspace management guidelines, a civil-military common system, and cooperative activities with the U.S. Department of Defense. The primary safety concern with regard to military training flights is the potential for aircraft mishaps to occur, which could be caused by mid-air collisions with other aircraft or objects, weather difficulties, mechanical failures, pilot error, or bird/wildlife air strike hazards.

There is no generally recognized threshold of air safety that defines acceptable or unacceptable conditions. Instead, the focus of airspace managers is to reduce risks through a number of measures. These include, but are not limited to, providing and disseminating information to airspace users, requiring appropriate levels of training for those using the airspace, setting appropriate standards for equipment performance and maintenance, defining rules governing the use of airspace, and assigning appropriate and well-defined responsibilities to the users and managers of the airspace. When these safety measures are implemented, risks are minimized, even though they can never be eliminated.

3.13.1.4 Submarine Navigation Safety

Methods for preserving submarine navigation safety are discussed in the 2015 NWTT Final EIS/OEIS (Section 3.13.2.4, Submarine Navigation Safety) and remain applicable and valid.

3.13.1.5 Surface Vessel Navigational Safety

The Navy's methods for ensuring navigational safety for surface vessels are discussed in the 2015 NWTT Final EIS/OEIS (Section 3.13.2.5, Surface Vessel Navigational Safety) and involve practicing the fundamentals of safe navigation, posting lookouts to scan for navigational hazards, or utilizing support boats, radar, and other auxiliary equipment to determine that all safety criteria are met. These safety methods remain applicable and valid.

3.13.1.6 Sonar Safety

Surface vessel and submarine sonar use is described in the 2015 NWTT Final EIS/OEIS (Section 3.13.2.6, Sound Navigation and Ranging [Sonar] Safety). When applicable, the Navy adheres to Naval Sea Systems Command Instruction 3150.2, Appendix 1A, which provides guidance for protecting divers during active sonar use, including the use of buffer zones. Guidance for protecting divers remains applicable and valid.

3.13.1.7 Explosive Ordnance Detonation Safety

Methods for ensuring explosive detonations associated with training and testing activities are described in the 2015 NWTT Final EIS/OEIS (Section 3.13.2.7, Explosive Ordnance Detonation Safety) and remain applicable and valid. Procedures for safety planning related to underwater detonations include

- ensuring impact areas and targets are clear;
- coordinating with submarine operational authorities on the use of underwater ordnance;
- receiving permission from range safety officers or test safety officers before commencing firing;

- ensuring units and targets remain in their assigned areas and units fire in accordance with current safety instructions; and
- conducting detonation activities only during daylight hours.

As discussed in the 2015 NWTT Final EIS/OEIS, some training and testing activities use ordnance as shown in Table 2.4-1 and Table 2.4-2. The type of ordnance that would be used for the Proposed Action would be the same as identified in the 2015 NWTT Final EIS/OEIS. As such, the procedures for handling and storing of ordnance remain applicable and valid.

3.13.1.8 Weapons Firing and Ordnance Expenditure Safety

Safety procedures that are described in the 2015 NWTT Final EIS/OEIS (Section 3.13.2.8, Weapons Firing and Ordnance Expenditure Safety) are still applicable and valid. Safety continues to be a primary consideration for all training and testing activities. Before commencing any firing, the Navy uses standard procedures and best practices to ensure that hazard areas and buffer zones are clear of all nonparticipants.

3.13.1.9 Laser Safety

High-energy lasers were not analyzed in the 2015 NWTT Final EIS/OEIS; however, the Proposed Action in this Supplemental adds new testing activities for the development of high-energy laser weapon systems, identified in Table 2.3-2 and Section A.2.6.7 (Radar and Other System Testing) of Appendix A (Navy Activities Descriptions), and described in Section 3.0.3.3.2.2 (High-Energy Laser Weapons). High-energy lasers would be used during testing activities that involve system and component tests. Low-energy lasers, analyzed in the 2015 NWTT Final EIS/OEIS, are used for precision range finding, as target designation/illumination devices for engagement with laser-guided weapons, and for mine detection and mine countermeasures, as well as for non-lethal deterrent. The Office of the Chief of Naval Operations Instruction 5100.27B/Marine Corps Order 5104.1C, *Navy Laser Hazards Control Program*, prescribes Navy and Marine Corps policy and guidance in the identification and control of laser hazards to prevent damaging a person's eyes with low-energy lasers or physically harming a person with high-energy lasers. The Navy observes strict precautions and has written instructions in place for laser users to ensure that non-participants are not exposed to intense light energy. Laser safety procedures for aircraft require an initial pass over the target before laser activation to ensure that target areas are clear. During actual laser use, aircraft run-in headings are also restricted to avoid unintentional contact with personnel or non-participants. Personnel participating in laser training activities are required to complete appropriate laser safety courses that are approved by the Navy's Administrative Lead Agent and the Lead Navy Technical Laboratory (U.S. Department of the Navy, 2008).

3.13.2 Environmental Consequences

The 2015 NWTT Final EIS/OEIS analyzed training and testing activities currently occurring in the Study Area and considered all potential stressors related to public health and safety. Stressors applicable to public health and safety in the Study Area are the same stressors analyzed in the 2015 NWTT Final EIS/OEIS with the exception of explosive stressors (see Table 3.0-1). In the 2015 NWTT Final EIS/OEIS, explosives were addressed under acoustic stressors; however, for purposes of this analysis, explosives will be analyzed as a separate stressor. The following are stressors analyzed for public health and safety and include stressor description updates from the 2015 NWTT Final EIS/OEIS:

- **Underwater Energy** (sonar and underwater explosives)

- **In-Air Energy** (radar and lasers)
- **Physical Interactions** (aircraft, vessels, in-water devices/targets, munitions, seafloor devices)
- **Secondary** (impacts on water quality from explosives and explosives byproducts, metals, chemicals other than explosives, and other materials)

This section evaluates how and to what degree potential impacts on public health and safety from stressors described in Section 3.0 (Introduction) may have changed since the analysis presented in the 2015 NWTT Final EIS/OEIS was completed. Table 2.5-1, Table 2.5-2, and Table 2.5-3 in Chapter 2 (Description of Proposed Action and Alternatives) list the proposed training and testing activities and includes the number of times each activity would be conducted annually and the locations within the Study Area where the activity would typically occur under each alternative. In addition to the tables in Chapter 2, Table 3.0-2 through Table 3.0-22 show the amounts and locations that specific activities, such as lasers or sonar, would be utilized during training and testing activities. The tables also present the same information for activities proposed in the 2015 NWTT Final EIS/OEIS so that the proposed levels of training and testing can be easily compared. The Navy conducted a review of federal and state regulations and standards relevant to public health and safety and reviewed literature published since 2015 for new information that could inform the analysis presented in the 2015 NWTT Final EIS/OEIS. The review concluded that there are no new regulations or standards regarding public health and safety and no new information that would alter the impact conclusions for the 2015 NWTT Final EIS/OEIS.

The analysis presented in this section also considers standard operating procedures, which can be found in Chapter 5 (Mitigation) of the 2015 NWTT Final EIS/OEIS with updated and additional standard operating procedures being presented in Section 2.3.3 (Standard Operating Procedures) of this Supplemental, and mitigation measures that are presented in Chapter 5 (Mitigation). The Navy would implement these measures to avoid potential impacts on public health and safety from stressors associated with the proposed training and testing activities.

3.13.2.1 Underwater Energy

Sources of underwater energy can be found in training and testing activity descriptions in Appendix A (Navy Activities Descriptions), and are generally the same as those discussed in the 2015 NWTT Final EIS/OEIS (Section 3.13.3.1, Underwater Energy). In-water electromagnetic devices, active sonar, underwater explosions, vessel movements, aircraft overflights, mine warfare training devices, and unmanned underwater vehicles encompass the various sources of underwater energy that would be used. Only recreational swimmers and self-contained underwater breathing apparatus (SCUBA) divers who are underwater and within an unsafe distance (600–3,000 yards) of training and testing activities, as prescribed in the *U.S. Dive Manual* (U.S. Department of the Navy, 2011), would potentially be exposed to the underwater energy produced by these stressors.

The effect of active sonar on humans varies with the sonar frequency. Generally, mid- to low-frequencies have the greatest effect since they fall within the range of human hearing (20 hertz to 20 kilohertz). In addition to acoustic stressors, underwater explosions produce pressure waves that can cause physical injury depending on the size, type, and depth of the explosive charge and the distance between the person and the explosive. Electromagnetic energy sources and their potential impacts on public health and safety are discussed in the 2015 NWTT Final EIS/OEIS (Section 3.13.3.1, Underwater Safety) and remain applicable in this discussion. In addition, standard safety buffers that are specified in Department of Defense Instruction 6055.11, *Protecting Personnel from Electromagnetic Fields* (U.S. Department of Defense, 2009b), and Military Standard 464A, *Electromagnetic Environmental Effects:*

Requirements for Systems (U.S. Department of Defense, 2002), would continue to be implemented to ensure public safety.

3.13.2.1.1 Impacts from Underwater Energy Under Alternative 1

Impacts from Underwater Energy Under Alternative 1 for Training Activities

Under Alternative 1, the number of proposed training activities that would generate underwater energy would generally increase from the 2015 NWTT Final EIS/OEIS (see Chapter 2, Description of Proposed Action and Alternatives, Table 2.5-1). Standard operating procedures, which are described in Section 2.3.3 (Standard Operating Procedures) and include clearing ranges prior to training activities, are in place to ensure that military activities do not overlap with non-military activities (e.g., boating, swimming, scuba diving, and fishing). Since the only potential receptors of underwater energy stressors are recreational swimmers and divers, training activities that could affect public health and safety are often held far from popular swimming and dive areas, reducing the potential for exposure. In addition, the NTMs posted by the U.S. Coast Guard alert the public of scheduled events so that they can avoid being in the same areas. The military's safety procedures would ensure that the potential for training activities to impact public health and safety under Alternative 1 would be unlikely. Therefore, increases shown in Tables 2.5-1, 2.5-2, and 2.5-3 for training activities proposed under Alternative 1 do not change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed training activities under Alternative 1 would remain negligible.

Impacts from Underwater Energy Under Alternative 1 for Testing Activities

Under Alternative 1, the number of proposed testing activities that would generate underwater energy would generally increase from the 2015 NWTT Final EIS/OEIS (see Chapter 2, Description of Proposed Action and Alternatives, Tables 2.5-2, and 2.5-3). Standard operating procedures, which are described in Section 2.3.3 (Standard Operating Procedures) and include clearing ranges prior to testing activities, are in place to ensure that military activities do not overlap with non-military activities (e.g., boating, swimming, and fishing). Since the only potential receptors of underwater energy stressors are recreational swimmers and divers, testing activities that could affect public health and safety are often held far from popular swimming and dive areas, reducing the potential for exposure. In addition, the NTMs posted by the U.S. Coast Guard alert the public of scheduled events so that they can avoid being in the same areas. The military's safety procedures would ensure that the potential for testing activities to impact public health and safety under Alternative 1 would be unlikely. Therefore, increases shown in Tables 2.5-2 and 2.5-3 for testing activities proposed under Alternative 1 do not change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed testing activities under Alternative 1 would remain negligible.

3.13.2.1.2 Impacts from Underwater Energy Under Alternative 2

Impacts from Underwater Energy Under Alternative 2 for Training Activities

Under Alternative 2, the number of some proposed training activities that would produce underwater energy would increase as compared to Alternative 1. Increases shown in Tables 2.5-1 for training activities proposed under Alternative 2 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. In general, sources of underwater energy stressors would become more frequent with the implementation of Alternative 2; however, standard operating procedures, which are described in Section 2.3.3 (Standard Operating Procedures), are in place to ensure that military activities

do not overlap with recreational or commercial activities. Since the only potential receptors of underwater energy stressors are recreational swimmers and divers, training activities that could affect public health and safety are often held far from popular swim and dive areas, reducing the potential for exposure. The military's safety procedures would ensure that the potential for training activities to impact public health and safety under Alternative 2 would be unlikely. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed training activities under Alternative 2 would remain negligible.

Impacts from Underwater Energy Under Alternative 2 for Testing Activities

Under Alternative 2, the number of some proposed testing activities that would produce underwater energy would increase as compared to Alternative 1. Increases shown in Tables 2.5-2 and 2.5-3 for testing activities proposed under Alternative 2 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. In general, sources of underwater energy stressors would become more frequent with the implementation of Alternative 2; however, standard operating procedures, which are described in Section 2.3.3 (Standard Operating Procedures), are in place to ensure that military activities do not overlap with recreational or commercial activities. Since the only potential receptors of underwater energy stressors are recreational swimmers and divers, testing activities that could affect public health and safety are often held far from popular swim and dive areas, reducing the potential for exposure. The military's safety procedures would ensure that the potential for testing activities to impact public health and safety under Alternative 2 would be unlikely. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed testing activities under Alternative 2 would remain negligible.

3.13.2.1.3 Impacts from Underwater Energy Under the No Action Alternative

Under the No Action Alternative, the proposed training and testing activities would not occur. Underwater energy stressors as described above would not be introduced into the marine environment. Therefore, existing environmental conditions would either remain unchanged or would improve slightly after cessation of ongoing training and testing activities.

Discontinuing the training and testing activities would result in less underwater energy within the marine environment where training and testing activities have historically been conducted. Therefore, discontinuing at-sea training activities under the No Action Alternative would lessen the potential for impacts on public health and safety from underwater energy stressors, but would not measurably improve the condition of public health and safety throughout the Study Area.

3.13.2.2 In-Air Energy

In-air energy stressors include sources of electromagnetic energy, such as radar, navigational aids, high-energy lasers, and electronic warfare systems, aircraft noise, surface explosions, and lasers. Current practices for protecting military personnel and the public are described in the 2015 NWTT Final EIS/OEIS (Section 3.13.3.2, Affected Environment) and remain applicable to this analysis. Important practices include abiding by minimum flight elevations, communicating to the public through notification channels when training and testing activities are scheduled, enforcing restriction areas and danger zones, and ensuring non-participants are clear of an area before using hazardous equipment. In addition, procedures for laser safety are described above in Section 3.13.1.9 (Laser Safety), as well as in Section 2.3.3.1 (High-Energy Laser Safety). Training and testing activities that involve electromagnetic energy and lasers are described in Appendix A (Navy Activities Descriptions). While there would be slight changes in the number of activities from what was described in the 2015 NWTT Final EIS/OEIS and

high-energy lasers would be added to the action, the activities associated with the Proposed Action would generally be the same was what was analyzed in the 2015 NWTT Final EIS/OEIS.

High-energy lasers are used as weapons to disable surface targets; however, high-energy lasers would only be used during testing activities to test auxiliary systems. The Navy would operate high-energy laser equipment in accordance with procedures defined in the Office of the Chief of Naval Operations Instruction 5100.23H, Navy Safety and Occupational Health Program Manual (U.S. Department of the Navy, 2020). The Occupational Safety and Health Administration (OSHA) has detailed the biological effects that laser beams may have on humans (Occupational Safety and Health Administration, 2018). Risks include damage to the eyes or skin after immediate exposure. The level of damage is dependent on the strength of the beam. A comprehensive safety program exists for the use of lasers. Current Navy safety procedures protect individuals from the hazard of injuries caused by laser energy. Laser safety requirements for aircraft and vessels mandate verification that target areas are clear before commencing training. In the case of aircraft, during actual laser use, the aircraft run-in headings are restricted to preclude inadvertent lasing of areas where the public may be present.

As a stressor, loud noises and vibrations generated from Navy training and testing activities such as aircraft overflights and vessel activities have the potential to disrupt or potentially injure (i.e., hearing loss, even ruptured ear drums, etc.) people in the Study Area. The training and testing activities that introduce the most noise into the environment are those that involve aircraft flights. A detailed description of current noise conditions and noise levels that would result from the Proposed Action is available in Appendix J (Airspace Noise Analysis for the Olympic Military Operations Area). Long, repeated exposure to noises exceeding 85 dB has been found to result in noise-induced hearing loss (National Institute on Deafness and Other Communication Disorders, 2017). The louder the noise, the shorter the time necessary for the noise to result in noise-induced hearing loss. OSHA has established duration thresholds for various noise levels to protect people in the workplace from experiencing noise-induced hearing loss. According to OSHA, people can be exposed to 90 dB for eight hours a day without experiencing noise-induced hearing loss (Occupational Safety and Health Administration, 2008). OSHA has also determined that noises above 140 dB are not safe for any duration of time (Occupational Safety and Health Administration, 2008). Although OSHA standards are technically applicable to the workplace environment, they are useful as a measure of comparison to determine if noise will result in health impacts in other settings. Loud noise below the OSHA standards does not directly impact human health, but a possible secondary impact from loud noises and vibrations is elevated levels of stress, which can occasionally impact a person's health by causing annoyance, impairing sleep, and impacting cognitive performance (Schomer, 2005; Stansfeld & Matheson, 2003; U.S. Department of Defense, 2009a). Regarding these non-auditory health effects, studies have been conducted to examine the nonauditory health effects of aircraft noise exposure, focusing primarily on stress response, blood pressure, birth weight, mortality rates, cardiovascular health, and impairment of cognitive performance in children. Exposure to noise levels higher than those normally produced by aircraft operating in the Olympic MOA can elevate blood pressure and also stress hormone levels. However, the response to such loud noise is typically short in duration: after the noise goes away, the physiological effects reverse, and levels return to normal. In the case of repeated exposure to aircraft noise, the connection is not as clear. The common factor in most studies is the chronic nature of noise that is required to result in any of the effects except for annoyance. Also, the chronic noise levels required for these effects are well in excess of the levels expected over the Olympic Peninsula as a result of Navy flight activities (Basner et al., 2014; Correia et al., 2013; Evans et al., 1998; Haralabidis et al., 2008; Schomer, 2005; Stansfeld & Matheson, 2003).

3.13.2.2.1 Impacts from In-Air Energy Under Alternative 1

Impacts from In-Air Energy Under Alternative 1 for Training Activities

Under Alternative 1, the number of proposed training activities that would produce in-air energy would generally increase as compared to the number of activities proposed in the 2015 NWTT Final EIS/OEIS (see Table 2.5-1). There are multiple ways to quantify noise. This analysis looks at the Day Night Average Sound Level (DNL) (an average noise level over a 24-hour period) and the instantaneous noise level (the noise level at a given instant in time). According to the noise analysis performed in Appendix J (Airspace Noise Analysis for the Olympic Military Operations Area), the maximum DNL that would occur underneath the Olympic Military Operations Area (MOA) under Alternative 1 is 36.7 decibels (dB). This is only a minor increase from the baseline DNL of 36.1 dB. DNLs of less than 65 dB are considered to be compatible with most land uses because although training would be audible at times, and consistent with OSHA standards, it would not cause noise-induced hearing loss.

Another noise metric that can provide additional supplemental information about the noise environment is the maximum noise level (L_{max}). For Special Use Airspace (SUA) noise analysis, the L_{max} metric provides the maximum noise level from the single loudest event potentially occurring somewhere within the SUA. However, an observer might not necessarily experience that event depending on where the observer was located in relation to the aircraft overflight. Because the flight activities within SUA are dispersed throughout the airspace, this means an observer would need to be directly below an aircraft as it flew at the lowest possible altitude at its highest power setting to experience the maximum level of noise. Alternative 1 would generate noises that are above the 90 dB level established by OSHA. This analysis looks at the duration and volume of those noises to determine if they would result in noise-induced hearing loss. The maximum instantaneous noise level (L_{max}) of 100.6 dB would not increase between the baseline and Alternative 1. Instead, there would only be an increase in the frequency of the maximum instantaneous noise level. In baseline conditions, the maximum instantaneous noise level would occur approximately four minutes over the course of a year, while the maximum instantaneous noise level would occur for approximately five minutes in Alternative 1. This means that all occasions of this 100.6 dB L_{max}, over a year and throughout the entire Olympic MOA would sum up to five minutes. This 100.6 dB level could only be experienced at the highest elevations where the aircraft would be closest to any observers. The five minutes a year is also not from a single event that would last five minutes, but rather numerous events, which are spread throughout the year. While this is a 25 percent increase from baseline conditions, the OSHA standard for exposure durations to noise levels of 102 dB is 1.5 hours per day before permanently affecting one's hearing, which is significantly longer than would be experienced. In addition, the areas that these volumes would occur at are some of the most remote areas with the least human presence within the Olympic Mountains. It would be unlikely for anybody to be in the area at the time of these maximum levels.

The maximum instantaneous noise level that would be experienced in the majority of the area (more than 77 percent) underneath the MOA is 84.4 dB. Figure 3.13-1 indicates that 84.4 dB is similar to hearing a garbage disposal or a large truck driving 50 feet away. In general, the noise analysis presented in Appendix J (Airspace Noise Analysis for the Olympic Military Operations Area) indicates that instantaneous noise levels would exceed 89.7 dB for 198 minutes out of the year. However, OSHA has determined that noise levels of 90 dB would have to be experienced for approximately eight hours a day before resulting in noise-induced hearing loss. These noise levels are also only experienced in the higher elevation areas of the Olympic Mountains, which make up approximately 4.25 percent of the region.

Exposure to these volumes would never be long enough to result in noise-induced hearing loss according to OSHA standards (Occupational Safety and Health Administration, 2008).

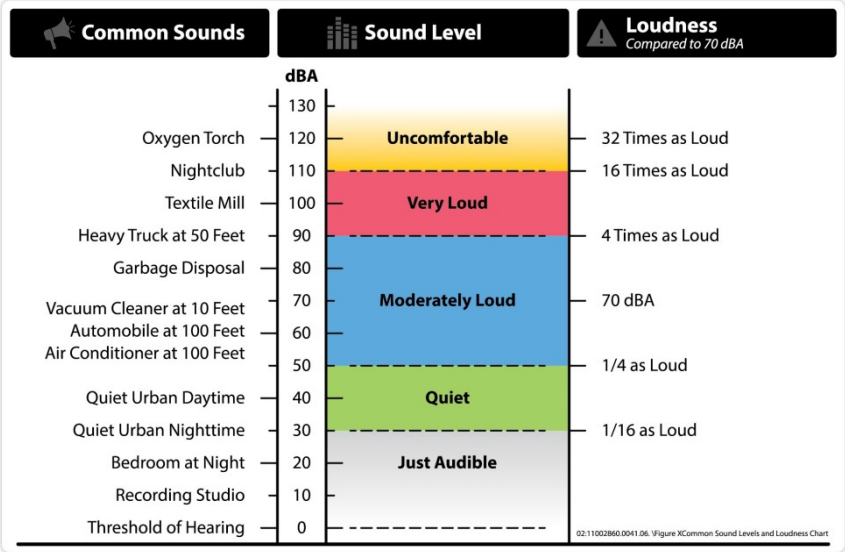

Figure 3.13-1: A-Weighted Sound Levels from Typical Sources

Although numerous studies examine the contribution of aircraft noise to health effects, there are no studies that definitively show a causal and significant relationship between aircraft noise and health. Such studies are difficult to conduct and interpret because of the large number of confounding factors that one should consider for their effects to be excluded from the analysis. The World Health Organization notes that there is still considerable variation among studies (World Health Organization, 2011). And, almost without exception, research studies conclude the need for additional research to determine if such a causal relationship exists. The European Network on Noise and Health (European Network on Noise and Health, 2013) in its summary report of 2013 concludes that "…while the literature on non-auditory health effects of environmental noise is extensive, the scientific evidence of the relationship between noise and non-auditory effects is still contradictory." In addition, no reports show a causal relationship between health effects and noise levels below 40 dB DNL, the level predicted beneath the Olympic MOA. As a result, it is not possible to state that there is sound scientific evidence that aircraft noise is a significant contributor to health disorders.

Increases in noise levels from the baseline would therefore not have a noticeable impact on public health and safety. In addition, standard operating procedures are in place to ensure that in-air energy stressors from training activities would not impact public health and safety. Therefore, the increases shown in Table 2.5-1 for training activities proposed under Alternative 1 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed training activities under Alternative 1 would remain negligible.

Impacts from In-Air Energy Under Alternative 1 for Testing Activities

Under Alternative 1, the number of proposed testing activities that would produce in-air energy would generally increase as compared to the number of activities proposed in the 2015 NWTT Final EIS/OEIS (see Tables 2.5-2 and 2.5-3). In addition, high-energy lasers, which were not previously analyzed, would be used during testing activities. It is unlikely that the public would be exposed to high-energy lasers

from testing activities because high-energy laser tests would occur either at sea, far from potential receptors, or in docked testing facilities that have restricted access and standard operating procedures for laser use that would further prevent participants and non-participants from coming into contact with a laser. Standard operating procedures described above would also prevent other in-air energy stressors from affecting public health and safety. Therefore, the general increase in the frequency of in-air energy stressors under Alternative 1 would not significantly change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS (Section 3.13.3.2, In-Air Energy) and would not increase potential for testing activities to impact public health and safety. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed testing activities under Alternative 1 would remain negligible.

3.13.2.2.2 Impacts from In-Air Energy Under Alternative 2

Impacts from In-Air Energy Under Alternative 2 for Training Activities

Under Alternative 2, the number of proposed training activities that would produce in-air energy would increase as compared to Alternative 1 (see Table 2.5-1). Although there would be a minor increase in aircraft training activities within the MOA, the noise levels generated under Alternative 1 and Alternative 2 are roughly equivalent. Therefore, the impacts that noise would have on public health and safety would be similar to the impacts of Alternative 1. In addition, standard operating procedures are in place to ensure that in-air energy stressors from training activities would not impact public health and safety. Therefore, the increases shown in Table 2.5-1 for training activities proposed under Alternative 2 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed training activities under Alternative 2 would remain negligible.

Impacts from In-Air Energy Under Alternative 2 for Testing Activities

Under Alternative 2, the number of proposed testing activities that would produce in-air energy would increase as compared to the number of activities proposed in the 2015 NWTT Final EIS/OEIS (see Tables 2.5-2 and 2.5-3). In addition, high-energy lasers, which is new in this Supplemental, would be used during testing activities. It is unlikely that the public would be exposed to high-energy lasers from testing activities because high-energy laser tests would occur either at sea, far from potential receptors, or in docked testing facilities that have restricted access and standard operating procedures for laser use that would further prevent participants and non-participants from coming into contact with a laser. Standard operating procedures described above would also prevent other in-air energy stressors from affecting public health and safety. Therefore, the general increase in the frequency of in-air energy stressors, standard operating procedures for electromagnetic energy and lasers would prevent personnel and non-participants from being exposed to these stressors. The military's safety procedures would ensure that the potential for training and testing activities to impact public health and safety under Alternative 2 would be unlikely. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed testing activities under Alternative 2 would remain negligible.

3.13.2.2.3 Impacts from In-Air Energy Under the No Action Alternative

Under the No Action Alternative, the proposed training and testing activities would not occur. In-air energy stressors as listed above would not be introduced into the environment. Therefore, existing environmental conditions would either remain unchanged or would improve slightly after cessation of ongoing training and testing activities.

Discontinuing the training and testing activities would result in less in-air energy within the Study Area where training and testing activities have historically been conducted. Therefore, discontinuing at-sea training activities under the No Action Alternative would lessen the potential for impacts on public health and safety from in-air energy stressors, but would not measurably improve the condition of public health and safety throughout the Study Area.

3.13.2.3 Physical Interactions

As discussed in the 2015 NWTT Final EIS/OEIS (Section 3.13.3.3, Physical Interactions), military aircraft, vessels, targets, munitions, towed devices, seafloor devices, and other training and testing expended materials have the potential to directly encounter recreational, commercial, institutional, and governmental aircraft, vessels, and users such as swimmers, divers, and anglers. Instances of physical interactions that could pose the most risk to the safety of both civilians and Navy personnel include vessel collisions, aircraft collisions, munition discharge, and encountering unexploded ordnance. Methods for providing notice to non-participants of Navy training and testing activities, procedures for minimizing encounters with military expended materials, and a discussion of unexploded ordnance are all outlined in the 2015 NWTT Final EIS/OEIS (Section 3.13.3.3, Physical Interactions) as well as in Sections 3.13.1.1.1 (Sea Space), 3.13.1.1.2 (Airspace), and 3.13.1.2 (Safety and Inspection Procedures) of this Supplemental.

3.13.2.3.1 Impacts from Physical Interactions Under Alternative 1

Impacts from Physical Interactions Under Alternative 1 for Training Activities

Under Alternative 1, the number of proposed training activities that could lead to physical interactions between the Navy and non-participants would generally decrease as compared to the number of activities proposed in the 2015 NWTT Final EIS/OEIS (see Table 2.5-1). In addition, the standard operating procedures that are in place ensure that training activities would not lead to interactions between Navy vessels, aircraft, munitions, or other objects and non-participants. In addition, the communication channels that the Navy uses to inform the public of upcoming training events would alert non-participants of where and when training events would occur so that they may avoid these areas. While there is potential for unexploded ordnance, ordnance would end up on the ocean bottom, and would therefore be highly unlikely to be stumbled upon by anybody. Therefore, the increases shown in Table 2.5-1 for training activities proposed under Alternative 1 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed training activities under Alternative 1 would remain negligible.

Impacts from Physical Interactions Under Alternative 1 for Testing Activities

Under Alternative 1, the number of proposed testing activities that could lead to physical interactions between the Navy and non-participants would generally increase as compared to the number of activities proposed in the 2015 NWTT Final EIS/OEIS (see Tables 2.5-2 and 2.5-3). However, the standard operating procedures that are in place ensure that testing activities would not lead to interactions between Navy vessels, aircraft, munitions, or other objects and non-participants. In addition, the communication channels that the Navy uses to inform the public of upcoming testing events would alert non-participants of where and when testing events would occur so that they may avoid these areas. While there is potential for unexploded ordnance, ordnance would either end up on closed off ranges or on the ocean bottom, and would therefore be highly unlikely to be stumbled upon by anybody. Therefore, the increases shown in Tables 2.5-2 and 2.5-3 for testing activities proposed under

Alternative 1 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed testing activities under Alternative 1 would remain negligible.

3.13.2.3.2 Impacts from Physical Interactions Under Alternative 2

Impacts from Physical Interactions Under Alternative 2 for Training Activities

Under Alternative 2, the number of proposed training activities that could lead to physical interactions between the Navy and non-participants would generally increase as compared to Alternative 1 (see Table 2.5-1). However, the standard operating procedures that are in place ensure that training activities would not lead to interactions between Navy vessels, aircraft, munitions, or other objects and non-participants. In addition, the communication channels that the Navy uses to inform the public of upcoming training events would alert non-participants of where and when training events would occur so that they may avoid these areas. While there is potential for unexploded ordnance, ordnance would end up on the ocean bottom, and would therefore be highly unlikely to be stumbled upon by anybody. Therefore, the increases shown in Table 2.5-1 for training activities proposed under Alternative 2 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed training activities under Alternative 2 would remain negligible.

Impacts from Physical Interactions Under Alternative 2 for Testing Activities

Under Alternative 2, the number of proposed testing activities that could lead to physical interactions between the Navy and non-participants would generally increase as compared to Alternative 1 (see Tables 2.5-2 and 2.5-3). However, the standard operating procedures that are in place ensure that testing activities would not lead to interactions between Navy vessels, aircraft, munitions, or other objects and non-participants. In addition, the communication channels that the Navy uses to inform the public of upcoming testing events would alert non-participants of where and when testing events would occur so that they may avoid these areas. While there is potential for unexploded ordnance, ordnance would either end up on closed off ranges or on the ocean bottom, and would therefore be highly unlikely to be stumbled upon by anybody. Therefore, the increases shown in Tables 2.5-2 and 2.5-3 for testing activities proposed under Alternative 2 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed testing activities under Alternative 2 would remain negligible.

3.13.2.3.3 Impacts from Physical Interactions Under the No Action Alternative

Under the No Action Alternative, the proposed training and testing activities would not occur. Physical interaction stressors as listed above would not be introduced into the marine environment. Therefore, existing environmental conditions would either remain unchanged or would improve slightly after cessation of ongoing training and testing activities.

Discontinuing the training and testing activities would result in fewer physical interaction stressors within the marine environment where training and testing activities have historically been conducted. Therefore, discontinuing at-sea training activities under the No Action Alternative would lessen the potential for impacts on public health and safety from physical interaction stressors, but would not measurably improve the condition of public health and safety throughout the Study Area.

3.13.2.4 Secondary Stressors

As discussed in the 2015 NWTT Final EIS/OEIS (Section 3.13.3.4, Secondary Impacts), public health and safety has the potential to be impacted if sediment or water quality were degraded. Section 3.1 (Sediments and Water Quality) considered the impacts on marine sediments and water quality of explosives and explosives byproducts, metals, chemicals other than explosives, and other materials (marine markers, flares, chaff, targets, and miscellaneous components of other materials). In addition, public health and safety could be impacted by a contaminated food supply, which can include fish located within the Study Area. Sections 3.9 (Fishes) and 3.12 (Socioeconomic Resources and Environmental Justice) discuss the impacts that the Proposed Action would have on fish and fisheries in the Study Area.

3.13.2.4.1 Impacts from Secondary Stressors Under Alternative 1

Impacts from Secondary Stressors Under Alternative 1 for Training Activities

Under Alternative 1, there would be a general increase in the number of proposed training activities that could release secondary stressors into the environment as compared to the number of activities proposed in the 2015 NWTT Final EIS/OEIS (see Table 2.5-1). According to the discussions presented in Sections 3.1 (Sediments and Water Quality), 3.9 (Fishes), and 3.12 (Socioeconomic Resources and Environmental Justice) increases shown in Table 2.5-1 for training activities proposed under Alternative 1 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. Although a general increase in some activities and military expended materials would occur, the implementation of Alternative 1 would not significantly degrade sediment or water quality or contaminate the food supply. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed training activities under Alternative 1 would remain negligible.

Impacts from Secondary Stressors Under Alternative 1 for Testing Activities

Under Alternative 1, there would be a general increase in the number of proposed testing activities that could release secondary stressors into the environment as compared to the number of activities proposed in the 2015 NWTT Final EIS/OEIS (see Tables 2.5-2 and 2.5-3). According to the discussions presented in Sections 3.1 (Sediments and Water Quality), 3.9 (Fishes), and 3.12 (Socioeconomic Resources and Environmental Justice) increases shown in Table 2.5-1 for testing activities proposed under Alternative 1 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. Although a general increase in some activities and military expended materials would occur, the implementation of Alternative 1 would not significantly degrade sediment or water quality or contaminate the food supply. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed testing activities under Alternative 1 would remain negligible.

3.13.2.4.2 Impacts from Secondary Stressors Under Alternative 2

Impacts from Secondary Stressors Under Alternative 2 for Training Activities

Under Alternative 2, there would be a general increase in the number of proposed training activities that could release secondary stressors into the environment as compared Alternative 1 (see Table 2.5-1). According to the discussions presented in Sections 3.1 (Sediments and Water Quality), 3.9 (Fishes), and 3.12 (Socioeconomic Resources and Environmental Justice) increases shown in Table 2.5-1 for training activities proposed under Alternative 2 do not appreciably change the impact conclusions presented in

the 2015 NWTT Final EIS/OEIS. Although a general increase in some activities and military expended materials would occur, the implementation of Alternative 1 would not significantly degrade sediment or water quality or contaminate the food supply. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed training activities under Alternative 2 would remain negligible.

Impacts from Secondary Stressors Under Alternative 2 for Testing Activities

Under Alternative 2, there would be a general increase in the number of proposed testing activities that could release secondary stressors into the environment as compared to Alternative 1 (see Tables 2.5-2 and 2.5-3). According to the discussions presented in Sections 3.1 (Sediments and Water Quality), 3.9 (Fishes), and 3.12 (Socioeconomic Resources and Environmental Justice) increases shown in Tables 2.5-2 and 2.5-3 for testing activities proposed under Alternative 1 do not appreciably change the impact conclusions presented in the 2015 NWTT Final EIS/OEIS. Although a general increase in some activities and military expended materials would occur, the implementation of Alternative 1 would not significantly degrade sediment or water quality or contaminate the food supply. As stated in the 2015 NWTT Final EIS/OEIS and summarized in this section, the potential impacts on public health and safety from the proposed testing activities under Alternative 2 would remain negligible.

3.13.2.4.3 Impacts from Secondary Stressors Under the No Action Alternative

Under the No Action Alternative, the proposed training and testing activities would not occur. Secondary stressors as listed above would not be introduced into the marine environment. Therefore, existing environmental conditions would either remain unchanged or would improve slightly after cessation of ongoing training and testing activities.

Discontinuing the training and testing activities would result in less secondary stressors within the Study Area where training and testing activities have historically been conducted. Therefore, discontinuing at-sea training activities under the No Action Alternative would lessen the potential for impacts on public health and safety from secondary stressors, but would not measurably improve the condition of public health and safety throughout the Study Area.

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